

Integracja treści przedmiotowo-językowych  
w szkole podstawowej w teorii i praktyce.  
Biologia w klasach dwujęzycznych



Ewa Kusz, Judyta Pawliszko

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## PRZEDMOWA

Głównym założeniem zintegrowanego kształcenia przedmiotowo-językowego (CLIL – Content and Language Integrated Learning) jest połączenie treści przedmiotowych z językiem obcym przy wykorzystaniu odpowiednich metod nauczania oraz uczenia się. Samo pojęcie zintegrowanego kształcenia przedmiotowo-językowego jest również definiowane jako *edukacja dwujęzyczna, dwujęzyczne nauczanie treści czy przedmiotowe nauczanie języka* (Wolff 2003: 211; Muszyńska, Papaja 2019: 13).

Aby metoda CLIL miała swoje zastosowanie w polskim systemie edukacji i mogła być wykorzystywana przez nauczycieli różnych przedmiotów, konieczne jest stworzenie treści, które pomogłyby dydaktykom w całej Polsce realizować jej główne cele. Jak podkreślają w swojej pracy Muszyńska i Papaja (2019: 11–13), to właśnie nauczyciele zaangażowani w tę metodę muszą zacząć od znalezienia odpowiedzi na pytania, czego uczą oraz jak to robią. Bez odpowiednich pomocy dydaktycznych i materiałów dostępnych na rynku jest to zadanie nadzwyczaj trudne, wymagające wielu godzin intensywnej pracy, znajomości języka obcego na zaawansowanym poziomie, korelacji z wiedzą i doświadczeniem nauczanych treści przedmiotowych z innych dziedzin niż językoznawstwo i literaturoznawstwo.

Niniejsza publikacja odnosi się przede wszystkim do kontekstu edukacyjnego w Polsce. Pierwszy rozdział prezentuje podstawy podejścia holistycznego i jego zastosowanie w procesie integracji wiedzy. Omówione tu zostały najczęściej pojawiające się definicje CLIL, a także główne założenie, jakim jest wykorzystanie języka obcego do nauczania treści niejęzykowych, a co za tym idzie, możliwość poszerzania wiedzy z danego przedmiotu (lub przedmiotów), jak i podnoszenie poziomu języka obcego, w którym przekazywane są treści.

Rozdział drugi w sposób szczegółowy prezentuje metodę CLIL w przeprowadzonych do tej pory badaniach naukowych. W ciągu ostatnich 20 lat ich wysoka liczba potwierdziła dużą wartość zintegrowanego nauczania przedmiotowo-językowego (CLIL) dla współczesnej edukacji języków obcych. Taki stan rzeczy wywołał również debatę na temat związku CLIL

z poprzednią metodą nauki języków obcych polegającą na posługiwaniu się językiem obcym w trybie ciągłym i we wszystkich sytuacjach życiowych, a więc tak zwanej immersji językowej, czyli całkowitym zanurzeniu w języku, czy też submersji oznaczającej częściowe zanurzenie.

Rozdział trzeci zawiera praktyczną realizację omawianej metody w postaci scenariuszy z biologii dla dwujęzycznych klas VII. Przykłady realizacji zajęć zaprezentowane w tej części pracy obejmują zakres tematyczny zgodny z realizowanym w klasie VII programem nauczania oraz zgodnie z rozporządzeniem Ministerstwa Edukacji do klasy VII szkoły podstawowej. Zdecydowanie można uznać tę część książki za nowość na polskim rynku wydawniczym. Do tej pory nie pojawiły się publikacje tak szczegółowo wyjaśniające cały zakres materiału zrealizowanego w duchu metody CLIL. Dodatkowo, rozdział trzeci obfituje w grafiki stworzone przez studentów lingwistyki stosowanej, członków Koła Naukowego Lingwistów „Poligloci”, którzy w ramach projektu o nazwie IMAG(in)E BIOLOGY podjęli się wykonania większości prezentowanych w książce ilustracji. Pomysłodawcami projektu są autorki niniejszego manuskryptu. Do scenariuszy dołączono nagrania ułatwiające prowadzenie zajęć, glosariusz, w którym zostały wyjaśnione najważniejsze i najtrudniejsze pojęcia, a także nagrania słów, które pojawiły się w glosariuszu, by ułatwić nauczycielom (oraz uczniom) przyswojenie wymowy tych jakże czasem wymagających pod względem fonetycznym terminów.

Mamy nadzieję, że niniejsza publikacja przyczyni się do wypełnienia luki na polskim rynku w omawianej tu dziedzinie. Nauczanie przedmiotów przyrodniczych w klasach dwujęzycznych jest praktykowane w polskiej oświacie od wielu lat, jednak wciąż nie powstało opracowanie, które, oprócz części teoretycznej wprowadzającej czytelnika w tajniki metody CLIL, oferowałoby praktyczną realizację zajęć z zakresu nauk przyrodniczych (w tym wypadku zajęć z biologii w klasie VII). Propozycja gotowych scenariuszy, nagrań, załączników oraz sporządzony do wszystkich zajęć glosariusz wyjaśniający najtrudniejsze wyrażenia/zwroty z zakresu biologii i pokrewnych nauk będą z pewnością ułatwieniem w pracy nauczycieli tego przedmiotu. Pozwoli to dydaktykom zaoszczędzić czas, który będą mogli poświęcić na podnoszenie swoich kwalifikacji (np. językowych), a także skupić się na potrzebach uczniów, dla których niniejsza książka, wedle zamysłu autorek, okaże się również źródłem wiedzy i inspiracji.

# **Podejście holistyczne i jego zastosowanie w procesie integracji wiedzy**

## **1. Podstawy podejścia holistycznego**

By dokładnie opisać podejście holistyczne i jego zastosowanie w procesie integracji wiedzy, należałoby zacząć od przedstawienia definicji edukacji, w której owe podejście może być realizowane. Już w 1958 r. John Dewey za dobrą edukację uznał proces skupiający się przede wszystkim na przyswajaniu umiejętności eksperymentowania i badania pozwalających na wykorzystanie dostępnej już wiedzy niż na jej bezużytecznym zapamiętywaniu. Idea edukacji holistycznej (z grec. *holos* oznacza całość) również opiera się na założeniu, że uczeń podczas swojej edukacji otrzymuje kompleksowy, spójny obraz świata, a wiedza zdobywana jest w sposób wielokontekstowy. Przewidywane przez ucznia treści są mu prezentowane w sposób zintegrowany z jego doświadczeniami pochodzącymi z życia codziennego. Ma to na celu pobudzić wyobraźnię, wywołać emocje, a co za tym idzie, wzbudzić refleksje i wspomóc proces poznawczy. Przekazywanie wiedzy w sposób zintegrowany, tj. łączący doświadczenia z życia codziennego z tym, co uczeń przyswaja podczas lekcji w szkole, skłania również do przemyśleń nad różnorodnością i wielokulturowością, budując tym samym u młodych osób postawę tolerancji. Podejście holistyczne zakłada, że wszelkie zjawiska i procesy poznawcze tworzą tzw. układy całościowe, których nie da się przyswoić i wywnioskować, patrząc jedynie na ich części składowe, stąd w nauczaniu holistycznym tak ważna jest integracja zdobywanej przez uczniów wiedzy. Dzięki temu wspierana jest twórcza inicjatywa ucznia, jego samodzielność, umiejętność stawiania pytań, wnioskowania i krytycznego myślenia.

Warto podkreślić, że idea CLIL łączy w sobie podejście konstruktywistyczne, poznawcze, komunikacyjne i dialogowe, co stanowi całość idei wykorzystywanej w dydaktyce. Innymi słowy, uczniowie czerpią z własnego doświadczenia, współpracy oraz interakcji. Nauczyciel wspiera proces

poznawczy ucznia, który nie jest tylko biernym uczestnikiem przyjmującym przekazywaną wiedzę a priori. Proces uczenia się jest tu ważniejszy od wyników. „Nauczyciel – pomocnik” pobudza aktywność ucznia, jego chęć zdobywania wiedzy, daje mu wybór i stwarza warunki do samodzielnej pracy. Takie podejście nawiązuje do tego, co w drugiej połowie XX w. głosił Piaget (1966), który podkreślał, iż to dziecko powinno być twórcą swego własnego rozwoju. Uczeń wykorzystuje swoje doświadczenie i wcześniej zdobytą wiedzę do przyswajania nowych treści, co powoduje zmiany w jego strukturach poznawczych. Nowo zdobyta wiedza jest nie tyle przez ucznia rejestrowana, co konstruowana. Jak podkreśla Dylak (2000), na tej podstawie uczący się tworzy i rozwija własną wiedzę.

W podejściu CLIL istotną rolę odgrywa również integracja z rówieśnikami, która pomaga kształtować i rozwijać kompetencje poznawcze uczniów. Takie podejście głosili w XX w. Bruner (1978) oraz Wygotski (1989), którzy podkreślali, iż wiedza tworzy się w warunkach interakcji nie tylko z nauczycielem, a także (a może i przede wszystkim) z kompetentnymi rówieśnikami i we wspólnym odkrywaniu istniejących prawd i zależności (zob. Muszyńska, Papaja 2019).

Jak już wspomniano wcześniej, rozwój procesów poznawczych w podejściu CLIL jest oparty na łączeniu treści przedmiotowych nauczanych w dwóch systemach językowych: ojczystym i obcym. Język jest nieodłączną, integralną częścią służącą do poznawania, rozumienia i tworzenia nowych znaczeń. Jak podkreślają Muszyńska i Papaja (2019: 21), intelektualnym wyzwaniem dla uczniów jest „transformacja informacji w celu rozwiązania jakiegoś problemu lub odkrycia znaczenia przez twórcze myślenie”. Aby to osiągnąć, uczniowie korzystają z umiejętności klasyfikowania, porównywania, dopasowywania, odgadywania. Jak podkreślają wyżej wspomniane autorki, taki sposób uczenia ma pozytywny wpływ na przyrost wiedzy zarówno przedmiotowej, jak i językowej. Stąd nauczyciele realizujący ideę CLIL często korzystają z takich technik, jak: burza mózgów, mapy myśli, metody sześciu kapeluszy De Bono, kwiatu lotosu, stosowanie pytań otwartych czy strategii wykorzystywanych w podejściu poznawczym jak powtarzanie, elaboracja czy organizacja nauki, pamiętając, że są to jedynie strategie i techniki, których wybór jest uwarunkowany konkretnymi potrzebami ucznia.

Idea CLIL wykorzystuje także model uczenia przez doświadczenie zaproponowany przez Davida Kolba (1984), amerykańskiego teoretyka metod nauczania, który podzielił proces uczenia na cztery etapy: doświadczenie/eksperymentowanie, refleksja i obserwacja, generalizacja oraz zastosowanie,

gdzie główne znaczenie przypisuje się rozwiązywaniu problemu poprzez doświadczenie. Jak podkreślają Rogers & Freiberg (1994) rezultatem uczenia się przez doświadczenie jest zauważalna pozytywna zmiana w samym uczniu (Muszyńska i Papaja, 2019: 22). Natomiast w podejściu komunikatywnym i dialogowym, które również wykorzystywane jest w założeniach CLIL, nacisk kładzie się na interakcję jako formę i cele uczenia się języka. Uczeń powinien wykorzystywać język obcy przyswajany w autentycznych kontekstach i sytuacjach, w których nie skupia się na popełnianych błędach, ale na efekcie, czyli umiejętności swobodnej komunikacji. Rolą nauczyciela jest stworzenie okazji do posługiwania się językiem obcym poprzez dialog, zadawanie pytań, interakcję z rówieśnikami, wspólne dociekanie prawdy.

### **1.1. Zintegrowane kształcenie przedmiotowo-językowe (CLIL): historia definicji**

Pierwsze próby wprowadzenia terminu CLIL pojawiły się w Europie w latach 90. XX w. Jak podkreśla Marsh (2002), pojęcie zintegrowanego kształcenia przedmiotowo-językowego powstało przy współpracy grupy ekspertów z różnych środowisk, w tym pracowników oświaty piastujących stanowiska administracyjne, dydaktyków i naukowców. Warto jednak wspomnieć, że idea, która później przerodziła się w podejście CLIL, narodziła się znacznie wcześniej i została uwarunkowana migracją ludności, trwającymi przez wieki wojnami i zmianami gospodarczo-ekonomicznymi. Na przykład, już około 5000 lat temu klęska Sumerów spowodowała, że Akadyjczycy zaczęli uczyć się lokalnego języka sumeryjskiego. W kolejnych wiekach te same terytoria były zamieszkiwane przez wielojęzyczne społeczeństwa, stąd dwu-, a nawet wielojęzyczność okazała się być nieodzowną zaletą warunkującą rozwój. Już w starożytnym Rzymie pomysł używania języka obcego do nauczania innych treści niż językowe cieszyła się dużą popularnością (dzieci przyswajały nową wiedzę w języku greckim) (Coyle, Hood, Marsh 2010). W późniejszych wiekach zwracano uwagę na nauczanie języków obcych w ich rzeczywistych kontekstach. Podkreślali to pedagodzy, m.in. J.A. Komeński (1592–1670) czy Matthias Bel (1684–1749).

W latach 60. XX w. jeszcze nienazwana wtedy idea CLIL była realizowana w Quebecu (Kanada), gdzie grupa dzieci przedszkolnych została objęta programem nauczania polegającym na przyswajaniu nowych treści w języku francuskim (nienatywnym). W kolejnych dekadach, nie tylko w Kanadzie, ale również w USA, coraz więcej szkół zaczęło wykorzystywać metodę

nauczania treści niejęzykowych w języku innym niż natywny. W opisach CLIL pojawił się termin „immersji językowej” oraz „immersyjnego nauczania”. Również w Europie nauczanie dwu- i wielojęzyczne stawało się coraz bardziej popularne. Od 1978 r. Komisja Europejska zaczęła podkreślać znaczenie nauczania w szkołach treści niejęzykowych w języku innym niż natywny (Marsh 2002: 51), natomiast w 1983 r. Parlament Europejski zobowiązał Komisję Europejską do opracowania lepszego programu nauczania języków obcych. W kolejnych latach coraz więcej szkół w państwach europejskich zaczęło wykorzystywać języki obce (nienatywne) do nauczania innych przedmiotów. Metoda CLIL wpisała się w nurt wielojęzyczności państw Unii Europejskiej i znajduje coraz szersze grono zwolenników.

Ważną datą dla historii idei CLIL był rok 2005, kiedy to Marsh i in. (2005) podjęli próbę objęcia terminem CLIL tych metod, które wykorzystywane są w kształceniu opartym zarówno na omawianym temacie, jak i języku, w którym dany temat jest realizowany. Według raportu Eurydice w 2016 r. zanotowano 38 krajów europejskich realizujących w szkołach metody CLIL.

## 1.2. Definicje i główne założenia CLIL

Idąc za nomenklaturą przedstawioną przez wspomnianego w przedmowie Wolffa (2003: 211), zintegrowane kształcenie przedmiotowo-językowe (CLIL) ma swoje inne nazwy, takie jak “edukacja dwujęzyczna”, “dwujęzyczne nauczanie treści” czy “przedmiotowe nauczanie języka”. Definiując metodę CLIL, Wolff (2003: 211) podkreśla, że jest to jednoczesne nauczanie/uczenie się języka wraz z przyswajaniem treści merytorycznych danego przedmiotu. W CLIL zarówno język, jak i treści są traktowane jako zintegrowana całość. Co więcej, język jest przede wszystkim przekąźnikiem treści przedmiotowych w procesie nauczania oraz uczenia się. Podobną definicję w swojej publikacji z 2000 r. stosują Coyle, Hood i Marsh (2010), którzy tłumaczą CLIL jako podejście do procesu edukacyjnego skupiającego się na realizacji dwóch głównych celów: poznania treści przedmiotowych oraz opanowania języka obcego, w którym odbywa się proces nauczania/uczenia się. Bardzo podobną definicję przedstawiają Marsh i in. (2005), wyjaśniając, że CLIL to „ogólne podejście edukacyjne, w którym dodatkowy (obcy) język jest używany do nauczania oraz uczenia się przedmiotów innych niż ten język” (Marsh i in. 2005, cyt. za Muszyńska, Papaja 2019: 12).

Maljers i in. (2002: 65) wyróżniają pięć najistotniejszych aspektów związanych z metodą CLIL. Widoczne są one na płaszczyźnie kultury (CULTIX),

otoczenia (ENTIX), języka (LANTIX), treści przedmiotowych (CONTIX) oraz sposobu uczenia się (LEARNTIX) (Muszyńska, Papaja 2019: 41–42). Głównym celem aspektu kulturowego jest poszerzenie wiedzy na temat innych kultur, krajów, regionów, a także zwrócenie uwagi na rozwój umiejętności komunikacji międzykulturowej. Poszerzanie horyzontów związanych z uświadamianiem istnienia różnic międzykulturowych ma również na celu budowanie tolerancji. Do tego zmierza też aspekt otoczenia, którego głównym założeniem jest przygotowanie do umiędzynarodowienia z włączeniem w to integracji europejskiej. Aspekt językowy skupia się na rozwoju kompetencji językowych, a co za tym idzie, umiejętności komunikacyjnych w języku obcym. Nieco inne cele można zauważyć w kontekście aspektu treści przedmiotowych, gdzie dokonuje się analizy tychże z różnych perspektyw, zwracając szczególną uwagę na terminologię danego przedmiotu. Realizacja treści przedmiotowych z wykorzystaniem metody CLIL może być także przygotowaniem do studiowania lub pracy za granicą. Głównym celem w aspekcie uczenia się jest zastosowanie różnorodnych metod i technik nauczania oraz indywidualnie dopasowanych strategii uczenia się, które zwiększają motywację do przyswojenia danej wiedzy (Muszyńska, Papaja 2019: 42).

Inaczej niż Maljers i in. (2002), Coyle (2005) prezentuje tzw. model 4Cs (Content, Communication, Cognition, Culture), w którym wyróżnia cztery najistotniejsze aspekty dotyczące CLIL. Są to: treść, poznanie, komunikacja oraz kultura. Treść może być bezpośrednio powiązana z rozwojem umiejętności językowych, jednak głównym jej celem jest wzbudzenie zainteresowania uczniów oraz zaspokojenie ich potrzeb. Poznanie oznacza zauważalne postępy uczniów zarówno w zakresie umiejętności językowych, jak i zdobywania wiedzy. Komunikacja to nie tylko używanie języka w procesie przyswajania informacji, ale także swoiste medium w przekazywaniu myśli, wartości i idei. Kultura pozwala odpowiednio zrozumieć i zinterpretować znaczenie CLIL w oparciu o wartości i tradycje prezentowane przez uczniów, nauczycieli i inne osoby biorące udział w procesie przyswajania wiedzy (Coyle 2005; Muszyńska, Papaja 2019).

Podobnie do Marsha i in. (2005), Mehisto, Marsh i Frigols (2008: 31) definiują CLIL jako metodę, dzięki której język obcy jest wykorzystywany do nauczania treści przedmiotowych (niejęzykowych), czego efektem jest jednoczesny przyrost wiedzy z zakresu danego przedmiotu oraz umiejętności językowych. Podejście CLIL, ze względu na sytuacje, w których jest wykorzystywane, mianowicie łączenie języka obcego z treściami niejęzykowymi

(przedmiotowymi), Mehisto, Marsh i Frigols (2008) określili również mianem parasola (umbrella term), który „obejmuje i jednocześnie swobodnie korzysta z praktyki specyficznej dla różnych form tego połączenia” (Zaparucha 2017: 8). Podobnie jak Coyle (2005), Mehisto, Marsh i Frigols (2008) rozwijają pojęcia treści, poznania oraz komunikacji, wprowadzając zamiast terminu „kultura” definicję społeczności. Pisząc o treściach przedmiotowych, podkreślają, iż powinny być one zintegrowane, merytoryczne, przejrzyste oraz powiązane ze społecznością w klasie i poza nią. Natomiast treści kulturowe to te, które można zauważyć we wszystkich nauczanych przedmiotach (Mehisto, Marsh i Frigols 2008: 31; Muszyńska, Papaja 2019: 41–44). W kwestii poznania proces przyswajania wiedzy przez uczniów bazuje na posiadanych już przez nich zasobach, doświadczeniu, postawach, zainteresowaniach i umiejętnościach. Dzięki temu uczniowie analizują swój postęp i wyznaczają sobie nowe cele, wykorzystując wiedzę zdobytą na kilku przedmiotach. Mehisto, Marsh i Frigols (2008: 31) podkreślają, że najważniejsze w komunikacji są próby podejmowane przez uczniów w klasie i poza nią. Podobnie do aspektu poznawczego umiejętności językowe, wliczając w to umiejętności komunikacyjne, powinny być rozwijane na wszystkich przedmiotach. Przez definicję społeczności Mehisto, Marsh i Frigols (2008: 31) rozumieją proces, w którym dzięki zintegrowanemu kształceniu uczniowie budują poczucie przynależności do danej wspólnoty, nabywają umiejętności pracy w grupie i współpracy z lokalną społecznością oraz potrafią określić swoją rolę w klasie i w społeczeństwie, w którym dorastają. Nauczyciele oraz opiekunowie stają się nie tylko mentorami, ale też partnerami w procesie zdobywania wiedzy i budowania świadomości społecznej.

Definiując pojęcie CLIL, warto skupić się na tym, jak postrzegany jest język podczas realizacji treści przedmiotowych. Język w CLIL określa się mianem *vehicular language* lub *language of instruction*. Innymi słowy, jest to język, który służy jako narzędzie w procesie uczenia oraz uczenia się, niezależnie od tego czy jest to język obcy (taki, który nie jest językiem urzędowym w danym kraju/regionie, np. język angielski w Polsce), język drugi (oficjalnie używany do publicznej komunikacji obok innego języka/ innych języków, np. francuski w Szwajcarii, w kantonie, gdzie pierwszym językiem jest niemiecki) czy język kolejny, a także ten zaliczany do mniejszości narodowej lub etnicznej (Coyle, Hood, Marsh 2010).

Głównym założeniem CLIL jest wykorzystywanie języka obcego do nauczania treści niejęzykowych, a co za tym idzie, możliwość rozwijania zarówno wiedzy z danego przedmiotu (lub przedmiotów), jak i rozwój poziomu

języka obcego, w którym przekazywane są treści (Mehisto, Marsh & Frigols 2008; Parr-Modrzejewska, Szubko-Sitarek 2016). Dodatkowo integracja wiedzy owocuje wzrostem rozwoju poziomu poznawczego u uczniów, wśród których zastosowano metodę CLIL. Język wykorzystywany w procesie nauczania jest traktowany jako pewnego rodzaju medium do nauczania treści przedmiotowych. Stąd ważne jest, by uczniowie mieli świadomość tego, jakie znaczenie ma przyswajanie języka obcego we współczesnych czasach. Język obcy wykorzystywany do omawiania treści przedmiotowych służy do krytycznej analizy tych treści, do łączenia znanych już faktów z nowo poznanymi, do rozwijania umiejętności wykorzystania zapamiętanych (i zrozumianych) treści w podobnych kontekstach. Co ważne, w podejściu CLIL najważniejsze są treści, natomiast poprawność gramatyczna jest na dalszym planie. Uczniowie skupiają swoją uwagę przede wszystkim na komunikacji, przy czym należy pamiętać, że nie jest to tylko rozwijanie umiejętności mówienia, ale także słuchania, czytania i pisanie (Komorowska 2005). Jak podkreślają Muszyńska i Papaja (2019: 18), dodatkowo uczniowie wchodzą w interakcje ze swoimi rówieśnikami, ucząc się od siebie nawzajem. Co więcej, CLIL to realizowanie międzynarodowych projektów (np. eTwinning). Takie zaangażowanie rozwija tolerancję i pozwala na lepsze zrozumienie treści (Lightbown, Spada 2006).

## CLIL W BADANIACH: PRZEGLĄD LITERATURY

### 2.1. Stan badań nad metodą CLIL

W ciągu ostatnich 20 lat liczne badania potwierdziły znaczenie zintegrowanego nauczania przedmiotowo-językowego (CLIL) w dziedzinie współczesnej edukacji języków obcych (m.in. Rumlich 2017: 111; San Isidro i Lasagabaster 2018). Od samego początku CLIL określany był jako zbiór praktyk o charakterze pedagogicznym obejmujących mniej fragmentaryczną koncepcję programu nauczania z naciskiem na zadania oparte na treści realizowane poprzez użycie języków obcych (Coyle i in. 2010; San Isidro 2018). Opierając się na tym założeniu, Pavón, Ávila, Gallego i Espejo (2014: 9) zgodnie podkreślają, iż współpraca jest warunkiem *sine qua non* w podejściu opartym na metodzie CLIL, jako że zarówno lektorzy języków obcych, jak i nauczyciele skupiający się na przekazywaniu treści współpracują, aby zapewnić uczniom przyswajanie nowych informacji poprzez użycie elementów języka drugiego.

Liczne próby scharakteryzowania CLIL wywołały debatę na temat jego związku z poprzednią metodą nauki języków obcych polegającą na posługiwaniu się językiem obcym w trybie ciągłym i we wszystkich sytuacjach życiowych, a więc tak zwanej *immersji językowej*, czyli *całkowitym zanurzeniu w języku*, czy też *submersji* oznaczającej *częściowe zanurzenie* (Pérez Cañado 2012: 315–316). Co więcej, jak wynika z przeglądu literatury, niektórzy badacze zarzucają metodzie CLIL *konceptualną niejasność* (Bruton 2013: 588), podczas gdy inni definiują ją jako dobrze rozpoznawalną i użyteczną konstrukcję do promowania i nauczania języków obcych (Cenoz i in. 2013: 16). Kolejna dyskusja toczy się wokół koncepcji CLIL i jej związku z programami immersyjnymi mającymi na celu ochronę języków mniejszości narodowych oraz regionalnych (Somers i Surmount 2011: 113; Cenoz i in. 2013: 316). Podobnie próby analizy przedmiotu badań i dostarczenia rozstrzygających dowodów na to, czy to podejście stanowi panaceum, a także próby znalezienia

odpowiedzi na pytania czy i w jaki sposób CLIL wpływa na proces uczenia się, nie tylko przyczyniły się do ożywionej dyskusji wśród badaczy, ale także doprowadziły do zidentyfikowania pewnych luk badawczych w omawianym zakresie. Za przykład może służyć wielowymiarowa, dogłębna analiza badań CLIL przeprowadzona przez Pérez Cañado (2012: 315–318). Rezultatem był kompleksowy, bezstronny, a zarazem krytyczny opis poprzednich programów immersyjnych, na których to podejście CLIL rzekomo miało bazować (m.in. edukacja dwujęzyczna w USA i Kanadzie, europejskie szkoły międzynarodowe); Pérez Cañado (2012) przedstawiła wnikliwą analizę stanu wiedzy/badań poprzez scharakteryzowanie heterogenicznej panoramy CLIL oraz analizę wyników badań z perspektywy geograficznej, tj. grupowanie według obszarów, takich jak Europa Północna, Środkowa, Wschodnia i Południowa. W swojej pracy Pérez Cañado (2012: 329) wysunęła wniosek, iż rzetelne badania empiryczne były znikome. Autorka w najnowszym artykule zaktualizowała poprzedni przegląd i ponownie skupiając się na literaturze związanej z CLIL, wykazała niejasności w badaniach związanych z wpływem zintegrowanej edukacji przedmiotowo-językowej na sam proces nauki (Pérez Cañado 2016: 92–100). Według Pérez Cañado zarówno osoby nauczane metodą CLIL, jak i ci, którzy nie korzystają z tego podejścia, powinni być porównywani poprzez analizę statystyczną oraz triangulację danych; badania powinny mieć charakter długotrwały oraz łączyć metody ilościowe i jakościowe; należy wziąć w nich pod uwagę zmienne zależne, takie jak nauka pierwszego języka czy nauczanie przedmiotów; należy również zagwarantować jednorodność analizowanych próbek.

Rosnące zainteresowanie samą metodą, jak i ilością nowo powstałych programów opartych na metodologii CLIL sprawia, iż liczba prac badawczych w obrębie CLIL znacznie wzrosła i została poszerzona nie tylko o szereg nowych aspektów, takich jak: wpływ CLIL na proces uczenia się języków obcych, uczenia się treści, motywacja, zjawisko translanguagingu<sup>1</sup>, zmiana kodów językowych (ang. *code-switching*) czy też stosunkowo nowa koncepcja uczenia (się) zwana Pluriliteracies Teaching for Learning (PTL<sup>2</sup>) bazująca

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<sup>1</sup> Translanguaging obejmuje efektywną komunikację, podczas której wielo- lub dwujęzyczni rozmówcy dysponują jednym repertuarem językowym, z którego czerpią niezbędne im elementy, formy, bez rozgraniczania lub zastanawiania się, z którego języka one pochodzą.

<sup>2</sup> Koncepcja PTL zakłada, iż proces uczenia się przedmiotu to o wiele więcej niż przyswajanie pewnej porcji wiedzy przedmiotowej/informacji. Składa się na niego wiele umiejętności, często charakterystycznych dla danej dziedziny. Rozwijanie

na doświadczeniach CLIL, ale także pod uwagę zostały wzięte wcześniej zidentyfikowane braki w literaturze przedmiotu.

Jak wspomniano wyżej, CLIL jest postrzegane jako dobrze rozpoznawalna i przydatna metoda promowania nauki języków obcych (Cenoz i in. 2013: 16), która, pomimo licznych kontekstowych różnic występujących przy jej realizacji, wykazuje szeroki zakres cech wspólnych (Coyle i in. 2010).

W ostatnich latach jednak pogląd ten uległ zmianie i niektórzy badacze obrali bardziej negatywny i nieco lekceważący stosunek do konceptualizacji CLIL. Za przykład mogą posłużyć autorzy tacy jak Paran (2013) i Bruton (2015), którzy uznają CLIL za niejasny i zbyt niejednorodny. Według autorów CLIL nie posiada wyraźnych różnic w odniesieniu do wcześniej istniejących programów opartych na immersji. Poglądy te jednak należałoby uznać za dyskusyjne. Fakt, iż metodologia CLIL jest zwykle powiązana z poprzednimi modelami edukacji dwujęzycznej i z nimi identyfikowana, można wyjaśnić za pomocą pewnych nieporozumień prowadzących do błędnych interpretacji tej metody. Chociaż podejście CLIL ma podobne cechy jak poprzedzające je metody nauczania, programy immersyjne w Kanadzie czy też programy dwujęzyczne w amerykańskich szkołach wykazują niewielkie podobieństwo do nauki języka angielskiego w ramach ideologii/metodologii/ideał? CLIL w Europie, szczególnie w kontekście socjolingwistycznym i społeczno-kulturowym (Gallardo del Puerto i in. 2009: 65). Tego samego zdania są inni badacze, tacy jak Lasagabaster i Sierra (2010), Cenoz i Ruiz de Zarobe (2015) oraz Somers i Surmount (2011).

Pérez Cañado (2012: 327) w swoich badaniach różnicuje CLIL w hiszpańskich społecznościach dwujęzycznych i monolingwicznych, stawiając tym samym CLIL na równi z programami immersyjnymi. Autorka stwierdza, iż społeczności dwujęzyczne używają metod opartych na CLIL dłużej niż 25 lat, mimo że programy immersyjne dla języków mniejszości narodowych w Hiszpanii istniały długo przed CLIL. Tego samego zdania jest Lorenzo (2007: 28), twierdzi, iż CLIL jest uważane za europejską etykietę dla edukacji dwujęzycznej. Zdanie to wydaje się jednak zaskakujące, biorąc pod uwagę istnienie programów dwujęzycznych w Europie na długo przed zdefiniowaniem metodologii CLIL.

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wielorakich umiejętności prowadzi do uczenia się głębokiego, czyli zinternalizowania wiedzy wyższego rzędu, w tym m.in. znaczenia pojęć, wypracowania schematów i strategii postępowania, co przyczynia się do długoterminowego rozumienia, a zdobyta w ten sposób wiedza może być zastosowana także w innych kontekstach, dziedzinach i językach (Meyer i in. 2015: 47–48).

Co ciekawe, wydaje się, że metoda CLIL została dostosowana do różnych kontekstów europejskiej różnorodności językowej (San Isidro 2018: 185) i pomimo tego, że jest nierozdzielnie połączona ze swoimi poprzednikami oraz mimo związku z programami immersyjnymi dla języków mniejszości narodowych, stanowi odrębną metodę i może być zidentyfikowana jako zestaw praktyk edukacyjnych (Navés 2009: 23; Pérez-Vidal 2013: 59). Godnym uwagi jest również fakt, iż mimo że CLIL jest podejściem zorientowanym na różnorodność językową, to język angielski stał się językiem najczęściej używanym przy jego realizacji (San Isidro 2018: 187).

Pytanie, czy wszystkie te metody należałoby opisać wspólną etykietą to wciąż aktualny i budzący wiele kontrowersji temat w literaturze. Należy zgodzić się z Dalton-Pufer i in. (2014: 117), że zarówno słowo *immersja*, jak i *CLIL* mają swoją historię i migrują z jednego dyskursu do drugiego, nabierając konotacji. Innymi słowy, granice między tymi wyrażeniami zacierają się. Mimo to postawienie programów immersyjnych skupiających się na języku mniejszości narodowych na równi z CLIL jest kwestią sporną, ponieważ głównym celem nauki języków mniejszości jest ochrona i rozwój języka. Ponadto programy immersyjne języka mniejszości istniały na długo przed CLIL i były oparte na różnych parametrach metodologicznych oraz zróżnicowanych scenariuszach edukacyjnych. Metoda CLIL jest podwójnie ukierunkowana, skupia się na uczeniu się treści poprzez język obcy lub dodatkowy, który pełni funkcję pośrednika. Celem jest uzupełnienie nauki języka obcego poprzez rozszerzenie jego zastosowania na cały program nauczania. Powinno nastąpić więc jasne rozgraniczenie między CLIL a innymi podejściami, aby zapewnić w ten sposób bardziej przejrzystą oraz jednoznaczną charakterystykę nauczania przedmiotowo-językowego (Marsh i in. 2005).

Pérez Cañado (2016: 81) zwraca uwagę na problem autoselekcji, braku homogeniczności i elitarności przy tworzeniu grup CLIL. Na przestrzeni lat studenci zapisywali się dobrowolnie (w wyniku własnej motywacji do nauki poprzez język obcy) lub byli zapisywani do programów CLIL w drodze selekcji, w której brano pod uwagę wyniki w nauce. W ten sposób powstawały grupy uczniów o silnej motywacji i wysokich kompetencjach językowych, które wykazywały ogromne różnice w porównaniu z grupami nieuczącymi się metodą CLIL. Brak egalitaryzmu w tym skupiającym się na segregacji podejściu do realizacji CLIL uwarunkował znaczną część istniejących badań. Większość autorów podkreśla pozytywne efekty w zakresie nauki języków obcych (uczniowie korzystający z CLIL osiągają lepsze wyniki niż ich rówieśnicy) oraz zwraca uwagę na neutralne lub pozytywne wyniki w odniesieniu

do pierwszego języka lub uczenia się innych treści. Niemniej jednak w wielu badaniach porównywalność jest zakłócona brakiem jednorodności w zwyczaj podzielonych grupach. Obecnie jednak przepisy ulegają zmianie nie tylko w różnych krajach, ale także na poziomie regionalnym. Istnieją miejsca, w których CLIL, choć wciąż eksperymentalny, stał się inicjatywą ogólnoszkolną dostępną dla wszystkich uczniów (m.in. włoska polityka narodowa w zakresie CLIL lub przypadki Galicji i Walencji w Hiszpanii).

Analizy dotyczące efektów CLIL ujawniły dwubiegunowość w trendach badawczych. CLIL okazał się koncepcją budzącą entuzjazm albo niechęć wśród naukowców. Od początkowo pozytywnych opinii na temat rezultatów CLIL (Marsh 2002; Coyle 2007; Coyle i in. 2010; Dalton-Pufer i Smit 2007; Lasagabaster 2008; San Isidro 2010; Navés 2009) można było zauważyć tendencję do pojawiania się krytycznych osądów kwestionujących zasadność badań. Krytycy zarzucają CLIL brak homogeniczności oraz problemy we wdrażaniu samej metody (Paran 2013; Bruton 2015; Rumlich 2017). Stąd dokładny przegląd literatury stanowi istotne wyzwanie, głównie ze względu na ogromną liczbę badań, ale także ich wieloaspektowość i różnorodność. Uogólnianie wniosków uczonych na temat zróżnicowanej rzeczywistości CLIL jest zadaniem trudnym, ponieważ konteksty nauczania CLIL są różnorakie, a implementacja CLIL różni się w zależności od uwarunkowań społeczno-kulturowych, jak również od polityki edukacyjnej poszczególnych krajów (Coyle 2008: 3–4). Mając powyższe na uwadze, można pogrupować literaturę przedmiotu w sposób przekrojowy, skupiając się wokół pięciu tematów odpowiadających różnym rodzajom wpływu, jaki CLIL wywiera na proces uczenia się, mianowicie: wpływ CLIL na percepcję/postrzeganie, postawy i motywacje, wpływ CLIL na naukę języków obcych, wpływ CLIL na język pierwszy, wpływ CLIL na uczenie się treści oraz zmianę kodów językowych w CLIL. Kolejne akapity po krótko przedstawią wymienione zależności.

#### *Wpływ CLIL na percepcję/postrzeganie, postawy i motywacje*

Podczas analizy literatury (m.in. Lasagabaster i Doiz 2017; Pladevall-Ballester 2015; San Isidro i Lasagabaster 2019) dotyczącej wpływu CLIL na postrzeganie, postawy i motywacje uczniów na pierwszy plan wysuwają się trzy główne problemy badawcze. Po pierwsze, badania pokazują, że osoby uczone metodą CLIL wykazują pozytywne postawy, a także większą motywację do nauki języka obcego. Chociaż istnieje bogata literatura opisująca percepcję z punktu widzenia nauczycieli, wydaje się jednak, że rośnie zapotrzebowanie na badania dotyczące poglądów, postrzegania i „postaw rodzin i uczniów nie tylko w odniesieniu do języka obcego, ale także do

innych parametrów, takich jak kontekst uczenia się, treść lub zastosowana metodologia. Po drugie, Lasagabaster i Doiz (2017: 689) w swoim artykule „A Longitudinal Study on the Impact of CLIL on Affective Factors” ujawniają wyniki, które nie zgadzają się z wcześniejszą literaturą. Autorzy udowadniają, iż motywacja do nauki języka obcego może nie być podtrzymywana w dłuższej perspektywie. Stąd też sugerują oni potrzebę przeprowadzenia w przyszłości długotrwałych badań o charakterze jakościowym. Istniejąca literatura zdaje się nie brać pod uwagę również wpływu CLIL na postawy wobec języka pierwszego, co jest bardzo ważne w społecznościach posługujących się dwoma lub większą liczbą systemów językowych, w których jeden jest językiem mniejszościowym. Autorzy w ten sposób zwracają uwagę na luki badawcze, które należałoby wykorzystać do przyszłych analiz CLIL.

#### *Wpływ CLIL na naukę języków obcych*

Analizując literaturę pod kątem wpływu podejścia CLIL na naukę języków obcych, można dojść do wniosku, iż badania wskazują pozytywne rezultaty zastosowania zintegrowanego kształcenia przedmiotowo-językowego. Jednakże warto zwrócić uwagę na pewne aspekty, które zostały pominięte przez badaczy, takie jak potrzeba badań długofalowych obejmujących dłuższy okres oraz skupienie się na rozwoju umiejętności czytania i pisania związanych z danym przedmiotem (Ackerl 2007; Pérez-Vidal 2013).

#### *Wpływ CLIL na język pierwszy*

Mimo że wpływ metody CLIL na język ojczysty jest słabo zbadany, badania oparte na spostrzeżeniach nauczycieli wskazują na pozytywne opinie w odniesieniu do wpływu CLIL na język pierwszy uczniów (Salvo i San Isidro 2012), inne natomiast (Lorenzo i in. 2010) przedstawiają CLIL jako zagrożenie. Z kolei Seikkula-Leino (2007) oraz Serra (2007) wskazują na brak negatywnego oddziaływania. Podsumowując, należy zwrócić uwagę nie tylko na potrzebę długofalowych badań nad efektem oddziaływania CLIL na język pierwszy, lecz także nad jego wpływem na język(i) używany do wyrażania wiedzy oraz związkiem CLIL z wykorzystaniem modelu translanguing.

#### *Wpływ CLIL na uczenie się treści*

Dostępna literatura sugeruje, iż CLIL nie ma wpływu na uczenie się treści przedmiotu lub wykazuje pozytywne oddziaływanie (m.in. Wode 1999; Admiraal i in. 2006; Stohler 2006; Mariotti 2006). Jednakże liczba badań dotyczących samego procesu uczenia się treści wydaje się niewystarczająca, biorąc pod uwagę badania dotyczące postaw lub nauki języków obcych. Solidne badania długofalowe oparte na testach wydają się być potrzebne, by móc wyciągnąć ostateczne wnioski.

### *Zmiana kodów językowych w CLIL*

Jak wskazują Lasagabaster (2008) i Pérez-Vidal (2013) prawie nieistniejąca literatura badawcza dotycząca zamiany kodów językowych przez uczniów uniemożliwia wyciągnięcie wniosków na temat wpływu CLIL na zjawisko code-switching. Analizowanie tego, jak i w jakim stopniu studenci CLIL używają wielu kodów językowych może być zmienną, którą badacze powinni wykorzystać, aby uzyskać głębszy wgląd we wpływ CLIL na naukę i rozwój językowy.

## CLIL w praktyce.

### Scenariusze z biologii dla klas dwujęzycznych

Niniejszy rozdział jest propozycją realizacji idei CLIL w praktyce w oparciu o polski system nauczania, gdzie nauczanie dwujęzyczne realizowane jest m.in. w klasie VII szkoły podstawowej. Jak zostało podkreślone w przedmowie, praktyczną realizację podejścia CLIL ukazano na przykładzie scenariuszy lekcji z biologii, uwzględniając materiał realizowany w polskim systemie oświaty.

#### I Biology: the study of life

##### Lesson plan 1. How the organism is organised

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** Students learn the structure and functions of the human body.

**Objectives:** At the end of this lesson the students will be able to:

- provide levels of structural organisation of the human body;
- provide functions of organ systems;
- explain the importance of homeostasis.

**Methods and forms of work:** brainstorming; listening and watching a video for general information; pair work.

**Didactic support:** recordings; handouts; Internet sources.

**Procedure and stages of the lesson:**

1. Greeting
2. Checking attendance
3. Warm-up

The teacher says: *This is the first lesson in this school year. Let's start with something extra important! Something that has started EVERYTHING! Do you know what it is? You have four options.*

*One: organ / Two: cell / Three: tissue / Four: Enzymes' (option two: cell)*

Students decide which answer is correct.

The teacher says: *That's right! Option two: cell is the correct answer. That's the main topic for today's lesson. Please write down the lesson subject in your notebooks: How the organism is organised*

#### 4. Lead-in

The teacher gives each pair a set of cards with the terms: *cell, tissue, organ, organ system, organism, homeostasis*, and their definitions (see attachment 1). One student should receive definitions and the other their explanations. The students should match terms to their definitions. The teacher should cut them up before giving them to the students:

The teacher says: *Each pair is going to receive a set of cards. One person gets terms, whereas the other receives only definitions. Your task is to match terms to their explanations. You have three minutes to do this task.*

The teacher gives 3 minutes for this exercise.

#### Attachment 1

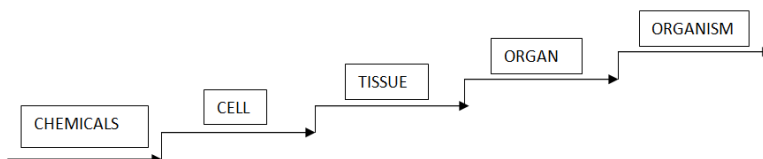
CELL (komórka)	IS A BASIC BUILDING BLOCK OF ALL LIVING ORGANISMS.
TISSUE (tkanka)	IT CONSISTS OF A GROUP OF SIMILAR CELLS AND THEIR INTERCELLULAR MATERIAL THAT WORK TOGETHER TO PERFORM A FUNCTION
ORGAN (organ)	IS PART OF AN ORGANISM, WHICH IS TYPICALLY SELF-CONTAINED AND HAS A SPECIFIC VITAL FUNCTION. EXAMPLES ARE HEART, LUNGS, BRAIN, ETC.
ORGAN SYSTEM (układ narządów)	FUNCTIONALLY RELATED ORGANS THAT OFTEN ACT COOPERATIVELY. IN HUMANS, THERE ARE 11 OF THEM COMMONLY RECOGNISED: INTEGUMENTARY, MUSCULAR, SKELETAL, NERVOUS, CIRCULATORY, LYMPHATIC, RESPIRATORY, ENDOCRINE, URINARY/EXCRETORY, REPRODUCTIVE, AND DIGESTIVE
ORGANISM (organizm)	IS A SINGLE LIVING THING
HOMEOSTASIS (homeostaza)	IS THE MAINTENANCE OF A STABLE INTERNAL ENVIRONMENT

Source: <https://kids.britannica.com/students/article/tissue/623451>

After three minutes the teacher checks the students' answers.

The teacher says: *Now you remember/revised general definitions of the main terms for today's lesson. I want you to tell me which terms should be put in the second, third, fourth, and fifth place in the following scheme (see attachment 2).*

## Attachment 2



Levels of structural organisation of the human body

To show students the levels of structural organisation of the human body, the teacher may use a short video available at <https://toxtutor.nlm.nih.gov/08-003.html>

## 5. Presentation and practice

The teacher presents the functions of the organ systems of the human body.

The students receive a short text (see attachment 3) and watch a short video available at [https://www.youtube.com/watch?v=gD1K7IA\\_6wg](https://www.youtube.com/watch?v=gD1K7IA_6wg). The given text is a tape script from the video. Before they watch the video, the students should read the text carefully and skip the gaps.

The teacher says: *Please look at the given text and fill in the gaps with an appropriate translation. To make it easier, watch the short video once again. You'll have 5 minutes to do this task.*

## Attachment 3

The human organism is comprised of 11 organ systems. These 11 systems are made up of groups, or organs that function closely together toward a common goal. These organs form a system. While the names of these systems may vary slightly among the medical community, their functionality and descriptions are the same.

1. The ..... system (skóra) has the main functions of protection and temperature regulation.
2. The..... system (układ mięśniowy) assists in movement and support, and connects bones to one another as well.
3. The ..... system (układ szkieletowy) provides protection, structural support, assists with movement, and blood production.

4. The .....system (układ nerwowy) is the communication network and centre.
5. The ..... system (układ hormonalny) assists the nervous system with communication, through message delivery.
6. The ..... system (układ krwionośny) carries blood and nutrients throughout the body.
7. The ..... system (układ limfatyczny) works to transport fluids and fats and defends the organism against disease.
8. The ..... system (układ oddechowy) exchanges gases, as well as filters and transports air.
9. The ..... system (układ pokarmowy) breaks down food and nutrients for absorption and use.
10. The ..... system (układ wydalniczy) is responsible for maintaining pH and balance of body fluids, as well as excretion of waste.
11. The ..... system (układ rozrodczy) gives the organism the ability to produce offspring.

Answers: 1. integumentary 2. muscular 3. skeletal 4. nervous 5. endocrine  
6. circulatory or cardiovascular 7. lymphatic 8. respiratory 9. digestive 10. excretory or urinary 11. reproductive

The teacher elicits answers from students.

The teacher says: *There is one more term that has not been thoroughly discussed yet. Can you guess what it is? (a short break for students' answers) Exactly! That's HOMEOSTASIS. We said that it is the maintenance of a stable internal environment. Let's explain this process more carefully.*

*To function efficiently (sprawnie), organisms have control systems to keep internal conditions near constant. This is a feature known as HOMEOSTASIS. This requires information about conditions inside the body and the surroundings, which are detected by sensory cells. Some of the physiological factors controlled in homeostasis in mammals are: a) core body temperature; b) metabolic wastes, carbon dioxide (dwutlenek węgla) and urea (mocznik); c) blood pH; d) blood glucose concentration; e) water potential of the blood; f) the concentrations in the blood of the respiratory gases, oxygen and carbon dioxide.*

*Source: Jones, M., Fosbery, R., Gregory, J., and Taylor, D. (2014): Cambridge International AS and A Level. Biology. Coursebook. Fourth Edition. Cambridge University Press, p. 300.*

The students receive a note read/presented by the teacher (see attachment 4).

#### **Attachment 4**

To function efficiently (sprawnie), organisms have control systems to keep internal conditions near constant. This is a feature known as HOMEOSTASIS. This requires information about conditions inside the body and the surroundings, which are detected by sensory cells. Some of the physiological factors controlled in homeostasis in mammals are: a) core body temperature; b) metabolic wastes, carbon dioxide (dwutlenek węgla) and urea (mocznik); c) blood pH; d) blood glucose concentration; e) water potential of the blood; f) the concentrations in the blood of the respiratory gases, oxygen and carbon dioxide.

*Source: Jones, M., Fosbery, R., Gregory, J., and Taylor, D. (2014): Cambridge International AS and A Level. Biology. Coursebook. Fourth Edition. Cambridge University Press, p. 300.*

#### **6. Summary**

The teacher reads five sentences that summarise the lesson and asks students to decide whether they are true or false.

1. The cell is a basic building block of all living organisms.
2. There are ten most commonly recognised organ systems in the human body.
3. The most important function of homeostasis is to maintain a stable internal environment.
4. There are five main levels of structural organisation of the human body: chemicals, cells, tissues, organs, and organism.
5. The lymphatic system works to transport fluids and fats and defends the organism against disease.

Answers: 1. True 2. False – 11 3. True 4. True 5. True

## II The human skin

### Lesson plan 1. It's all about our skin

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** The students learn the functions and structure (layers) of the skin.

**Objectives:** At the end of this lesson the students will be able to:

- explain the functions of the skin;
- describe the three layers of the skin;

**Methods and forms of work:** pair work; mini-lecture; group work.

**Didactic support:** handouts; Internet sources.

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher asks the students a question: *What is the largest organ of the body?* The teacher gives the students 30 seconds to think of the answer and repeats the question.

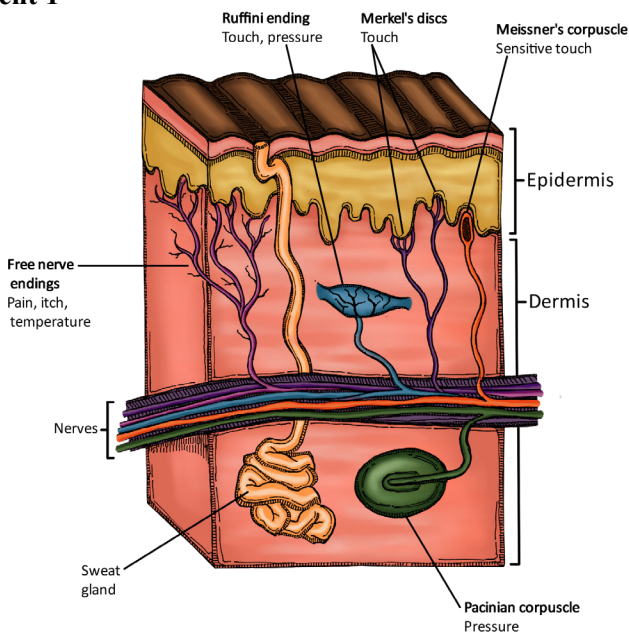
Students' anticipated answer: the skin

#### 4. Lead-in

The teacher says: *Today we're going to learn about the largest organ of the human body: the skin. Its total area is about 20 square feet. In a moment, you'll learn its functions and structure. First, I would like you to have a look at this image.*

The teacher shows on a projector an image of the skin (see attachment 1).

## Attachment 1



Graphic: Mikołaj Siciarz

### 5. Presentation

The teacher says: *Please look carefully at the picture of the skin. The skin has three layers: the epidermis, the dermis, and the hypodermis (subcutaneous fat – podściółka tłuszczowa). The epidermis is the outermost layer of the skin. Its main function is to provide a waterproof barrier and create our skin tone (odcień skóry). The second layer, dermis, is beneath the epidermis. It contains tough connective tissue (tkanka łączna), hair follicles (mieszek/torebka włosy), sweat glands (gruczoły potowe), nerve endings blood vessels, oil glands (gruczoły łojowe), collagen, and elastin. The last layer, hypodermis, is made of fat and connective tissue. It holds the skin to the underneath tissues. Hair follicles start growing in this layer.*

### 6. Practice

The teacher gives each student a worksheet (see attachment 2) and asks them to fill in the gaps with an appropriate word/phrase.

The teacher says: *Please fill in the gaps with an appropriate word or phrase given in the box. You may work in pairs or in small groups.*

The teacher gives 3 minutes for this exercise.

## Attachment 2

Skin's function

- ..... a protective covering
- ..... the body
- ..... fluid loss
- ..... the entrance of pathogens
- ..... a sense of touch
- ..... manufacture Vitamin D

HELP, ALLOW, PREVENT, WATERPROOF, FORM, BLOCK

Source: [https://713d617c-307b-4620-8b39-5de1608ccee6.filesusr.com/ugd/fe60fb\\_1b4e89a13c5c48dc993624ce5b102810.pdf](https://713d617c-307b-4620-8b39-5de1608ccee6.filesusr.com/ugd/fe60fb_1b4e89a13c5c48dc993624ce5b102810.pdf)

Answers: form, waterproof, prevent, block, allow, help

The teacher checks the answers with the students and explains any difficulties.

## 7. Summary

The teacher asks students summary questions and gives the students one minute to provide the answers:

- a. *What is the body's largest organ?* [the skin]
- b. *How many layers is the skin is made up of?* [three]
- c. *What are the layers of the skin?* [epidermis, dermis, hypodermis]
- d. *Which/What skin layer can be described in the following sentences? It is visible. It takes about two weeks to a month for the skin to rise to the top. 95% of the cells of this layer make new skin cells. 5% of the cells of this layer make melanin.* [epidermis]
- e. *This layer contains nerve endings, blood vessels, oil glands, sweat glands, collagen, and elastin.* [dermis]
- f. *This layer is made mostly of fat.* [hypodermis]

Source: [https://713d617c-307b-4620-8b39-5de1608ccee6.filesusr.com/ugd/fe60fb\\_1b4e89a13c5c48dc993624ce5b102810.pdf](https://713d617c-307b-4620-8b39-5de1608ccee6.filesusr.com/ugd/fe60fb_1b4e89a13c5c48dc993624ce5b102810.pdf)

Answers: a) the skin b) three c) epidermis, dermis, hypodermis d) epidermis e) dermis f) hypodermis

The teacher elicits answers from students.

## Lesson plan 2. The pathologies of the integumentary system

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** The students will be able to enumerate and explain the pathologies of the integumentary system.

**Objectives:** At the end of this lesson the students will be able to:

- describe the symptoms and causes of some skin pathologies;
- explain the importance of keeping the skin clean.

**Methods and forms of work:** pair work; mini-lecture; group work.

**Didactic support:** handouts; Internet sources; crossword.

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher says: *I have two quick questions for you.*

1. *What is the biggest organ of the human body?*
2. *Why is the skin so important to us?*

Students' anticipated answers: 1. skin 2. it protects other organs, keeps our body at the right temperature, it allows us to have the sense of touch

The teacher says: *Unlike other organs, like brain, lungs, heart, etc., your skin needs to be regularly washed. This is the easiest way we can care for our largest organ. However, there are some situations in which we need to visit a doctor. Today we'll learn about the pathologies of the integumentary system, including melanosis, scales, acne, and many others. Let's start!*

### 4. Lead-in

The teacher gives the students a list with the eight most common pathologies of the integumentary system in English and Polish, and asks the students to work in small groups (3–4 students) (see attachment 1).

The teacher says: *Please try to guess the following names of skin pathologies presented in English and match them to their Polish translations. Don't worry if you don't know the correct answer. You have 5 minutes to do this exercise.*

## Attachment 1

English	Polish
1. Acne	a. Potówka
2. Sunburn	b. Melanizm

- |   |                                       |
|---|---------------------------------------|
| 3. Folliculitis                         | c. Krosta, pryszcz                    |
| 4. Sebaceous Cyst                       | d. Zapalenie mieszków włosowych       |
| 5. Miliaria / prickly heat / sweat rash | e. Trądzik                            |
| 6. Ecchymosis                           | f. Poparzenie słoneczne               |
| 7. Pustule / pimple                     | g. Kaszak                             |
| 8. Melanosis                            | h. Krwawy wylew podskórny, wybroczyna |

Answers: 1.e 2.f 3.d 4.g 5. a 6. h 7. c 8. b

The teacher elicits answers from the students.

### 5. Presentation

The teacher says: *The symptoms of ACNE are painful red sores on the skin. It usually affects the face. It is caused due to the overproduction of sebum. Sunburns appear on the skin as red burns and they are the results of skin exposure to UV rays.*

*Folliculitis is the infection and inflammation of one or more hair follicles. The symptoms of this pathology are rash, itching skin, and pimples (or pustules) located around a hair or follicle.*

*Sebaceous Cyst is a closed sac made of fatty material. It is located under the skin. It grows slowly; however, it is not life-threatening.*

*Miliaria, prickly heat, or sweat rash is caused by blockage of sweat glands. It is a very itchy rash that affects babies and adults, especially during hot, humid weather.*

*Ecchymosis (bruise) is a large, irregular area of purple discoloration. It appears when blood vessels near the surface of the skin are damaged, usually from an injury.*

*Pustule/pimple is the result of excess sebum and dead skin cells being trapped in the pores of the skin. It is a large, irregular area of purple discoloration.*

*Melanosis is a form of hyperpigmentation associated with increased melanin.*

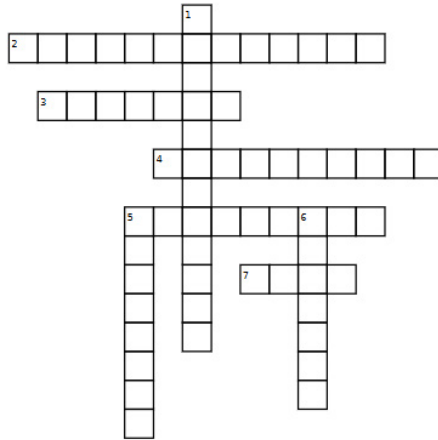
### 6. Practice

The teacher says: *I will now give you a crossword about skin pathologies. Please read the instruction carefully and do the crossword in pairs (see attachment 2).*

The teacher gives 3–4 minutes to do this exercise.

## Attachment 2

# The skin pathologies



**Down:**

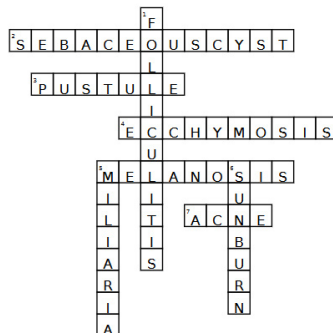
1. it is the infection and inflammation of one or more hair follicles. The symptoms of this pathology are rash, itching skin, and pimples (or pustules) located around a hair or follicle.
5. in other words prickly heat, or sweat rash. It is caused by blockage of sweat glands. It is a very itchy rash that affects babies and adults, especially during hot, humid weather.
6. It appears on the skin as red burns and it is the result of skin exposure to UV rays.

**Across:**

2. it is a closed sac made of fatty material. It is located under the skin. It grows slowly, however, it is not life-threatening.
3. It is the result of excess sebum and dead skin cells being trapped in the pores of the skin. It is a large, irregular area of purple discoloration.
4. In other word a 'bruise', it is a large, irregular area of purple discoloration. It appears when blood vessels near the surface of the skin are damaged, usually from an injury.
5. It is a form of hyperpigmentation associated with increased melanin.
7. It is a painful red sore on the skin. It usually affects the face.

**Answers:**

# The skin pathologies



The teacher checks the answers together with the students by showing and explaining the answer key on a projector or asking each pair for the correct answer.

The teacher says: *Please save your crosswords and glue them to your notebooks. Remember the definitions of the given skin pathologies.*

## **7. Summary**

The teacher asks students several questions to summarise the lesson.

The teacher says: *I would like you to tell me a few things that summarise today's lesson.*

1. Why is it important to keep your skin clean?
2. What are the most common skin pathologies?
3. What causes ecchymosis?
4. What are other names for miliaria?
5. What is acne?
6. What is folliculitis?

Suggested answers: 1. Keeping the skin clean prevents you from getting spots and impurities. Skin provides a protective barrier for the rest of your body, hence it is so important to keep it clean. Cleaning your skin improves hydration. Your skin looks better and gives you more confidence. 2. Acne, Sunburn, Folliculitis, Sebaceous Cyst, Miliaria / prickly heat / sweat rash, Ecchymosis, Pustule / pimple, Melanosis 3. blood vessels near the surface of skin are damaged 4. prickly heat, sweat rash 5. a painful red sore on the skin caused due to the overproduction of sebum 6. folliculitis is the infection and inflammation of one or more hair follicles; the symptoms of this pathology are rash, itching skin, and pimples (or pustules) located around a hair or follicle

The teacher says: *Thank you for your attendance. Please revise the vocabulary about skin pathologies. Use the glossary to help you.*

### III The human skeleton and muscles

#### Lesson plan 1. Body without skin: the human skeleton

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** Students will be able to identify the main parts of the human skeleton

**Objectives:** At the end of this lesson the students will be able to:

- state the main functions of the skeletal system;
- describe what the skeletal system is;
- explain the purpose of the major bones in the human body;

**Students' background knowledge:** Students should know the basic vocabulary about the skeletal system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; individual work.

**Didactic support:** handouts; Internet sources; word search.

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher says: *Before I write the subject of today's lesson, I want you to listen to this riddle:*

*It's a body but without skin*

*We can say that it is very thin*

*It cannot cry or laugh or groan*

*Cause it's only made of more than one bone*

*Can you tell me what it is?*

Students' anticipated answer: the skeleton

The teacher says: *That's right! It's a skeleton. That's the key word for today's lesson. Let's write the subject then.*

The teacher writes the subject on the whiteboard: **Body without skin: the human skeleton.**

#### 4. Lead-in

The teacher says: *Do you know how many bones we have?* The students try to guess the number of bones the human skeleton has.

Students' anticipated answer: We have 300 bones at birth and 206 bones by adulthood.

The teacher says: *Today we'll learn the parts of the human skeleton, bones functions, bones types and the structure of bone cells. Can you name any of part of the human skeleton?*

The students attempt to enumerate the parts of the human skeleton.

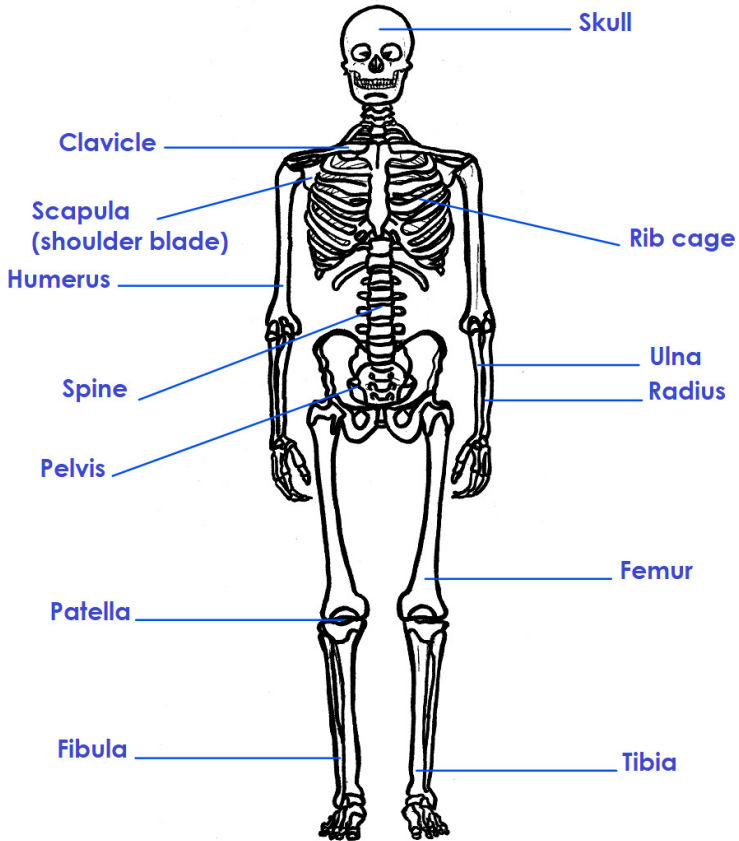
Students' anticipated answers: skull, clavicle, scapula (shoulder blade), humerus, spine, pelvis, patella, tibia, fibula, femur, radius, ulna, rib cage

## **5. Presentation and practice**

The teacher presents the human skeleton (see attachment 1) on a projector and says:

*In the photo/picture you can see the human skeleton. The skull means in Polish czaszka, clavicle or collarbone is obojczyk, scapula, shoulder blade, blade-bone or scapular bone is łopátka, humerus means kość ramienna, spine – kręgosłup, pelvis – miednica, patella or knee cap is rzepka, tibia or shinbone is piszczel / kość piszczelowa, fibula, fibular bone, peroneal bone is kość strzałkowa / strzałka, femur – kość udowa, radius – kość promieniowa, ulna or elbow bone means kość łokciowa, and rib cage is klatka piersiowa. I will now give you copies of the human skeleton and the names of its parts that you'll need to match to the correct place. In a moment, I will turn off the projector so please try to remember as much as possible.*

## Attachment 1

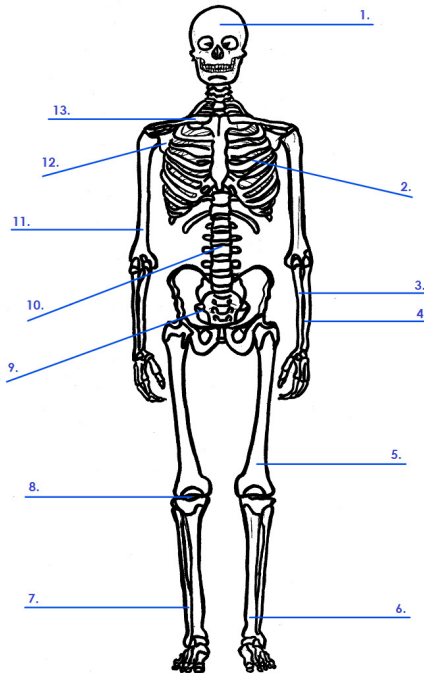


Graphic: Klaudia Kozuszek

The teacher turns off the projector and gives the students copies of the human skeleton (see attachment 2).

The teacher gives 5 minutes for this exercise.

## Attachment 2



skull, clavicle, scapula (shoulder blade), humerus, spine, pelvis, patella, tibia, fibula, femur, radius, ulna, rib cage

Answers: 1. skull 2. rib cage 3. ulna 4. radius 5. femur 6. tibia 7. fibula 8. patella 9. pelvis 10. spine 11. humerus 12. scapula (shoulder blade) 13. clavicle

After 5 minutes the teacher checks the answers with the students by showing them the labelled image (see attachment 1) on a projector.

The teacher says: *Well done! Can you think of any function(s) our skeleton has? Do you have any ideas?*

The teacher elicits answers from students.

The teacher says: *I will now give you 7 sentences among which there are 5 that present the functions of the human skeleton and 2 that do not. Please highlight the appropriate statements (see attachment 3).*

## Attachment 3

1. The human skeleton supports the structure of body.
2. The skeletal system provides protection for organs.

3. The human skeleton gives the body its shape.
4. The human skeleton allows movement.
5. The skeletal system makes blood cells.
6. The human skeleton carries cells and antibodies to fight infection.
7. The skeletal system filters blood.

Answers: sentences 1–5 describe the functions of the human skeleton

The teacher elicits answers from students.

## 6. Summary

The teacher gives the students a summary task in which they have to find five words related to the human skeleton (see attachment 4).

The teacher says: *Please find 5 words related to the human skeleton.*

The teacher gives 3–4 minutes for this exercise.

### Attachment 4

#### The human skeleton

Please find 5 words related to the human skeleton.

S	M	S	W	Q	U	U	J	R	S
J	C	B	K	N	I	M	R	Q	P
Z	S	K	U	L	L	G	T	W	I
B	U	K	J	A	N	L	U	S	O
B	R	R	M	L	G	V	S	T	A
I	E	W	B	U	L	H	E	J	K
B	M	S	B	P	V	O	F	P	F
Y	U	C	L	A	V	I	C	L	E
W	H	H	B	C	K	X	P	T	I
N	S	W	K	S	D	C	P	M	D

Answers:

S	M	S	W	Q	U	U	J	R	S
J	C	B	K	N	I	M	R	Q	P
Z	S	K	U	L	L	G	T	W	I
B	U	K	J	A	N	L	U	S	O
B	R	R	M	L	G	V	S	T	A
I	E	W	B	U	L	H	E	J	K
B	M	S	B	P	V	O	F	P	F
Y	U	C	L	A	V	I	C	L	E
W	H	H	B	C	K	X	P	T	I
N	S	W	K	S	D	C	P	M	D

The teacher says: *Please learn the parts of the human skeleton. We'll use your knowledge at our next meeting.*

## Lesson plan 2. Bones and their types

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** Students will learn the types of bones and bone structure.

**Objectives:** At the end of the lesson the students will be able to:

- enumerate the types of human bones (long, short, flat and irregular);
- classify the different bones;
- describe bone structure.

**Students' background knowledge:** Students should know the basic functions of bones and the parts of the skeletal system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; group work; pair work.

**Didactic support:** handouts: a scientific text; worksheets.

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher says: *I have a task for you. Please take a pen and a piece of paper and write down as many names of the human bones as you remember. You have 2 minutes for that. The student who recalls the largest number of the human bones gets a plus.*

The teacher elicits answers from students.

The teacher says: *Thank you for so many examples of the human bones. Today we'll learn how to classify them.*

### 4. Lead-in

The teacher says: *When we are born we have about 300 bones. In adulthood there are 206 bones in our body. Can you guess how many types of bones we have?* [answer: 4 types]

*That's right! There are four main types of bones: long, short, irregular and flat (plaskie). Please look at the human skeleton you have in your notebooks. Can you give examples of long and flat types?*

Students' anticipated answers: long bones: humerus, radius, ulna; flat bones: scapula, hipbone (kość biodrowa)

The teacher elicits answers from students.

## 5. Presentation and practice

The teacher says: *There are also short and irregular bones. Short bones are located in the wrist (nadgarstek) and ankle joints (stawy skokowe). Irregular bones vary in structure and shape which is usually very complex and helps protect internal organs. The example of irregular bones is vertebrae (krę w kręgosłupie), which protects the spine, or pelvis, which protects organs in the pelvic cavity (jama miednicy). In a moment you'll receive a task in which you'll be asked to decide which bones are short, long, flat or irregular.*

The teacher gives the students a task in which the students have to decide which bones belong to which category (see attachment 1).

The teacher says: *Please choose which bones belong to which category. You have 5 minutes to do this task.*

### Attachment 1

Types of bones	Examples	CORRECT ANSWERS
LONG	humerus, vertebrae,	
SHORT	scapulae, femur, tarsals,	
FLAT	ulna, tibia, sternum, cranial	
IRREGULAR	bones, radius, fibula, carpals, ribs, sacrum	

Answers: long bones: humerus, radius, ulna, femur, fibula, tibia; short bones: tarsals, carpals; flat bones: scapulae, sternum, cranial bones, ribs; irregular bones: vertebrae, sacrum

The teacher monitors the students' work and checks the answers.

The teacher says: *Now it's time to learn how our bones are built. That's the next part of our lesson.*

The teacher gives the students a piece of scientific text adjusted to the students' level of English (see attachment 2).

The teacher says: *Please read the text and underline the elements that form the bones. Work in pairs. One student reads the text and the other follows the text and underlines the bones elements. You may change your roles while doing this exercise. You have 4 minutes to do this task.*

## Attachment 2

When you look at the skeleton you might think that the bones we have are dry, empty and fragile. In fact, they are strong and elastic because they support the human body. They are also alive, growing and changing like other parts of the human body. They contain water that keeps the bones hydrated. We may distinguish the following layers: the first surface is called the periosteum (okostna). It is important for growing and repairing human bones. It is a thin membrane that contains blood vessels and nerves.

The next substance is called bone marrow (szpik kostny), which is in the centre of the bones. Bone marrow is the substance where red and white blood cells are produced. When we are born, all of our bones possess bone marrow. However, when we are adults, only long bones have it.

The bone tissue (tkanka kostna) consists of two parts:

1. Salts (sole) like calcium (wapń) and phosphorus (fosfor) that make the bone strong and resistant.
2. Ossein (osseina) that makes the human bones elastic.

Answers: periosteum, bone marrow, bone tissue, salts, calcium, phosphorus, ossein

The teacher observes students' work and monitors if they do the task correctly. After 4 minutes the teacher checks students' answers.

The teacher says: *On the basis of the text you've just read try to match the functions of mineral salts, water, bone marrow, ossein and periosteum. Please do it in small groups.*

The teacher gives the students the grid (see attachment 3).

## Attachment 3

ELEMENT	FUNCTION
1. Mineral salts	a. It helps to reconstruct the bone when it's broken.
2. Water	b. It hydrates the bones.
3. Bone marrow	c. It is responsible for producing red and white blood cells.
4. Ossein	d. It makes the bones resistant and elastic.
5. Periosteum	e. Thanks to calcium and phosphorus the human bones are strong and resistant.

Answers: 1.e 2.b 3.c 4.d 5.a

The teacher elicits answers from the students.

## 6. Summary

The teacher gives each pair 8 questions. Each question is placed on a separate card. The students ask one another questions. If one gives the correct answer, he/she gets a card with that question. A student with the larger number of cards wins and gets a plus (see attachment 4).

The teacher monitors students' work and verifies the students' answers.

The teacher says: *You'll now work in pairs. Each pair will receive 8 summary questions. Please ask one another. If you answer correctly, you get a point and keep the card on which the question was written. The one who gets more points wins and gets a plus.*

### Attachment 4

How many bones are in the human body at birth?
How many bones are in the human body when we're adults?
How many types of bones do we have? Can you name them?
What are the elements of bones?
What is the function of water in bones?
What is the function of periosteum?
What is the role of ossein?
What is the function of bone marrow?

Answers:

1. How many bones are in the human body at birth? [answer: 300 bones]
2. How many bones are in the human body when we're adults? [answer: 206 bones]
3. How many types of bones do we have? Can you name them? [answer: 4 types: long, short, flat, irregular]
4. What are the elements of bones? [answer: periosteum, bone marrow, bone tissue which consists of mineral salts and ossein]
5. What is the function of water in bones? [answer: it keeps them hydrated]
6. What is the function of periosteum? [answer: it helps to reconstruct the bone when it's broken]
7. What is the role of ossein? [answer: it makes the bones resistant and elastic]
8. What is the function of bone marrow? [answer: it is responsible for producing red and white blood cells]

The teacher says: *Thank you for today's meeting! I have the last question for you; however, you should give me an answer at the beginning of our next lesson. The question is: What enables our bones to move?*

### Lesson plan 3. What moves our bones? A look at the muscular system

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** Students will learn the structure and function of muscles in the human body.

**Objectives:** At the end of the lesson the students will be able to:

- tell how many muscles are in the human body;
- identify the functions of muscles;
- identify the name and location of major muscles in the human body;
- explain differences between voluntary and involuntary muscles.

**Students' background knowledge:** Students should know the basic function of muscles in the human body. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; group work/pair work/individual work.

**Didactic support:** recordings; handouts; Internet sources.

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher says: *For your homework you were supposed answer the question: What enables our bones to move? What's your answer?*

Students' anticipated answer: muscles

The teacher says: *That's right! Our muscles enable our bones to move. Today we'll learn some important information about them: their structure, types, and functions. Before we start, I would like you to tell me if you know how many muscles we have in our body. Any ideas?*

The teacher listens to the students' answers but doesn't provide the correct one (about 700 muscles).

The teacher says: *Please note down your answers. We'll find out who was right during our meeting.*

#### 4. Lead-in

The teacher gives the students a short note (see attachment 1) and says:

*Please look at the short note and listen to it carefully. Don't worry if you don't understand some words, we'll explain it afterwards.*

The teacher reads the text aloud or uses the recording (see recording 1).

## Attachment 1

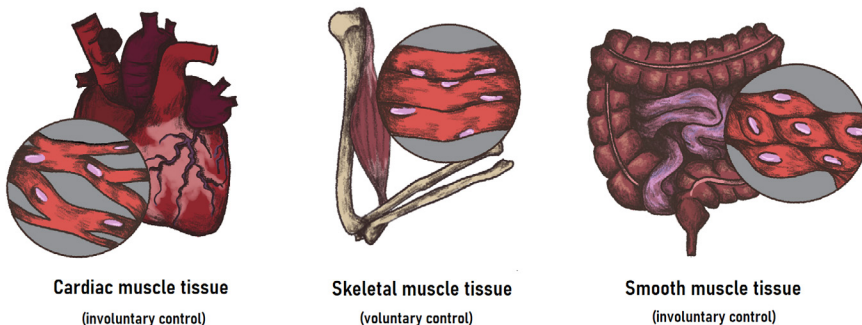
### [RECORDING 1]

There are about 700 muscles in the human body. The muscles in the human body are made up of an **elastic tissue**. We may distinguish three types of muscle tissues: **smooth**, **cardiac**, and **skeletal**. Smooth and cardiac are **involuntary**, while skeletal is **voluntary**. Skeletal muscles are connected to our bones and **joints**.

## 5. Presentation

The teacher explains the text with the use of Polish translation of difficult words and projects an image of the human muscle tissues (see attachment 2).

## Attachment 2



Graphic: Karolina Kondak

The teacher says: *As you can see on a projector, there are three types of muscle tissues. Tissue in Polish means tkanka. Cardiac muscle tissue means 'tkanka mięśniowa sercowa', skeletal muscle tissue is 'tkanka mięśniowa szkieletowa', whereas smooth muscle tissue means 'tkanka mięśniowa gładka. There are two more words that might be difficult to you: voluntary and involuntary. If we say that the muscle tissue is voluntary it means that we decide if we want to use it. In Polish it means that it is 'mięsień podległy woli'. For instance, skeletal muscle tissues that build arms or legs are voluntary. In contrast, smooth muscle tissues that are found in the walls of such organs as stomach or urinary bladder (pęcherz moczowy) are involuntary. This means that we cannot decide if we want to move them. Another example of involuntary muscle is cardiac muscle which is responsible for contracting the heart to pump blood.*

*Now, when you know the three types of muscle tissues and you learned about the main the difference between voluntary and involuntary muscles, it's time to think of the functions of muscles in the human body. I have a task for you that will help you get this information.*

The teacher gives the students a task in which they have to decide if the statements are true or false (see attachment 3). The teacher reads the sentences out loud or asks one of the students to do it. The students work together with the teacher and they all decide if the statement is true or false. The teacher gives 3–4 minutes to label the parts.

### **Attachment 3**

1. One of the main functions of our muscular system is the movement of our body.
2. Our muscular system causes the movement of substances through the body.
3. The muscular system produces white and red blood cells.
4. The muscular system is responsible for the production of nerve cells.
5. Our muscles maintain the posture and body position.
6. One of the main functions of our muscular system is the generation of body heat.

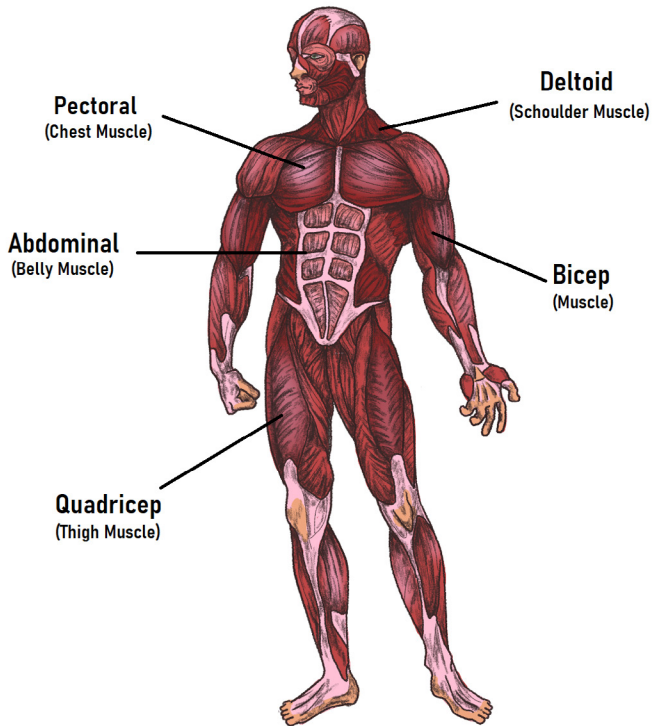
Answers: 1.T 2.T 3.F 4.F 5.T 6.T

The teacher elicits answers from students.

*The teacher says: Our muscles are responsible for pushing blood through our veins. Thanks to that our organs can work correctly. Together with our skeletal system they enable our body to stand up straight. The last thing we'll learn today is muscles in the human body and their main functions. Please look at the projector.*

The teacher shows on a projector the main muscles in the human body (see attachment 4).

## Attachment 4



Graphic: Karolina Kondek

The teacher says: *Here are the most major muscles in the human body. Pectoral, in other words chest muscles, means 'mięśnie piersiowe' connects the front of our chest with the bones of the upper arm and shoulder.*

*Abdominal muscle, also known as belly muscle, holds our organs in place and supports the trunk (tułów). It is located under the ribcage (klatka piersiowa).*

*Biceps are located between the shoulder and the elbow. They allow our arms to move.*

*Quadriceps, also known as thigh muscles (mięsień czworogłowy), enable our body to walk, run, jump, etc. They are situated in the front of thighs.*

*Deltoid muscle (mięsień naramienny), in other words, shoulder muscle, is located around the human shoulder and it allows its movement.*

Source: <http://kidshealth.org/en/kids/muscles.html>

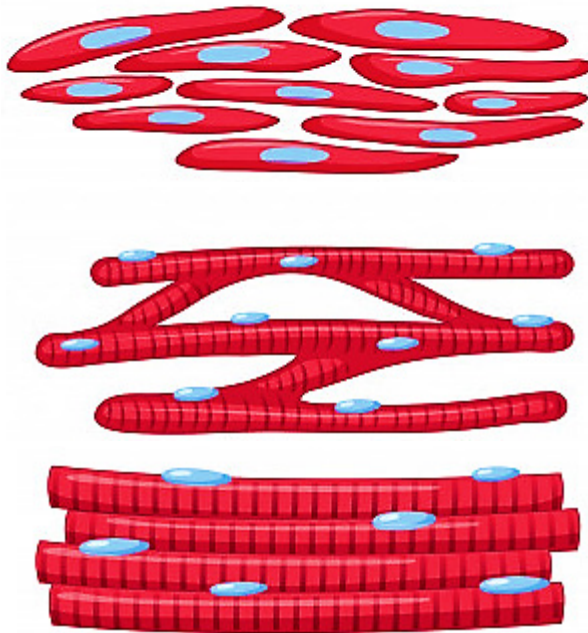
## 6. Practice

The teacher gives the students a worksheet with three tasks. Each task checks students' knowledge on the muscular system (see attachment 1).

The teacher gives 10 minutes for this exercise.

### Attachment 5

Exercise 1. Name the following images of muscle tissues and write if they are voluntary or involuntary.



Graphic: Judyta Pawliszko

Exercise 2. What muscles were used in the following situations? Are they voluntary or involuntary? Focus on the words in bold.

- Kate **ran** in a marathon last year.
- Ron **wrote** a letter to his girlfriend.
- It was so silent that Lillie could hear her **heartbeat**.
- Kevin joined the karate classes. He learned how to **do the high kicks**.
- Sebastian **lifted** 50 kilos yesterday.
- Igor **ate** a cake.

Exercise 3. Match the synonyms of the following muscles of the human body.

PECTORAL  
ABDOMINAL  
BICEPS  
QUADRICEPS  
DELTOID

BELLY MUSCLES  
THIGH MUSCLES  
SHOULDER MUSCLES  
MUSCLES  
CHEST MUSCLES

Answers:

Exercise 1. smooth, cardiac, skeletal

Exercise 2. a) quadriceps, voluntary; b) skeletal, voluntary; c) cardiac, involuntary; d) quadriceps, voluntary; e) deltoid, voluntary; f) abdominal, involuntary

Exercise 3. pectoral-chest muscles; abdominal-belly muscles; biceps-muscles; quadriceps-thigh muscles; deltoid-shoulder muscles  
The teacher elicits answers from students.

## 7. Summary

The teacher asks students the final question: *Can you now tell me how many muscles are in the human body?*

Students' anticipated answer: 700

The teacher asks: *Who guessed this answer at the beginning of our lesson?*

The teacher gives students homework: *Please watch a video available at this link: <https://www.youtube.com/watch?v=aLPIRJve70M> and revise information we learned in today's lesson.*

## IV The human digestive system

### Lesson plan 1. Nutrients: carbohydrates, fats, proteins

#### How do we know that they are in our food?

**IMPORTANT:** Before the lesson starts the students should be asked to make a list of the products they eat during the day. The longer the list the better.

**Form:** students of the 7th grade – primary school

**Realization time:** 90 minutes

**General aim:** Students will learn the structure and function of the digestive system

**Objectives:** At the end of the lesson the students will be able to:

- name and identify the organs of the digestive system;
- describe the functions of each organ of the digestive system;
- explain the process of digestion.

**Students' background knowledge:** Students should know the basic information about digestive system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; group work.

**Didactic support:** things needed to do the experiments (see attachments).

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher asks their students to count how many products they wrote in their lists. The student that wins gets a plus and reads his/her list out loud. The teacher writes down the products on the whiteboard.

#### 4. Lead-in

The teacher draws a pie chart/a table that includes three categories: **carbohydrates, fats, and proteins**, and asks students to insert each product to the category it belongs.

The teacher says: *Please insert each product to the appropriate category. Decide whether they should go to carbohydrates (węglowodany), fats (tłuszcze) or proteins (białka).*

## 5. Presentation

The teacher asks students to read their answers and makes sure they understand the difference between carbohydrates, fats and proteins.

The teacher says: *Carbohydrates, or carbs, are sugar molecules which are broken down in our body into glucose. It is important because glucose or blood sugar is the main source of energy for the body's cells, tissues, and organs. Common foods that include carbohydrates are whole grains, fruits, milk, milk products, starchy (bogaty w skrobię) vegetables (potatoes, peas, corn, etc.).*

*Fats (tłuszcze) give you energy and help your body absorb some vitamins. Proteins (białka) are in every cell in the body. Thanks to proteins, the body can build and maintain bones, muscles and skin. We get proteins from meat, dairy products, nuts, and certain grains and beans.*

Source:

Carbohydrates: [<https://medlineplus.gov/carbohydrates.html>]

Fats: [<https://medlineplus.gov/dietaryfats.html>]

Proteins: [<https://medlineplus.gov/dietaryproteins.html>]

## 6. Practice

The teacher divides students into three groups and explains that each group has to do an experiment (see attachment 1, 2 and 3).

The teacher gives 10 minutes for this exercise.

### Attachment 1

#### INSTRUCTION FOR GROUP 1

Extracting proteins from food

#### Things needed:

One apple, concentrated nitric acid, a pipette, test tubes, and a test-tube stand.

#### How to do the experiment:

1. Put the apple slice into the test tube.
2. Add a few drops of concentrated nitric acid very carefully using a pipette.
3. Watch the test tube and then put it back into the test-tube stand. If the food contains proteins, it will turn yellow.
4. Write down the results of the experiment and think of the conclusions you may draw from your observations.

## **Attachment 2**

### **INSTRUCTION FOR GROUP 2**

Extracting starch from food

#### **Things needed:**

A slice of bread, measuring-glass with water, a dropper, Lugol's iodine, test tubes, and a test-tube stand.

#### **How to do the experiment:**

1. Put the slice of bread into the test tube.
2. Add some water and mix.
3. Take three drops of Lugol's iodine with a dropper and pour it into the test tube.
4. Watch the test tube and then put it back into the test-tube stand. If the food contains starch, it will turn purple.
5. Write down the results of the experiment and think of the conclusions you may draw from your observations.

## **Attachment 3**

### **INSTRUCTION FOR GROUP 3**

Extracting fats from food

#### **Things needed:**

A slice of cheese, Sudan III alcoholic solution, a dropper, a burner, test tubes, tongs to hold the test-tube, and a test-tube stand.

#### **How to do the experiment:**

1. Put the slice of cheese into the test tube.
2. Take some Sudan III alcoholic solution with a dropper and add it into the test tube.
3. Heat the test tube over the burner.
4. Watch the test tube and then put it back into the test-tube stand. If the food contains fats, it will turn orange.
5. Write down the results of the experiment and think of the conclusions you may draw from your observations.

#### **Safety advice when using a burner:**

1. Always light the splint before turning on the gas.
2. Always inspect the burner, tubing, and gas valve before use.
3. Tie back long hair and do not wear loose long sleeves. Take care that hair, clothing, and hands are a safe distance away from the flame at all times. Never reach over an exposed flame.

4. Use tongs when holding objects in a flame.
5. Never leave a lit burner unattended.
6. Never leave anything that is being heated unattended.
7. Always turn the burner off when it is not in use.
8. Never look into a test tube or container being heated.
9. Never point the open end of a test tube being heated towards anyone.
10. The barrel of the burner may remain hot for some time after the burner has been used. Carefully check to make sure the burner has cooled before moving it or putting it away.

The teacher monitors students' work and helps whenever it's needed. The teacher asks each group to write down their observations.

The teacher says: *While taking your notes, please answer the following questions: What was the main product of our experiment? What liquid was used? What did we extract? What colour did we achieve? What does it mean?*

## **7. Summary**

The students present their observations to other students by reading out loud their notes. Those who listen also take notes. The teacher monitors students' answers and gives comments.

## Lesson plan 2. Vitamins, minerals, water: is this all we need to survive?

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** Students will learn the functions of vitamins, minerals and water in the human body.

**Objectives:** At the end of the lesson the students will be able to:

- name fat-soluble and water-soluble vitamins;
- distinguish macro- and micronutrients;
- explain the importance of water in the human body;
- explain the importance and effects of vitamin and mineral deficiencies in the human body.

**Students' background knowledge:** Students should know the basic information about the digestive system and carbohydrates, fats, and proteins. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; reading for general information; group work; individual work.

**Didactic support:** reading texts; jigsaw; markers; Bristol board.

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher asks the students an easy question: *What did you have for your dinner yesterday? Make a list of products you had. You'll have 3 minutes to do it.*

The students try to write down what they had for dinner.

The teacher says: *Last week we paid attention to nutrients: carbohydrates, fats, proteins. They are all very important in our diet. Can you think of other nutrients which are essential to our health?*

If students don't know the answer, the teacher can help them by saying: *This nutrient starts with the letter 'v' and ends with 'n'. It consists of seven letters. Another one starts with 'm' and ends with 's'. It is in plural and consists of eight letters.*

When students find out the answer the teacher says: *That's right! Vitamins and minerals also help our body to perform hundreds of functions! Today we're going to talk about vitamins, minerals and water. Let's see how much you know about them.*

The teacher writes the students' answers on the whiteboard: **Vitamins, minerals, water: is this all we need to survive?**

#### **4. Lead-in**

The teacher says: *Vitamins are essential micronutrients required by the body in small amounts to support a range of vital functions. Vitamins are divided into two groups: water-soluble (B-complex vitamins and C vitamins) and fat-soluble vitamins (A, D, E and K). Unlike water-soluble vitamins that need regular replacement in the body, fat-soluble vitamins are stored in the liver and fatty tissues, and are eliminated much more slowly than water-soluble vitamins.*

Source: <https://extension.colostate.edu/topic-areas/nutrition-food-safety-health/fat-soluble-vitamins-a-d-e-and-k-9-315/>

The teacher divides students into five groups and explains what they are about to do.

The teacher says: *We will now work in groups. I want you to divide yourselves into five equal groups. Each team will have one task to do.*

*Group 1 will read a text about fat-soluble vitamins (see attachment 1).*

*Group 2 will get familiar with water-soluble vitamins (see attachment 2).*

*Group 3 will focus on a text about water (see attachment 3).*

*Group 4 will focus on a text about macronutrients/macrominerals (see attachment 4).*

*Group 5 will read a text about micronutrients/trace minerals (see attachment 5).*

The teacher gives each student a fragment of text (according to their group) and says: *You'll now have five minutes to carefully read the fragment you received. You may highlight the key words and phrases.*

After five minutes the teacher says: *I will now give each group some markers and a Bristol board and I want you to find the key words/phrases from the text and write down, using your OWN words the most crucial information about your subject. You will also need to answer one question: WHAT IS THE ROLE OF the nutrient you need to describe?*

*Each group should choose a team leader who will then present your work. Please speak English while doing this task.*

#### **Attachment 1 for Group 1**

Fat-soluble vitamins are most abundant in high-fat foods and are much better absorbed into your bloodstream when you eat them with fat.

There are four fat-soluble vitamins in the human diet: Vitamin A, Vitamin D, Vitamin E, Vitamin K

## **Vitamin A**

Vitamin A, also known as retinol, is a fat-soluble vitamin traditionally associated with vision and eye health.

The most abundant dietary sources of vitamin A are liver, fish liver oil and butter.

It can also be derived from provitamin A carotenoids found in red, yellow and orange vegetables, as well as some leafy, dark-green vegetables.

Deficiency is rare in developed countries, but is most common among people who follow diets lacking in diversity, especially those dominated by rice, white potatoes and cassava.

Early symptoms of vitamin A deficiency include night blindness, and severe deficiency may eventually lead to total blindness.

Nevertheless, while getting enough vitamin A is vital, too much may cause harm.

Pregnant women should be extra careful not to eat excessive amounts of vitamin A because of the risk of birth defects.

## **Vitamin D**

Vitamin D is sometimes called the sunshine vitamin. This is because your skin can produce all the vitamin D you need, given enough sunlight.

Nevertheless, most people don't get enough vitamin D from sunlight alone. Also, few foods naturally contain high amounts of vitamin D, making supplements necessary.

The richest natural sources of vitamin D include fatty fish, fish oil and mushrooms that have been exposed to sunlight or ultraviolet light.

Vitamin D deficiency is traditionally associated with osteomalacia in adults, or rickets in children. Both diseases are characterized by brittle or soft bones.

## **Vitamin E**

Vitamin E is a group of powerful antioxidants, the most common of which is alpha-tocopherol.

Its main function is to serve as an antioxidant and protect the body's cells against damage by free radicals.

The most abundant dietary sources of vitamin E include vegetable oils, nuts and seeds. Deficiency is very rare in healthy people.

While supplements may provide certain health benefits, not all scientists agree. The long-term safety of vitamin E supplements is a matter of debate.

## **Vitamin K**

Vitamin K is a group of fat-soluble compounds divided into vitamin K1 (phylloquinone) and vitamin K2 (menaquinone).

Vitamin K1 is mainly found in leafy green vegetables, whereas vitamin K2 comes from animal-sourced foods, such as liver, butter and egg yolks.

Small amounts are also produced by gut bacteria in the colon.

Deficiency impairs the blood's ability to clot, causing a risk of excessive bleeding.

There is limited evidence on the health benefits of supplements among people who aren't deficient. However, a few controlled studies suggest that vitamin K supplements benefit bone and heart health.

*Source: <https://www.healthline.com/nutrition/fat-soluble-vitamins#6>*

## **Attachment 2 for Group 2**

Vitamins are often categorised based on their solubility.

Most of them dissolve in water and are called water-soluble vitamins. In contrast, there are only four fat-soluble vitamins, which dissolve in oil (liquid fat).

Nine water-soluble vitamins are found in the human diet:

- Vitamin B1 (thiamine)
- Vitamin B2 (riboflavin)
- Vitamin B3 (niacin)
- Vitamin B5 (pantothenic acid)
- Vitamin B6
- Vitamin B7 (biotin)
- Vitamin B9
- Vitamin B12 (cobalamin)
- Vitamin C

Unlike the fat-soluble vitamins, water-soluble vitamins are generally not stored in the body. For this reason, you should try to get them regularly from your diet.

**Thiamine**, also known as vitamin B1, was the first B vitamin to be discovered.

Like the other B vitamins, thiamine acts as a coenzyme. It plays an essential role in many metabolic processes, including those that convert nutrients into energy. The richest dietary sources of thiamine include liver, pork, seeds and whole-grain cereals. Deficiency is uncommon, but diabetes and excessive alcohol intake increase the risk. Serious deficiency may result in diseases such as beriberi and Wernicke-Korsakoff syndrome.

High-dose thiamine supplements do not seem to have any adverse effects and the tolerable upper intake level hasn't been established. However, sup-

plements do not appear to have any benefits for those who get adequate amounts from their diets.

**Niacin**, also known as vitamin B3, is a group of two related compounds – niacinamide and nicotinic acid. They serve many vital functions in the body. Niacin is found in many different foods, such as liver, fish, poultry, eggs, dairy products, sunflower seeds and peanuts, to name a few. Additionally, it is commonly added to processed food like flour and breakfast cereals.

Deficiency is rare in Western nations. People who eat low-protein diets that lack diversity are at an increased risk.

High-dose nicotinic acid supplements are commonly used to normalize blood lipid levels, although some scientists doubt the vitamin's benefits for heart health.

But supplements may also have some negative side effects, such as liver damage, reduced insulin sensitivity and niacin flush.

**Pantothenic acid**, also known as vitamin B5, plays various important roles in metabolism.

Almost all foods contain this vitamin. The best sources include liver, sunflower seeds, mushrooms, root vegetables and whole grains.

Since pantothenic acid is so widespread in foods, deficiency is virtually unknown and is usually only associated with severe malnutrition.

Supplements are safe and do not have any adverse effects. However, very high doses may cause diarrhoea and other digestive issues.

Although some people regularly take pantothenic acid supplements, there is currently no strong evidence for their effectiveness in the treatment of diseases in those who get adequate amounts from food.

**Vitamin B6** is a group of nutrients that are required for the formation of pyridoxal phosphate, a coenzyme that plays a vital role in numerous metabolic pathways.

The richest dietary sources are liver, salmon, sunflower seeds and pistachio nuts, to name a few.

Deficiency is rare, although regularly drinking high amounts of alcohol may raise the risk.

High supplemental doses may cause nerve damage and skin lesions, but getting vitamin B6 from food doesn't appear to have any negative effects.

While adequate vitamin B6 intake is healthy, no good evidence demonstrates that vitamin B6 supplements are useful in the treatment of diseases.

**Biotin**, also known as vitamin B7, is a coenzyme required for many key metabolic processes.

It is found in a wide range of foods. Good sources include organ meats, egg yolk, meat, legumes, cauliflower, mushrooms and nuts.

Deficiency is uncommon and adverse effects are unknown, even at high supplemental doses. Further studies need to establish the tolerable upper intake level. Limited evidence supports the use of biotin supplements among people who already get adequate amounts from their diets. However, a few studies suggest they may improve the symptoms of MS and strengthen brittle nails.

Like all other B vitamins, **vitamin B9** acts as a coenzyme. It is essential for cell growth and various key metabolic functions.

It is found in both plants and animals. Rich sources include liver, legumes and leafy greens.

Deficiency in vitamin B9 is uncommon. The main symptom is anaemia, but in pregnant women, low levels also raise the risk of birth defects. High intake doesn't have any serious adverse effects.

For those who get enough vitamin B9 from their diet, the benefits of supplements are unclear. But studies suggest they may reduce the risk of heart disease and lower blood sugar levels.

**Vitamin B12** functions as a coenzyme and plays a vital role in many metabolic pathways. It also helps maintain neurological function and the formation of red blood cells.

It is found in virtually all animal-sourced foods, but is absent from plant foods. As a result, vegans are at risk of deficiency or poor vitamin B12 status. Older people are also at risk because of impaired absorption. Anaemia and impaired neurological function are classic deficiency symptoms.

High supplemental intake doesn't have any known adverse effects. No strong evidence shows that they have benefits either, at least not in those who get adequate amounts from their diets.

**Vitamin C** is a powerful antioxidant that is vital for the maintenance of connective tissue.

The main dietary sources are fruits and vegetables, but low amounts can be acquired from raw animal-sourced foods. Deficiency, known as scurvy, is rare in developed countries.

Most people tolerate high-dose supplements without any adverse effects. However, studies on the benefits of vitamin C supplements have had mixed results, suggesting supplements may not be that useful for those who already get sufficient amounts from their diets.

*Source: <https://www.healthline.com/nutrition/water-soluble-vitamins>*

### **Attachment 3 for Group 3**

You know you need water to survive, and you feel better when you drink it regularly. But what's really at play in the body when you sip H<sub>2</sub>O?

In short, a lot.

Here are the reasons why water is such a powerful element when it comes to your health.

#### **1. Water Protects Your Tissues, Spinal Cord, and Joints**

Water does more than just quench your thirst and regulate your body's temperature; it keeps the tissues in your body moist. You know how it feels when your eyes, nose, or mouth gets dry? Keeping your body hydrated helps it retain optimum levels of moisture in these sensitive areas, as well as in the blood, bones, and brain. In addition, water helps protect the spinal cord, and it acts as a lubricant and cushion for your joints.

#### **2. Water Helps Your Body Remove Waste**

Adequate water intake enables your body to excrete waste through perspiration, urination, and defecation. Water helps your kidneys remove waste from your blood and keep the blood vessels that run to your kidneys open and helps filter the blood, according to the National Kidney Foundation. Water is also important for helping prevent constipation, points out the University of Rochester Medical Centre. However, as research notes, there is no evidence to prove that increasing your fluid intake will cure constipation.

#### **3. Water Aids in Digestion**

Water is important for healthy digestion. As the Mayo Clinic explains, water helps break down the food you eat, allowing its nutrients to be absorbed by your body. After you drink, both your small and large intestines absorb water, which moves into your bloodstream and is also used to break down nutrients. As your large intestine absorbs water, the stool changes from liquid to solid, according to the National Institute for Diabetes and Digestive and Kidney Diseases. Water is also necessary to help you digest soluble fibre, according to MedlinePlus. With the help of water, this fibre turns to gel and slows digestion.

#### **4. Water Prevents You From Becoming Dehydrated**

Your body loses fluids when you engage in vigorous exercise, sweat in high heat, or come down with a fever or contract an illness that causes vomiting or diarrhoea, according to the Centers for Disease Control and Prevention. If you're losing fluids for any of these reasons, it's important to increase your fluid intake so that you can restore your body's natural hydration level. Your doctor may also recommend that you drink more fluids to help treat other

health conditions, like bladder infections and urinary tract stones. If you're pregnant or nursing, you may want to consult with your physician about your fluid intake because your body will be using more fluids than usual, especially if you're breastfeeding.

#### 5. Water Helps Your Brain Function Optimally

Ever feel foggy headed? Take a sip of water. Research shows that dehydration is a drag to memory, attention, and energy, according to a small study on adult men from China published in June 2019 in the *International Journal of Environmental Research and Public Health*. It's no wonder, considering H<sub>2</sub>O makes up 75 percent of the brain, the authors point out. One reason for that foggy-headed feeling? "Adequate electrolyte balance is vital to keeping your body functioning optimally. Low electrolytes can cause issues including muscle weakness, fatigue, and confusion," says Gabrielle Lyon, DO, a functional medicine physician in New York City.

#### 6. Water Keeps Your Cardiovascular System Healthy

Water is a huge part of your blood. (For instance, plasma — the pale yellow liquid portion of your blood — is about 90 percent water, notes Britannica.) If you become dehydrated, your blood becomes more concentrated, which can lead to an imbalance of the electrolyte minerals it contains (sodium and potassium, for example), says Susan Blum, MD, founder of the Blum Center for Health in Rye Brook, New York. These electrolytes are necessary for proper muscle and heart function. "Dehydration can also lead to lower blood volume, and thus blood pressure, so you may feel light-headed or woozy standing up," she says.

#### 7. Water Can Help You Eat Healthier

It may be plain, but it's powerful. In a study of more than 18,300 American adults, people who drank just 1 percent more water a day ate fewer calories and less saturated fat, sugar, sodium, and cholesterol, according to a study published in February 2016 in the *Journal of Human Nutrition and Dietetics*. Water may help fill you up, especially if you drink it before eating a meal, a notion that was backed up in a small study of 15 young, healthy participants that was published in October 2018 in *Clinical Nutrition Research*.

### **Attachment 4 for Group 4**

Minerals are important for your body to stay healthy. Your body uses minerals for many different jobs, including keeping your bones, muscles, heart, and brain working properly. Minerals are also important for making enzymes and hormones.

There are two kinds of minerals: macrominerals and trace minerals. You need larger amounts of macrominerals. They include calcium, phosphorus, magnesium, sodium, potassium, chloride and sulphur. You only need small amounts of trace minerals. They include iron, manganese, copper, iodine, zinc, cobalt, fluoride and selenium.

Most people get the amount of minerals they need by eating a wide variety of foods. In some cases, your doctor may recommend a mineral supplement. People who have certain health problems or take some medicines may need to get less of one of the minerals. For example, people with chronic kidney disease need to limit foods that are high in potassium.

*Source: <https://medlineplus.gov/minerals.html>*

## **Calcium**

You have more calcium in your body than any other mineral. Calcium has many important jobs. The body stores more than 99 percent of its calcium in the bones and teeth to help make and keep them strong. The rest is found throughout the body in blood, muscle and the fluid between cells. Your body needs calcium to help muscles and blood vessels contract and expand, to secrete hormones and enzymes and to send messages through the nervous system. It is important to get plenty of calcium in the foods you eat. Foods rich in calcium include

- Dairy products such as milk, cheese, and yogurt
- Leafy, green vegetables
- Fish with soft bones that you eat, such as canned sardines and salmon
- Calcium-enriched foods such as breakfast cereals, fruit juices, soy and rice drinks, and tofu. Check the product labels.

The exact amount of calcium you need depends on your age and other factors. Growing children and teenagers need more calcium than young adults. Older women need plenty of calcium to prevent osteoporosis. People who do not eat enough high-calcium foods should take a calcium supplement.

*Source: <https://medlineplus.gov/calcium.html>*

## **Sodium**

Your body needs some sodium to work properly. It helps with the function of nerves and muscles. It also helps to keep the right balance of fluids in your body. Your kidneys control how much sodium is in your body. If you have too much and your kidneys can't get rid of it, sodium builds up in your blood. This can lead to high blood pressure. High blood pressure can lead to other health problems.

## **Potassium**

Potassium is a mineral that your body needs to work properly. It is a type of electrolyte. It helps your nerves to function and muscles to contract. It helps your heartbeat stay regular. It also helps move nutrients into cells and waste products out of cells. A diet rich in potassium helps to offset some of sodium's harmful effects on blood pressure.

Many people get all the potassium they need from what they eat and drink.

Sources of potassium in the diet include

- Leafy greens, such as spinach and collards
- Fruit from vines, such as grapes and blackberries
- Root vegetables, such as carrots and potatoes
- Citrus fruits, such as oranges and grapefruit

Your kidneys help to keep the right amount of potassium in your body. If you have chronic kidney disease, your kidneys may not remove extra potassium from the blood. Some medicines also can raise your potassium level. You may need a special diet to lower the amount of potassium that you eat.

## **Attachment 5 for Group 5**

Trace minerals, also called micro minerals, are essential minerals that the human body must get from food, but, unlike macro minerals, we only need a very small amount. Even though trace minerals are needed in tiny doses, they are still crucial to our health and development. The recommended daily allowance for most trace minerals is between .2 and 15 milligrams. You can see below a list of trace minerals, their functions, and common foods that contain them.

### **Trace Minerals:**

- **Chromium** helps insulin regulate glucose (blood sugar) levels and can be found in liver, whole grains, nuts, and cheeses.
- **Copper** aids in the formation of bone and cartilage and helps the body use iron properly. Copper can be found in beef, organ meats, fruits, vegetables, nuts, and beans.
- **Fluoride** aids in the formation of bones and teeth and helps prevent tooth decay. It can be found in fish, some teas, and water that is either naturally fluorinated or has added fluoride. It is important not to exceed the recommended daily allowance for fluoride.
- **Iron** is critical for the manufacture of blood and crucial in pregnancy and early childhood. Iron can be found in meat, poultry, enriched breads and cereals, whole grains, nuts, and beans.

- **Manganese** can be found in many foods, particularly plants. It is involved in many chemical processes in the body, including processing of cholesterol, carbohydrates, and protein. It might also be involved in bone formation.
- **Molybdenum** is an essential mineral found in high concentrations in legumes, grains and organ meats. It activates enzymes that help break down harmful sulphites and prevent toxins from building up in the body.
- **Iodine** is found in hormones that help regulate metabolism, growth, and development and can be found in foods that are grown in iodine rich soil. Most people now get iodine from iodized salt, since iodine deficiency is a leading worldwide cause of impaired cognitive development in children.
- **Selenium** is an antioxidant found in grains, meat, and seafood. Antioxidants are molecules that can help protect against cell damage.
- **Zinc** is found in many enzymes in the human body that help make protein and genetic material. Zinc also plays a role in foetal development, wound healing, the immune system, and adolescent development. It can be consumed through meat, fish, poultry, vegetables, and some grains.

Source: <https://www.brainbalancecentres.com/blog/trace-minerals-important-health>

## 5. Presentation and practice

The teacher monitors students' work and encourages them to speak English all the time. When the students are ready, the teacher asks team leaders to present the students' projects. Each group has to take notes.

The teacher says: *Each team leader will now have 3–5 minutes to present the results of the students' work. I want you to listen to them carefully and take notes.*

The students present their projects. The teacher should monitor their presentations.

## 6. Summary

The teacher asks students to guess the name of vitamins/minerals.

The teacher says: *Please try to guess the name of the following vitamins or minerals:*

- *It helps with the function of nerves and muscles. It also helps to keep the right balance of fluids in your body. Your kidneys control the level of it in your body.*

- *It is a mineral that is involved in many chemical processes in the body.*
- *It keeps the tissues in your body moist.*
- *It is sometimes called the sunshine vitamin.*
- *Its main function is to serve as an antioxidant and protect the body's cells against damage by free radicals.*

Students' anticipated answers: 1. sodium 2. magnesium 3. water 4. vitamin D 5. vitamin E

### Lesson plan 3. How your digestive system works

**Form:** students of the 7<sup>th</sup> grade – primary school

**Realization time:** 90 minutes

**General aim:** Students will learn the structure and function of the digestive system

**Objectives:** At the end of the lesson the students will be able to:

- name and identify the organs of the digestive system;
- describe the functions of each organ of the digestive system;
- explain the process of digestion.

**Students' background knowledge:** Students should know the basic information about the digestive system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; pair work; individual work.

**Didactic support:** worksheets; Internet sources: TED-Ed video; crossword.

**Procedure and stages of the lesson:**

**1. Greeting**

**2. Checking attendance**

**3. Warm-up**

The teacher gives the students a short crossword (see attachment 1) and asks them to read out loud the password.

Students' anticipated answer: digest

The teacher says: *Please do this crossword as fast as you can and try to guess its password. It's the combination of letters in grey fields. What is it?*

#### Attachment 1

**Across**

2. Wanting or needing food
3. Not bitter or salty

**Down**

1. You eat them on Fat Thursday
3. If something contains strong flavours it is

Answers: 1. donuts 2. hungry 3. sweet 4. spicy

The teacher elicits answers from the students.

#### 4. Lead-in

The teacher continues: *That's right! It's the word 'digest', which means the process of changing food in your stomach into substances that your body can use. Today we'll find out how digestion works in the human body. You'll also learn to name and identify the organs of the digestive system and describe the functions of each organ. Let's start!*

#### 5. Presentation and Practice

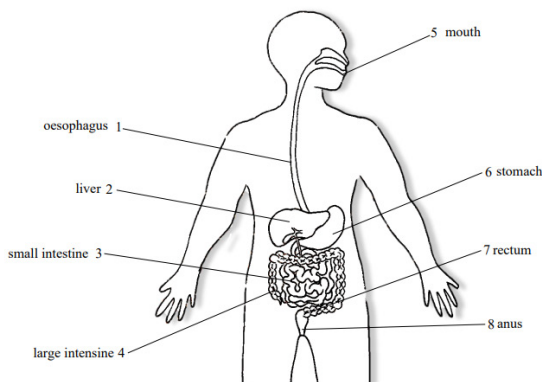
The teacher shows the students a video that explains how the digestive system works. The video is about 5 minutes long.

Available at: <https://ed.ted.com/lessons/how-your-digestive-system-works-emma-bryce>

*How your digestive system works – Emma Bryce*

After watching the video, the teacher gives the students handouts with an image of the digestive system (see attachment 2) and explains difficult terms.

#### Attachment 2



Graphic: Milena Rzońca

The teacher says: *On the basis of the video you've just watched, I want you to get familiar with the following words: gastrointestinal tract (przewód pokarmowy), pancreas (trzustka), gallbladder (pęcherzyk żółciowy) mouth, oesophagus (przelyk), stomach, liver (wątroba), enzymes, hormones, nerves,*

*blood, mesentery (krezka), saliva (ślina), peristalsis (perystaltyka), bile (żółć), chime (miażga pokarmowa), small intestine/duodenum (jelito cienkie), jejunum (jelito czcze), ileum (jelito kręte), villi (kosmki) large intestine/colon (jelito grube), stool (stolec) rectum (odbytnica), anus (odbyt).*

The teacher gives the students handouts with the terms he/she explained (see attachment 3).

### **Attachment 3**

gastrointestinal tract (przewód pokarmowy)

pancreas (trzustka)

gallbladder (pęcherzyk żółciowy)

mouth

oesophagus (przełyk)

stomach

liver (wątroba)

enzymes, hormones, nerves, blood,

mesentery (krezka)

saliva (ślina)

peristalsis (perystaltyka)

bile (żółć)

chime (miażga pokarmowa)

small intestine/duodenum (jelito cienkie)

jejunum (jelito czcze)

ileum (jelito kręte)

villi (kosmki)

large intestine/colon (jelito grube)

stool (stolec)

rectum (odbytnica)

anus (odbyt)

The teacher says: *Please look at the projector now and try to match the terms you've just learned to their definitions.*

The teacher shows on a projector the following definitions (see attachment 4):

### **Attachment 4**

1. It is a twisting channel that transports your food and has an internal surface area of between 30 and 40 square meters.
2. A trio of organs that break down food using an array of special juices.

3. They work together to break down food, modulate the digestive process, and deliver its final products.
4. It is a large stretch of tissue that supports and positions all your digestive organs in the abdomen, enabling them to do their jobs.
5. It is a series of defined muscular contractions.
6. It is a yellowish-green liquid that digests fat, in preparation for the next stages of digestion process.

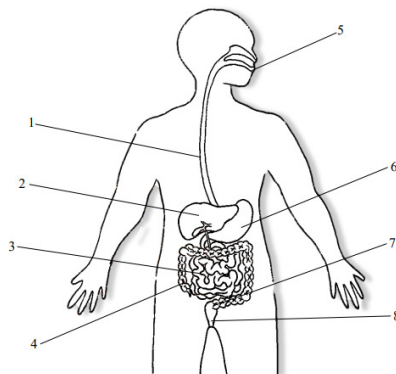
Answers: 1. gastrointestinal tract 2. pancreas, gallbladder, liver 3. enzymes, hormones, nerves, blood 4. mesentery 5. peristalsis 6. bile

The teacher elicits answers from the students.

The teacher shows the students an image of the digestive system and asks them to name its parts from number 1 to 8 (see attachment 5).

The teacher says: *Please name the parts of the digestive system you see on the projector.*

### Attachment 5



Graphic: Milena Rzońca

mouth    oesophagus    small intestine    large intestine  
                                  stomach    liver    rectum    anus

Answers: 1. oesophagus 2. liver 3. small intestine 4. large intestine 5. mouth 6. stomach 7. rectum 8. anus

The teacher monitors the students' work, checks their answers and says: *Well done! Now it's time to make a plan of the digestion process! Please put the*

*following processes in the correct order. I want you to work in pairs (see attachment 6). While doing the task, please listen to the audio of the video you watched at the beginning of our lesson. It helps you put all stages into the correct order.*

The teacher monitors the students' work and plays the recording of the video to help the students put the sentences in the correct order.

### **Attachment 6**

- a. The body drains out most of the remaining fluid through the intestinal wall. What's left is a soft mass called a stool. The colon squeezes this by-product into a pouch called the rectum.
- b. Here, it dissolves the fats floating in the slurry of chyme so they can be easily digested by the pancreatic and intestinal juices that have leached onto the scene. These enzyme-rich juices break the fat molecules down into fatty acids and glycerol for easier absorption into the body. The enzymes also carry out the final deconstruction of proteins into amino acids and carbohydrates into glucose.
- c. The digestive process begins before food even hits your tongue.
- d. After three hours inside the stomach, the once shapely bolus is now a frothy liquid called chyme, and it's ready to move into the small intestine.
- e. Once inside your mouth, chewing combines with the sloshing saliva to turn food into a moist lump called the bolus.
- f. Nerves in the surrounding oesophageal tissue sense the bolus's presence and trigger peristalsis, a series of defined muscular contractions that propels the food into the stomach, where it's left at the mercy of the muscular stomach walls, which bound the bolus, breaking it into chunks.
- g. Enzymes present in the saliva break down any starch. Then, your food finds itself at the rim of a 25-centimetre-long tube called the oesophagus, down which it must plunge to reach the stomach.
- h. Hormones, secreted by cells in the lining, trigger the release of acids and enzyme-rich juices from the stomach wall that start to dissolve the food and break down its proteins. These hormones also stimulate the pancreas, liver, and gallbladder to produce digestive juices and transfer bile, a yellowish-green liquid that digests fat, in preparation for the next stage.
- i. The by-products of digestion exit through the anus and the food's long journey, typically lasting between 30 and 40 hours, is finally complete.
- j. The blood takes them on the final leg of their journey to feed the body's organs and tissues. But it's not over quite yet. Leftover fibre, water, and

dead cells sloughed off during digestion make it into the large intestine, also known as the colon.

- k. This happens in the small intestine's lower regions, the jejunum and ileum, which are coated in millions of tiny projections called villi. These create a huge surface area to maximize molecule absorption and transference into the blood stream.

Answers: 1. c 2. e 3. g 4. f 5. h 6. d 7. b 8. k 9. j 10. a 11. i

The teacher elicits answers from the students.

## **6. Summary**

The teacher asks the students to decide if the statements he/she reads are true or false (see attachment 5).

### **Attachment 7**

1. The digestive system provides our blood with oxygen.
2. The digestive system breaks down food particles into smaller substances.
3. Food travels in the digestive tract in the following order: mouth, oesophagus, stomach, small intestine and large intestine.
4. The digestive system prepares waste to leave the body.

Answers: 1. F 2. T 3. T 4. T

#### Lesson plan 4. Digestive disorders.

For the purpose of this lesson, each group/pair should have an access to Internet plus one device (laptop or tablet).

**Form:** students of the 7th grade – primary school

**Realization time:** 90 minutes

**General aim:** Students will learn the main pathologies of the digestive system

**Objectives:** At the end of the lesson the students will be able to:

- enumerate the most common pathologies of the digestive system;
- describe the symptoms of such pathologies of the digestive system as constipation, gas, lactose intolerance, ulcers, botulism, cholera, e-coli, and salmonella;
- describe the possible treatments of such pathologies of digestive system as constipation, gas, lactose intolerance, ulcers, botulism, cholera, e-coli, and salmonella.

**Students' background knowledge:** Students should know the basic information about the digestive system in the human body. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; reading/finding relevant information; team work/pair work.

**Didactic support:** laptops/tablets; handouts; Internet sources.

**Procedure and stages of the lesson:**

##### 1. Greeting

##### 2. Checking attendance

##### 3. Warm-up

The teacher says: *I would like you to list as many Polish names of pathologies of the digestive system as you remember.*

The teacher writes some of the pathologies on the whiteboard (mainly those that will be explained at this lesson) and gives the students a worksheet with the Polish and English names of some diseases of the digestive system (see attachment 1).

The teacher says: *Please match Polish names of the pathologies of digestive system to their English equivalents.*

#### Attachment 1

constipation, gas, lactose intolerance, ulcers, botulism, cholera, e-coli, salmonella, nausea, diarrhoea, acid indigestion (heartburn), Gastroesophageal reflux disease (GERD), Colorectal polyps/colorectal cancer  
zgaga, rak jelita grubego, zatwardzenie, zarzucanie żołądkowo-przełykowe (refluku), gazy, nietolerancja laktozy, wrzód, zatrucie jadem kiełbasianym, bakteria e-coli, salmonella, cholera, nudności, biegunka

The teacher monitors students' work and checks their answers by asking students to read out loud their answers.

Answers:

Constipation – zatwardzenie

gas – gazy

lactose intolerance – nietolerancja laktozy

ulcers – wrzody

botulism – zatrucie jadem kiełbasianym

cholera – cholera

e-coli – bakteria e-coli

salmonella – salmonella

nausea – nudności

diarrhoea – biegunka

acid indigestion (heartburn) – zgaga

Gastroesophageal reflux disease (GERD) – zrzucanie żołądkowo-przełykowe (refluks)

Colorectal polyps/colorectal cancer – rak jelita grubego

#### **4. Lead-in**

The teacher asks the students to work in pairs (or in small groups). There should be 13 pairs (or small groups) so that each pair/group receives one pathology to describe.

The teacher asks the students to use laptops/tablets (or cell phones) and gives each pair one pathology to describe. The students draw lots with the names of digestive disorders.

The teacher says: *Each pair will have to focus on one digestive disorder. You will now draw lots with the names of pathologies of the digestive system. When you find out which digestive disorder you are to describe, please take your device (either a laptop or a tablet) and go to the website I'll ask you to use. Your task is to make a brochure/leaflet that you may find when you visit a doctor or pharmacy. The best brochure wins and it will be posted online on our school website.\**

\* Please note that you may think of some other rewards, e.g. you may scan and print the brochure, send it to the nearest clinic and ask for promulgation, you may pin the brochure on the noticeboard or ask the school's hygienist to keep it in her/his office.

## 5. Presentation and practice

The teacher continues: *A good brochure should include answers to the following questions and provide some ideas.*

The teacher presents on a projector some tips to make an effective brochure (see: attachment 2).

### Attachment 2

1. Consider who will read your brochure.
2. Include only the most important information:
  - a. What's the name of the digestive disorder?
  - b. What causes this disorder?
  - c. What are the symptoms?
  - d. What is the appropriate treatment?
3. Don't forget about some images. They will make your brochure more visible and eye-catching.

The teacher makes sure that each pair understands the task and gives students the list of links they can use to make their own brochures (see attachment 3). Ideally, send the links to a shared mailbox so that the students can use it from their devices.

### Attachment 3

#### Links to be used to make a brochure:

Digestive Disorder	Links
Constipation	<a href="https://kidshealth.org/en/teens/constipation.html?ref=search">https://kidshealth.org/en/teens/constipation.html?ref=search</a>
Gas	<a href="https://kidshealth.org/en/kids/fart.html?ref=search">https://kidshealth.org/en/kids/fart.html?ref=search</a>
Lactose intolerance	<a href="https://kidshealth.org/en/teens/lactose-intolerance.html">https://kidshealth.org/en/teens/lactose-intolerance.html</a>
Ulcers	<a href="https://kidshealth.org/en/teens/ulcers.html?ref=search">https://kidshealth.org/en/teens/ulcers.html?ref=search</a>
Botulism	<a href="https://www.cdc.gov/botulism/index.html">https://www.cdc.gov/botulism/index.html</a>
Cholera	<a href="https://kidshealth.org/en/teens/cholera.html?ref=search">https://kidshealth.org/en/teens/cholera.html?ref=search</a>
E-coli	<a href="https://kidshealth.org/en/teens/e-coli.html?ref=search">https://kidshealth.org/en/teens/e-coli.html?ref=search</a>
Salmonella	<a href="https://kidshealth.org/en/teens/salmonellosis.html?ref=search">https://kidshealth.org/en/teens/salmonellosis.html?ref=search</a>
Nausea	<a href="https://www.healthline.com/health/nausea#causes">https://www.healthline.com/health/nausea#causes</a>
Diarrhoea	<a href="https://kidshealth.org/en/teens/diarrhoea.html?ref=search">https://kidshealth.org/en/teens/diarrhoea.html?ref=search</a>
Acid indigestion (heartburn)	<a href="https://www.healthline.com/health/nausea#causes">https://www.healthline.com/health/nausea#causes</a>
Gastroesophageal reflux disease (GERD)	<a href="https://kidshealth.org/en/teens/gerd.html?ref=search">https://kidshealth.org/en/teens/gerd.html?ref=search</a>
Colorectal polyps/colorectal cancer	<a href="https://www.healthline.com/health/colorectal-polyps#risk-factors">https://www.healthline.com/health/colorectal-polyps#risk-factors</a>

The teacher gives students at least 30 minutes to make a brochure and then asks each pair to present the results of their work. Each student has one vote for the best brochure. The teacher comments on the students' work and encourages every student to give some feedback.

The teacher says: *After watching all the presentations we will now vote and decide which brochure, in your opinion, is the best one. You each have one vote. Please write down the name of digestive disorder which was best explained.*

The teacher gives the students a small piece of paper. The teacher gives 2–3 minutes to vote.

## **6. Summary**

The teacher reveals the results of the voting and asks the winners to show the other students their work once again. To sum up the lesson, the teacher asks the students to enumerate all the digestive disorders they have learned during the lesson. He/She collects all the brochures and pins them on a noticeboard.

## V The human circulatory system

### Lesson plan 1. What colour is blood?

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** Students will learn the function of blood components and how to identify them

**Objectives:** At the end of the lesson the students will be able to:

- enumerate components of the blood;
- identify functions of blood components;
- differentiate the functions of red and white blood;
- explain differences between platelets and plasma;
- explain why blood is red.

**Students' background knowledge:** Students should know the basic function of blood in the human body. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; group work.

**Didactic support:** recordings; handouts; Internet sources.

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher asks the students to write down in their notebooks an answer to the question given in lesson's subject and gives one minute for the task. After 30 seconds the teacher asks students to raise their hands if they wrote 'red'. Probably most students gave this answer.

The teacher says: *At this lesson I want to prove you that our blood is not red at all. At least its liquid part.*

#### 4. Lead-in

The teacher shows the students human blood under the microscope. If it's possible, the students use the microscopes by themselves. If not, the teacher shows students the photos available at: [https://www.austincc.edu/histology-help/tissues/tt\\_blood.html](https://www.austincc.edu/histology-help/tissues/tt_blood.html)

The teacher asks the students: *What can you see in the photos? How many 'blood parts' we can distinguish?*

Students' anticipated answers: Students should be able to notice red cells, white cells and 'the space' between them (plasma); however, they don't have to provide the teacher with the names/terms.

## 5. Presentation

The teacher introduces the students the components of blood: plasma, red blood cells, white blood cells and platelets, by giving them the following task to do:

The teacher says: *Please listen to the recording and, on the basis of your knowledge, try to match the given terms to the descriptions you're going to hear (see attachment 1 and recording 2).*

### Attachment 1

#### [RECORDING 2]

It is the liquid part of blood. It is mostly water. It contains many different substances dissolved in it.

They are most of the cells in the blood. They are unusually small. They are red because they contain a red pigment called haemoglobin.

They are larger than the other cells in our blood, and they always have a nucleus. They help to defend us against bacteria and viruses that get into the body. Some kinds of those cells put out 'fingers' that capture the bacterium. Then they produce enzymes that kill and digest the bacterium. Other cells produce special molecules called antibodies that attach to the bacteria and kill them.

They are small fragments of cells. If a blood vessel gets damaged, they help the blood to clot and seal the wound.

*Source: Jones, M., Fellowes-Freeman, D., Sang, D. (2013), Cambridge Checkpoint. Science. Coursebook 8, Cambridge University Press, pp. 36–37.*

Answers: plasma, red blood cells, white blood cells, platelets

The teacher elicits answers from students.

Teacher says: *Well done! Now you know all four components of blood which are: red blood cells, white blood cells, platelets and plasma. However, we still don't know why blood is red. Let's focus on red blood cells more to find out! Please listen to this short information carefully.*

The teacher gives one of the students a short note and ask one to read it out loud or reads it by himself (see attachment 2).

## **Attachment 2**

When blood flows through the lungs, oxygen diffuses into it. The oxygen combines with the haemoglobin inside those cells. The haemoglobin becomes oxyhaemoglobin. This is a very bright red.

When the blood flows through the body tissues, the oxygen separates from the haemoglobin. The oxygen diffuses out of the red blood cells and into the tissues. The oxyhaemoglobin becomes just haemoglobin again. This is a dull blueish-red.

*Source: Jones, M., Fellowes-Freeman, D., Sang, D. (2013), Cambridge Checkpoint. Science. Coursebook 8, Cambridge University Press, p. 36.*

The teacher asks the students: *Please tell me what makes our blood red?*

Students' anticipated answer: haemoglobin

The teacher continues: *That's right! Now I have a few more tasks for you about blood.*

## **6. Practice**

The teacher shows students 5 sentences (see attachment 3) and says: *Please read these sentences and decide whether they are true or false.*

Teacher gives 5 minutes for this exercise.

## **Attachment 3**

1. White blood cells transport oxygen.
2. Plasma is responsible for transporting dissolved substances such as sugar.
3. White and red blood cells float in a liquid called platelets.
4. Red blood cells are red because they contain haemoglobin.
5. Platelets help the blood to clot if a blood vessel gets damaged.

Answers: 1. F – correct answer: red blood cells 2. T 3. F – correct answer: plasma 4. T 5. T

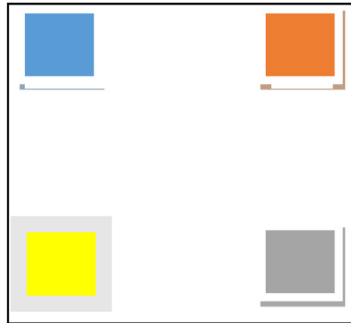
The teacher elicits answers from students.

## **7. Summary**

To summarise the lesson and evaluate students' understanding of the given material, the teacher uses a 'four corner strategy' (see attachment 4). Each student receives a square which is coloured in the corners with 4 different colours (blue, red, yellow and grey). Additionally, students get four squares

(1 blue, 1 red, 1 yellow and 1 grey) which represent one component of blood: blue for white blood cells, red square for red blood cells, yellow for platelets and grey for plasma. Their task is to answer the questions asked by the teacher by choosing one square and placing it into the relevant corner of the paper.

#### Attachment 4



1. This cell is responsible for carrying oxygen throughout your body.
2. This blood cell destroys invading micro-organisms.
3. This component of blood transports dissolved substances such as sugar.
4. This component of blood helps blood to clot.
5. This blood cell is larger than other blood cells and it always has a nucleus.
6. This blood cell produces enzymes that kill and digest the bacterium.
7. This part of blood is mostly water.
8. This blood cell is unusually small.
9. This blood cell contains haemoglobin.
10. This component of blood produces chemicals that cause fibres to form in the blood.

Answers: 1. red blood cell 2. white blood cell 3. plasma 4. platelets 5. white blood cell 6. white blood cell 7. plasma 8. red blood cell 9. red blood cell 10. platelets

## Lesson plan 2. The human circulatory system – how does it work?

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** The students will learn about the human circulatory system

**Objectives:** At the end of the lesson the students will be able to:

- explain how the process of blood circulation works;
- explain the functions of the primary organs of the human circulatory system;
- explain the differences between oxygenated and deoxygenated blood;
- explain the role of the circulatory system for the human body.

**Students' background knowledge:** Students should know the basic function of the heart and circulatory system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** listening for general information; matching words to their definitions; finding mistakes in a text; group work.

**Didactic support:** handout; diagram of the human circulatory system (copies for each student).

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher says: *What do you feel if you place the tips of your index and middle finger on the inside of your wrist below the base of your thumb and press lightly?*

Students' anticipated answers: pulse, beat or heartbeat

### 4. Lead-in

The teacher says: *That's correct! Each pulse that you can feel now means that it is one beat of your heart. It is your heart that constantly pushes blood around your body and keeps you alive. The blood travels round your body inside BLOOD VESSELS. I will now give you an exercise in which you should match terms to their definitions (see attachment 1). Please do the task in a group of three.*

The teacher gives 7 minutes for this exercise.

## Attachment 1

Term	Definition
1. Arteries (sing. Artery)	A. A muscle that pumps blood around the body.
2. Veins (sing. Vein)	B. The main artery that carries blood from the heart for distribution to all parts of the body.
3. Heart	C. Carry blood back to the heart.
4. Carbon dioxide	D. A colourless, odourless, tasteless gas that is necessary for life. Its chemical symbol is O.
5. Oxygen	E. The smallest of the body's blood vessels. They have thin walls thanks to which oxygen and glucose can pass through and enter the cells. Also, thanks to them waste products such as carbon dioxide can pass back into the blood to be carried away and taken out of the body.
6. Capillaries	F. It carries oxygen to deliver to body tissues.
7. Aorta	G. It carries carbon dioxide to be expelled from body.
8. Oxygenated blood	H. A colourless gas which has a faint, sharp odour and a slightly sour taste. Its chemical formula is CO <sub>2</sub> , which means that it consists of one atom of carbon and two atom of oxygen.
9. Deoxygenated blood	I. The vessels that carry blood away from the heart.
10. Valves	J. They prevent the backward flow of blood.

Source: <https://www.brainpop.com/games/buildabodycirculatorysystem>

Answers: 1. I 2. C 3. A 4. H 5. D 6. E 7. B 8. F 9. G 10. J

The teacher elicits answers from the students.

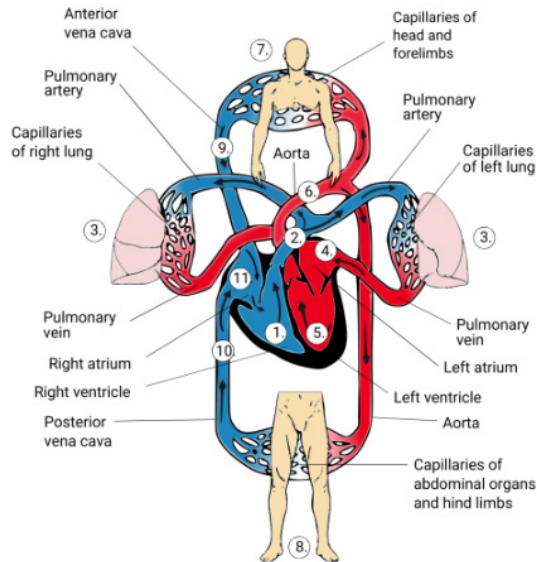
The teacher says: *These terms and definitions will allow us to see how the human circulatory system works.*

### 5. Presentation

The teacher says: *The heart and blood vessels make up the circulatory system. Now I will show you a diagram which presents the basic plan on which the blood vessels are arranged (see attachment 2). In the meantime, I will read you a text which explains how the human circulatory system works (see attachment 3). I want you to listen to it and look at the diagram carefully. Don't worry if you don't understand everything, we'll explain it later.*

The teacher shows the students the diagram and reads the text. The teacher shows on the diagram what he/she reads.

## Attachment 2



Graphic: Karolina Kloc

## Attachment 3

### What Does the Circulatory System Do?

The circulatory system is made up of blood vessels that carry blood away from and towards the heart. **Arteries** carry blood away from the heart and **veins** carry blood back to the heart.

The circulatory system carries oxygen, nutrients, and hormones to cells, and removes waste products, like carbon dioxide. These pathways travel in one direction only, to keep things going where they should.

### What Are the Parts of the Circulatory System?

Two pathways come from the heart:

- The **pulmonary circulation** is a short loop from the heart to the lungs and back again.
- The **systemic circulation** carries blood from the heart to all the other parts of the body and back again.

In pulmonary circulation:

- The pulmonary artery is a big artery that comes from the heart. It splits into two main branches, and brings blood from the heart to the lungs. At the lungs, the blood picks up oxygen and drops off carbon dioxide. The blood then returns to the heart through the pulmonary veins.

In systemic circulation:

- Next, blood that returns to the heart has picked up lots of oxygen from the lungs. So it can now go out to the body. The aorta is a big artery that leaves the heart carrying this oxygenated blood. Branches from the aorta send blood to the muscles of the heart itself, as well as all other parts of the body. [...]

At each body part, a network of tiny blood vessels called **capillaries** connects the very small artery branches to very small veins. The capillaries have very thin walls, and through them, nutrients and oxygen are delivered to the cells. Waste products are brought into the capillaries.

Capillaries then lead into small veins. Small veins lead to larger and larger veins as the blood approaches the heart. Valves in the veins keep blood flowing in the correct direction. Two large veins that lead into the heart are the superior vena cava and inferior vena cava. [...]

Once the blood is back in the heart, it needs to re-enter the pulmonary circulation and go back to the lungs to drop off the carbon dioxide and pick up more oxygen.

Source: <https://kidshealth.org/en/teens/heart.html>

## 6. Practice

The teacher says: *You listened to the text and looked at the diagram. I will now give you a fragment of the same text; however, it will contain FIVE mistakes. Please work in groups of three and try to correct them* (see attachment 4).

The teacher gives 7 minutes for this exercise.

### Attachment 4

#### What Does the Circulatory System Do?

The circulatory system is made up of blood vessels that carry blood away from and towards the heart. **1. Pulmonary circulation** carries blood away from the heart and **2. Arteries** carry blood back to the heart.

The circulatory system carries oxygen, nutrients, and hormones to cells, and removes waste products, like carbon dioxide. These pathways travel in one direction only, to keep things going where they should.

#### What Are the Parts of the Circulatory System?

Two pathways come from the heart:

- The **3. Veins** is a short loop from the heart to the lungs and back again.
- The **4. Capillaries** carries blood from the heart to all the other parts of the body and back again.

In pulmonary circulation:

- The pulmonary artery is a big artery that comes from the heart. It splits into two main branches, and brings blood from the heart to the lungs. At the lungs, the blood picks up oxygen and drops off carbon dioxide. The blood then returns to the heart through the pulmonary veins.

In systemic circulation:

Next, blood that returns to the heart has picked up lots of oxygen from the lungs. So it can now go out to the body. The aorta is a big artery that leaves the heart carrying this oxygenated blood. Branches from the aorta send blood to the muscles of the heart itself, as well as all other parts of the body. [...]

At each body part, a network of tiny blood vessels called **5. systemic circulation** connects the very small artery branches to very small veins. The capillaries have very thin walls, and through them, nutrients and oxygen are delivered to the cells. Waste products are brought into the capillaries.

Source: <https://kidshealth.org/en/teens/heart.html>

Answers: 1. arteries 2. veins 3. pulmonary circulation 4. systemic circulation 5. capillaries

The teacher elicits answers from students.

## 7. Summary

The teacher reads five sentences aloud. The students have to decide which statements are true or false.

The teacher says: *Please decide whether the following statements are true or false.*

1. The heart and blood vessels make up the circulatory system.
2. Blood flows out of the heart inside arteries, and back into the heart inside veins.
3. Oxygen does not enter the blood as the blood passes through lungs.
4. When blood contains a lot of oxygen it is deoxygenated.
5. When blood has lost most of its oxygen it becomes a more blueish-red and it is deoxygenated.

Source: Jones, M., Fellowes-Freeman D., Sang, D. 2013. Cambridge Checkpoint. Science. Coursebook 8. Cambridge University Press, p. 33.

Answers: 1. T 2. T 3. F 4. F 5 T

### Lesson plan 3. From the bottom of my heart

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** Students will be able to identify parts of heart, and their functions

**Objectives:** At the end of the lesson the students will be able to:

- explain how the human heart works;
- distinguish the functions of the heart;
- identify the four chambers of the heart;
- explain how the blood flows through the heart.

**Students' background knowledge:** Students should know the basic function of the heart and circulatory system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; gap-filling; pair work; group work.

**Didactic support:** video; handout; diagram of the human heart (copies for each student).

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher says: *Let's start our lesson with a short riddle that will help you guess today's subject. Here it is:*

*It is the size of an adult's fist. It beats about 115,000 times each day and pumps about 7600 litres of blood a day. It is just under your ribs, slightly to the left of centre of your body. It has four chambers and it can continue beating even when it's disconnected from the body. What is it?*

Students' anticipated answer: human heart

The teacher says: *That's right! Today we'll talk about the human heart, its functions and structure. Let's start!*

The teacher writes the topic on the whiteboard: **From the bottom of my heart.**

The teacher may explain the meaning of a phrase/metaphor: 'the bottom of one's heart', which means 'very sincerely'.

#### 4. Lead-in

The teacher says: *I will now give you nine words and I would like you to match them to their Polish translations. Don't worry if you don't know all the answers. We'll explain everything later (see attachment 1).*

The teacher gives 3–4 minutes for this exercise.

### Attachment 1

<b>Term</b>	<b>Polish translation</b>
Systole	Skurcz serca, wtłaczający krew do tętnicy
Diastole	Komora serca
Aorta	Odtlenowana krew
Valve	Przedsionek serca
Artery	Rozkurcz serca
Atrium (pl. atria/atria)	Tętnica
Ventricle	Tętnica główna/aorta
Oxygenated blood	Utlenowana krew
Deoxygenated blood	Zastawka

Answers:

<b>Term</b>	<b>Polish translation</b>
Systole	Skurcz serca, wtłaczający krew do tętnicy
Diastole	Rozkurcz serca
Aorta	Tętnica główna/aorta
Valve	Zastawka
Artery	Tętnica
Atrium (pl. atria/atria)	Przedsionek serca
Ventricle	Komora serca
Oxygenated blood	Utlenowana krew
Deoxygenated blood	Odtlenowana krew

The teacher elicits answers from students.

## 5. Presentation

The teacher says: *I will now present you a video about the human heart and circulatory system. Please watch it carefully.* Available at: <https://www.youtube.com/watch?v=CWFyxn0qDEU>

After watching the video, the teacher asks the students: *On the basis of what you've seen, can you please tell me what the function of the human heart is? Try to find at least one function. Please work in pairs or small groups.*

The teacher monitors students' work and writes their answers on the whiteboard.

The teacher asks: *Please write down the functions of the human heart in your notebooks.*

Students' anticipated answers:

- It supplies oxygen and nutrients to the tissues;
- It removes carbon dioxide and other wastes;
- The right atrium pumps deoxygenated blood to the right ventricle;
- The left atrium pumps oxygenated blood to the left ventricle;
- The left ventricle pumps oxygen-rich blood to the rest of the body;
- The right ventricle gets blood from the right atrium and pumps it to the lungs to load it with oxygen.

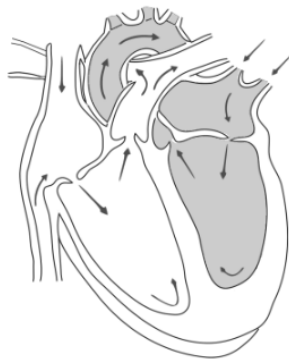
Source: [https://www.medicinenet.com/what\\_are\\_the\\_four\\_main\\_functions\\_of\\_the\\_heart/article.htm](https://www.medicinenet.com/what_are_the_four_main_functions_of_the_heart/article.htm)

The teacher says: *We already know what the functions of the heart are. The next step is to get to know exactly how the heart works. Please look at the diagram (see attachment 2).* The teacher continues:

*The heart is made of muscle. This muscle contracts and then relaxes. When muscle contracts, it gets shorter. This makes the walls of the heart chambers squeeze inwards. This pushes blood out of the heart.*

*There are valves between the upper chambers and the lower chambers. The valves only let the blood flow from the upper chamber to the lower chamber. There are also valves in the big arteries coming out of the heart. These valves only let the blood flow out, not back into the heart. This is what happens during one heart beat: the heart muscle contracts, pushing blood out into the arteries; the heart muscle relaxes, allowing blood to flow into the heart from the veins.*

## Attachment 2



Graphic: Karolina Kloc

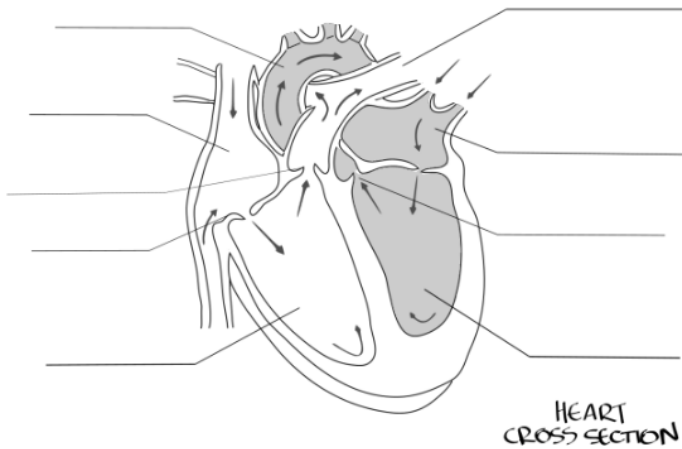
## 6. Practice

The students are given copies with a drawing of the human heart (see attachment 3).

The teacher says: *Now I would like you to label the parts of the human heart with the use of the words you have below the drawing. You have 3 minutes to do this exercise.*

### Attachment 3

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Graphic: Karolina Kloc

Answers (given from the top right): pulmonary artery, left atrium, aortic valve, left ventricle, right ventricle, tricuspid valve, pulmonary valve, right atrium, aorta

The teacher elicits answers from students.

## 7. Summary

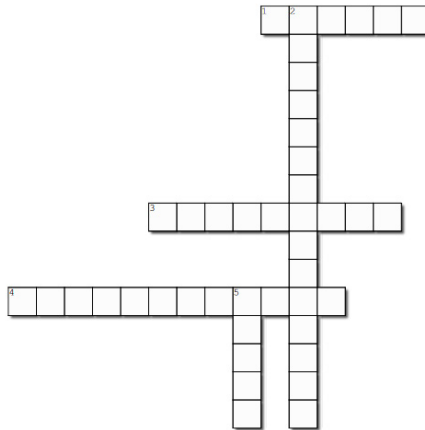
The teacher gives students the crossword (see attachment 4) and says: *Please do the crossword in pairs or small groups. You'll have five minutes to do this task.*

# Attachment 4

Name: \_\_\_\_\_

## The human heart

Complete the crossword puzzle below



Created using the Crossword Maker on TheTeachersCorner.net

### Across

1. one of the two spaces at the top part of the heart that receive blood from the veins and push it down into the ventricles (= )
3. either of two small, hollow spaces, one in each side of the heart, that force blood into the tubes leading from the heart to
4. the valve (= a structure that opens and closes) in the heart that stops blood from returning into the left atrium (= upper sp

### Down

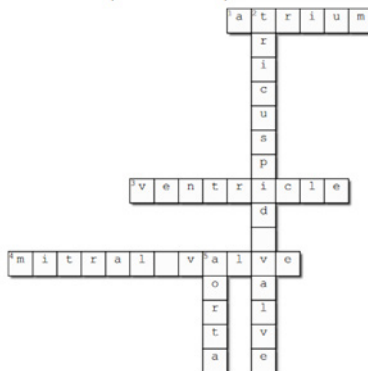
2. the valve (= structure that opens and closes) in the heart that stops blood from returning into the right atrium (= upper spa
5. the main artery (= thick tube carrying blood from the heart) that takes blood to the other parts of the body

Answers:

Name: \_\_\_\_\_

## The human heart

Complete the crossword puzzle below



Created using the Crossword Maker on TheTeachersCorner.net

### Across

1. one of the two spaces at the top part of the heart that receive blood from the veins and push it down into the ventricles (= **atrium**)
3. either of two small, hollow spaces, one in each side of the heart, that force blood into the tubes leading from the heart to (**ventricle**)
4. the valve (= a structure that opens and closes) in the heart that stops blood from returning into the left atrium (= upper sp (**mitral valve**))

### Down

2. the valve (= structure that opens and closes) in the heart that stops blood from returning into the right atrium (= upper spa (**tricuspid valve**))
5. the main artery (= thick tube carrying blood from the heart) that takes blood to the other parts of the body (**aorta**)

## Lesson plan 4. Immune system and its functions

**Form:** students of the 7th grade – primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the immune system

**Objectives:** At the end of the lesson the students will be able to:

- explain the structure of the immune system;
- explain the functions of the immune system;
- explain the role of white blood cells;
- distinguish two groups of leukocytes and name their functions.

**Students' background knowledge:** Students should know the basic function of circulatory system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; text analysis by writing the questions based on the given fragment; group work.

**Didactic support:** TED video about the immune system; handout (a tape script of the recording).

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher asks the students: *Can you guess the name of the system we'll discuss today? I'll give you some hints: it is bigger than the vascular system and moves about twice the amount of fluid on a daily basis. It defends your body and escorts foreign bodies away. Contrary to the circulatory system, it has no pump, and it is unidirectional, which means that it moves in one direction. If it stopped working, we would die within 24–48 hours. What is it?*

The students may find it hard to guess the name of the immune system, so the teacher may reveal the name after a few minutes. Both names: immune system and lymphatic system are correct.

### 4. Lead-in and presentation

The teacher says: *I would like you to watch and listen to a short video about the immune system. Don't worry if you don't understand everything. The video is about 5 minutes long.*

The students try to focus on the video and get as much information as possible. Available at: <https://www.youtube.com/watch?v=PSRJfaAYkW4>

After watching the video, the teacher asks students a few questions:

*Can you tell me why the immune system is so important? What are leukocytes? What are two main cellular groups? What are phagocytes? What are lymphocytes?*

If students don't know the answer, the teacher does not provide it but ensures students that they learn about it/them later.

## 5. Practice

The teacher divides students into three groups and gives each group a fragment of the tape script from the video (see attachment 1).

The teacher says: *I want you to work in three groups. Each group receives one short fragment of a tape script and needs to write five questions about the text you receive. First, read the text very carefully and then think of questions about the given fragment. You will have ten minutes to do this task.*

### Attachment 1

#### Text 1

A mosquito lands on your arm, injects its chemicals into your skin, and begins to feed. You wouldn't even know it was there, if not for the red lump that appears, accompanied by a tell-tale itch. It's a nuisance, but that bump is an important signal that you're being protected by your **immune system**, your body's major safeguard against infection, illness, and disease. This system is a vast network of cells, tissues, and organs that coordinate your body's defences against any threats to your health. Without it, you'd be exposed to billions of bacteria, viruses, and toxins that could make something as minor as a paper cut or a seasonal cold fatal. The **immune system** relies on millions of **defensive white blood cells**, also known as **leukocytes**, that originate in our **bone marrow**. These cells migrate into the bloodstream and **the lymphatic system**, a network of vessels which helps clear bodily toxins and waste. Our bodies are teeming with leukocytes: there are between 4,000 and 11,000 in every microlitre of blood. As they move around, leukocytes work like security personnel, constantly screening the blood, tissues, and organs for suspicious signs.

#### Text 2

This system mainly relies on cues called **antigens**. These molecular traces on the surface of pathogens and other foreign substances betray the presence

of invaders. As soon as the leukocytes detect them, it takes only minutes for the body's protective immune response to kick in. Threats to our bodies are hugely variable, so the immune response has to be equally adaptable. That means relying on many different types of leukocytes to tackle threats in different ways. Despite this diversity, we classify leukocytes in **two main cellular groups**, which coordinate a two-pronged attack. First, **phagocytes** trigger the immune response by sending macrophages and dendritic cells into the blood. As these circulate, they destroy any foreign cells they encounter, simply by consuming them. That allows phagocytes to identify the antigen on the invaders they just ingested and transmit this information to the second major cell group orchestrating the defence, the **lymphocytes**. A group of lymphocyte cells called **T-cells** go in search of infected body cells and swiftly kill them off. Meanwhile, **B-cells** and helper **T-cells** use the information gathered from the unique antigens to start producing special proteins called antibodies.

### **Text 3**

Each antigen has a unique, matching antibody that can latch onto it like a lock and key, and destroy the invading cells. B-cells can produce millions of these, which then circulate through the body and attack the invaders until the worst of the threat is neutralised. While all of this is going on, familiar symptoms, like high temperatures and swelling, are actually processes designed to aid the immune response. A warmer body makes it harder for bacteria and viruses to reproduce and spread because they're temperature-sensitive. And when body cells are damaged, they release chemicals that make fluid leak into the surrounding tissues, causing swelling. That also attracts phagocytes, which consume the invaders and the damaged cells. Usually, an immune response will eradicate a threat within a few days. It won't always stop you from getting ill, but that's not its purpose. Its actual job is to stop a threat from escalating to dangerous levels inside your body. And through constant surveillance over time, the immune system provides another benefit: it helps us develop long-term immunity. When B- and T-cells identify antigens, they can use that information to recognize invaders in the future. So, when a threat revisits, the cells can swiftly deploy the right antibodies to tackle it before it affects any more cells. That's how you can develop immunity to certain diseases, like chickenpox. It doesn't always work so well. Some people have autoimmune diseases, which trick the immune system into attacking the body's own perfectly

healthy cells. No one knows exactly what causes them, but these disorders sabotage the immune system to varying degrees, and underlie problems like arthritis, Type I diabetes, and multiple sclerosis. For most individuals, however, a healthy immune system will successfully fight off an estimated 300 colds and innumerable other potential infections over the course of a lifetime. Without it, those threats would escalate into something far more dangerous. So the next time you catch a cold or scratch a mosquito bite, think of the immune system. We owe it our lives.

After 10 minutes the teacher says: *I will now take those questions from you. In the meantime I want you to swap the texts and read them very carefully. Group 1 gives their text to group 2, group 2 to group 3, group 3 to group 1. You will now have three/four minutes to do it.*

After three/four minutes the teacher says: *I will now give each group about five minutes to think of four more questions about the fragment you've just received.*

After five minutes the teacher takes the students' questions and says: *Now, please swap your texts. Group 1 receives text 2, group 2 gets text 3, and group 3 gets familiar with text 1. You'll have three minutes to write two more questions based on the given fragment.*

The teacher monitors the students' work. It doesn't matter if the groups repeat the questions. The main idea of this task is to teach students how to deal with a text that includes new information.

After three minutes the teacher says: *Please give me the questions you wrote. Each group will now have a chance to win a competition in which you need to answer as many questions as possible. The team that wins and answers the largest number of questions, gets a 5.*

The teacher checks whether the questions repeat and monitors the students' involvement in the competition.

## **6. Summary**

The teacher counts the points that each group has scored and announces the winner.

## VI The human respiratory system

### Lesson plan 1. The human respiratory system

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the human respiratory system.

**Objectives:** At the end of the lesson the students will be able to:

- identify the parts of the respiratory system;
- describe the functions of each part of the respiratory system;
- explain the role of the respiratory system for the human body.

**Students' background knowledge:** Students should know the basic function of the lungs and respiratory system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** gap-filling; matching; crossword puzzle; word search; brainstorming; group work; pair work.

**Didactic support:** handouts (copies for each student).

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher begins the lesson by using a balloon and blowing it up.

The teacher says: *Do you know what organ is similar to this balloon and the way it was inflated?*

Students' anticipated answer: the lungs, a lung

The teacher writes the topic on the whiteboard: **The human respiratory system.**

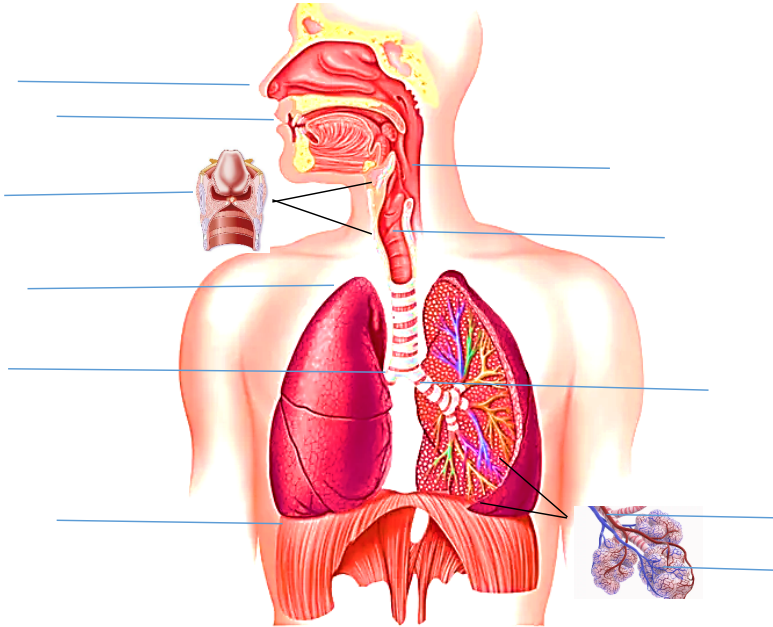
#### 4. Lead-in

The teacher says: *You are right! Before we learn more about the respiratory system I would like you to look at the worksheet. Study the diagram in pairs and identify the parts of the respiratory system. Then use each answer to correctly label the diagram. Don't worry if you don't understand everything, we'll explain it later (see attachment 1).*

The teacher gives 3–4 minutes to label the parts.

## Attachment 1

Label the parts of the respiratory system on this diagram.



trachea	alveoli	nasal cavity	larynx	left bronchi	bronchiole
diaphragm	pharynx	lung	right bronchi	mouth cavity	

Graphic: Judyta Pawliszko

Answers (given clockwise from the top right): pharynx, trachea, right bronchi, bronchiole, alveoli, diaphragm, left bronchi, lung, larynx, mouth cavity, nasal cavity

The teacher elicits answers from the students.

## 5. Presentation

The teacher says: *Please remember/note that each cell in your body needs oxygen for respiration (oddychanie tlenowe). Your cells are constantly producing carbon dioxide as a waste product. The oxygen is in the air. The air consists of 20% of oxygen and 0.04% carbon dioxide. The respiratory system is responsible for getting this oxygen from the air around you into your blood. At the same time, it gets rid of carbon dioxide.*

*During breathing in, air flows through the mouth and nose, down the throat, and through the trachea (tchawica) and bronchi (oskrzela) to the lungs. During breathing out, air goes in the opposite direction. Oxygen is transformed from the air into the bloodstream and carbon dioxide moves out of the blood and back into the air. This process is called gas exchange. Now I would like you to write in your notebook a definition and explanation of each part of the respiratory system as I explain it.*

The teacher goes over the worksheet (see attachment 1) again and explains the function of each part.

*Pharynx: Both food and air pass through the pharynx before reaching their appropriate destinations. The pharynx also plays a role in speech.*

*Trachea: Located just below the larynx, the trachea is the main airway to the lungs.*

*Bronchi: The bronchi branch from the trachea into each lung and create the network of intricate passages that supply the lungs with air.*

*Alveoli: The alveoli exchange oxygen and carbon dioxide molecules to and from the bloodstream.*

*Diaphragm: The diaphragm is the main respiratory muscle that contracts and relaxes to allow air into the lungs.*

*Lungs: Together the lungs form one of the body's largest organs. They're responsible for providing oxygen to capillaries and exhaling carbon dioxide.*

*Larynx: The larynx is essential to human speech.*

*Nasal cavity: Inside the nose, the sticky mucous membrane lining of the nasal cavity traps dust particles, and tiny hairs called cilia help move them to the nose to be sneezed or blown out.*

*Source: Jones, M., Fellowes-Freeman, D., Sang, D. (2013), Cambridge Checkpoint. Science. Coursebook 8, Cambridge University Press, p. 42.*

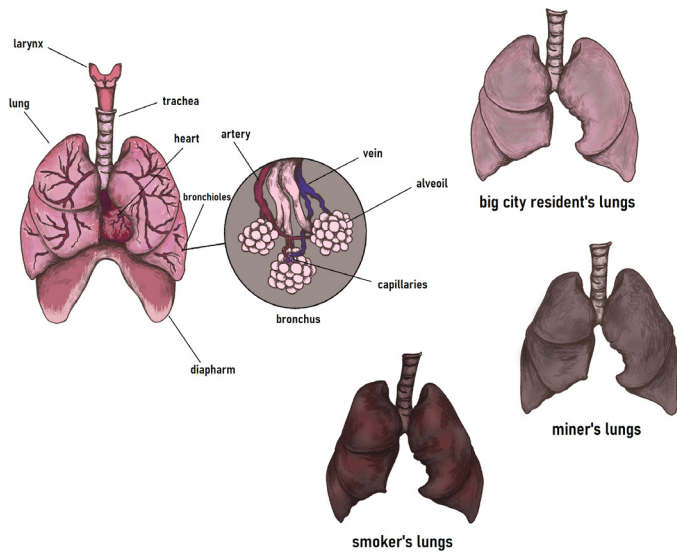
## **6. Practice**

The teacher says: *You're going to work in small groups of 3 or 4. I would like you to compare the healthy pair of lungs with the two other types presented in the worksheet (see attachment 2). How does each person's health condition impact their breathing ability? After discussion, complete exercise 2.*

The teacher gives 10 minutes for this exercise.

### **Attachment 2**

Exercise 1. Compare the healthy pair of lungs and the other types of lungs presented below. Compare each person's condition.



Graphic: Karolina Kondek

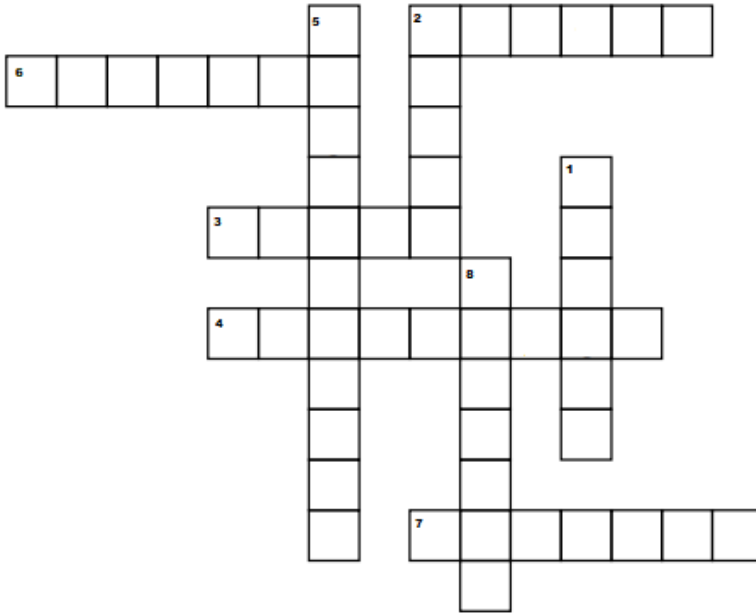
Exercise 2. Find the parts of the respiratory system.

N	A	B	R	O	N	C	H	I	O	L	E	S	C
U	N	V	C	E	X	L	R	C	R	P	I	H	H
P	U	E	A	X	N	Y	R	A	H	P	H	L	I
P	N	I	P	X	G	R	U	I	A	X	I	Y	H
R	L	N	I	S	N	B	R	O	N	C	H	U	S
R	O	I	L	E	U	V	A	L	V	E	O	L	I
R	I	R	L	N	L	L	O	A	P	I	A	N	L
A	U	I	A	I	P	N	A	A	R	S	S	E	R
A	N	X	R	V	R	E	G	R	A	N	A	S	E
R	Y	N	I	N	E	Y	G	T	Y	A	R	X	P
O	R	E	E	B	E	B	L	E	A	N	X	U	X
R	S	R	S	N	X	O	O	R	Y	L	X	N	H
R	T	T	X	X	A	U	N	Y	A	I	E	V	R
O	E	V	V	I	C	E	Y	B	R	O	E	N	H

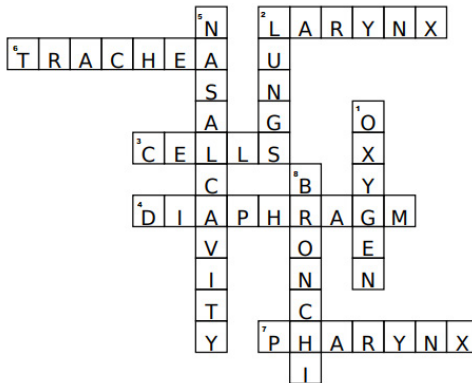
Source: [https://pl.pinterest.com/pin/353391901981044381/?nic\\_v2=1aWBvNy51](https://pl.pinterest.com/pin/353391901981044381/?nic_v2=1aWBvNy51)



After that, the air passes through two large tubes called **(8)** \_\_\_\_\_ .  
 These tubes expand into the left and right lung.



Answers:



The teacher writes the students' answers on the whiteboard.

### 8. The ending

The teacher says: *I would like you to learn the parts of the human respiratory system and their functions.*

## Lesson plan 2. Gas exchange

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the gas exchange process.

**Objectives:** At the end of the lesson the students will be able to:

- identify the path which oxygen takes through the body;
- enumerate functions of the primary organs taking part in gas exchange process;
- explain the importance of gas exchange for the human body.

**Students' background knowledge:** Students should know the basic function of the lungs and respiratory system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; listening for general information; pair work; group work; sequencing.

**Didactic support:** youtube video; handouts (copies for each student); diagram of gas exchange (projector); an image of an air sac (The teacher's own resources).

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher says: *We will start this lesson with a riddle that will help you to guess today's subject of our lesson. Are you ready? What is it?* (see attachment 1)

The teacher shows the students an image of magnified air sacks.

Students' anticipated answer: air sacs, alveoli

The teacher writes the topic on the whiteboard: **Gas exchange process.**

### 4. Lead-in

The teacher says: *The photograph presents what your lungs look like inside. It is magnified 300 times. As you can see, your lungs are full of spaces, which are called air sacs or alveoli, which means 'pęcherzyk płucny'. (The teacher should write these words on the whiteboard.) They are filled with air. When you look closer, you can also see very small blood capillaries which are called in Polish 'naczynia włosowate' in the living tissue, meaning 'żywa tkanka'. They are between the air sacs. Before we learn how the gas*

exchange takes place in the human body. I would like you to work in small groups of 3 or 4. Each group is going to get a set of 20 words or phrases. 10 of them are used to describe the process of gas exchange in the human body. Please try to choose these words. Don't worry if you don't understand some of the phrases (see attachment 1).

Teacher gives 3–4 minutes to do this exercise.

**Attachment 1**

air sac	blood plasma
saliva	anus
liver	carbon dioxide
oxygen	alveoli
rectum	red blood cells
salivary glands	lungs
pancreas	caecum
capillary	ileum
diffusion	appendix
colon	pulmonary vein

Students' anticipated answers: air sac, blood plasma, carbon dioxide, capillary, diffusion, oxygen, alveoli, red blood cells, lungs, pulmonary vein

The teacher elicits answers from the students.

**5. Presentation**

The teacher says: *Now I would like you to watch a short video about the gas exchange process.*

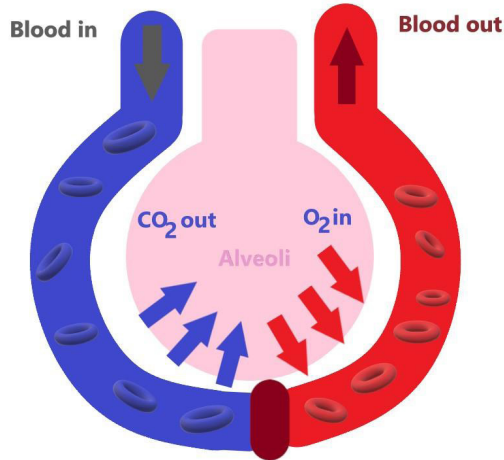
Available at: [www.youtube.com/watch?v=CWFyxn0qDEU](http://www.youtube.com/watch?v=CWFyxn0qDEU)

After watching the video, the teacher asks the students: *On the basis of what you've seen, can you please tell me what is the function of gas exchange in our body?* (Brainstorming: students discuss the question in pairs.)

The teacher writes the students' answers on the whiteboard.

The teacher says: *We already know what the gas exchange functions are. The next step is to get to know how gas exchange takes place. Please look at the diagram on the projector (see attachment 2).*

## Attachment 2



Graphic: Klaudia Kozuszek

The teacher says: *The diagram shows an air sac and a nearby blood capillary. The blood inside the capillary has come from the heart. Before that, it came from the organs of the body. The cells in these organs used up oxygen and produced carbon dioxide. So this blood contains only a little oxygen, and a lot of carbon dioxide. The air inside the air sac has come from outside the body. It contains a lot of carbon dioxide. Oxygen therefore diffuses from the air sac into the blood capillary. It diffuses into the red blood cells. Carbon dioxide diffuses from the blood inside the capillary into the air sac.*

*Source: Jones, M., Fellowes-Freeman, D., Sang, D. (2013), Cambridge Checkpoint. Science. Coursebook 8, Cambridge University Press, p. 44.*

### 6. Practice

Students are given copies with the cut up statements (see attachment 3).

The teacher says: *Now I would like you to put the cut up statements about gas exchange in the correct order. Work in pairs. You have three minutes to do this exercise. (Please remember to tell your students that they will learn more about the role of glucose in respiration process during the next lesson.)*

### Attachment 3

Start: Some of the oxygen in the lungs diffuses into the blood.
Carbon dioxide diffuses from the blood into the air sacs in the lungs.
Oxygen diffuses into the body cells.
Oxygen is used by cells for respiration to release energy from glucose.
Carbon dioxide diffuses from the body cells into the blood.
Carbon dioxide is transported back to the lungs.
Oxygen is transported in the blood to all parts of the body.
Carbon dioxide and water are waste products of respiration.

Answers:

1. Start: Some of the oxygen in the lungs diffuses into the blood.
2. Oxygen is transported in the blood to all parts of the body.
3. Oxygen diffuses into the body cells.
4. Oxygen is used by cells for respiration to release energy from glucose.
5. Carbon dioxide and water are waste products of respiration.
6. Carbon dioxide diffuses from the body cells into the blood.
7. Carbon dioxide diffuses from the blood into the air sacs in the lungs.
8. Carbon dioxide is transported back to the lungs.

The teacher elicits answers from the students.

### 7. Summary

Teacher shows four questions on the projector. The students have to discuss the answers among themselves (see attachment 4).

### Attachment 4

1. What is the name of the red pigment inside red blood cells which helps in oxygen transport?
2. What is the name of the large blood vessel which carries blood from the heart to the lungs?
3. How does oxygen diffuse from an air sac into the blood?
4. How does the fact that the air sacs and capillaries walls are very thin help gas exchange to take place quickly?

Answers: 1. haemoglobin 2. pulmonary vein 3. The oxygen in inhaled air passes across the thin lining of the air sacs and into the blood vessels. 4. The lining of the alveoli is very thin so that gases can quickly diffuse through it.

### 8. The ending

The teacher says: *As your homework, watch the video again and try to remember the most important information. Revise vocabulary.*

### Lesson plan 3. Aerobic respiration

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the aerobic respiration process.

**Objectives:** At the end of the lesson the students will be able to:

- identify the role of glucose in the respiration process;
- define aerobic respiration;
- study the effect of temperature on aerobic respiration;
- compare the rates of cell respiration in germinated and non-germinated peas.

**Students' background knowledge:** Students should know the basic function of the lungs and respiratory system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** group work; pair work; laboratory experiment; brainstorming.

**Didactic support:** diagram of aerobic respiration (copies for each student); handout; poster board; projector; pea respiration experiment tools (per group: 200 pea seeds soaked in water 24 hours before the experiment, 200 dead pea seeds with antiseptic, two thermo flasks, wet cotton wool, 2 thermometers).

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

Teacher displays a poster board divided into two columns: *know/learned*.

The teacher says: *Today we will learn about the aerobic respiration process (oddychanie tlenowe). What do you know about respiration and gas exchange so far?*

The teacher writes the students' answers on the poster in the *know* column.

#### 4. Lead-in

The teacher says: *All living things on our planet respire. Today we will take pea seeds as an example of respiration. They respire quicker when they are germinating when soaked in water for about an hour. In this experiment, you will observe the respiration process and the temperature effect on the rate of respiration. Now I would like you to sit in groups of 3 or 4 and carry out the following experiment:*

1. *Prepare your apparatus as it is presented in the diagram (see attachment 1). Remember to make sure that the two pieces of apparatus are set up in*

the same way, except that first contains dead peas and second contains live germinating peas.

2. Measure the temperature inside each flask. Make notes of the two temperatures in a results worksheet (see attachment 2).
3. Continue to note the temperature inside the two flasks at regular intervals. (The teacher should inform the students about the intervals.)
4. Draw line graphs presenting how the temperature in each flask changes over the course of the experiment in the result worksheet (see attachment 2).

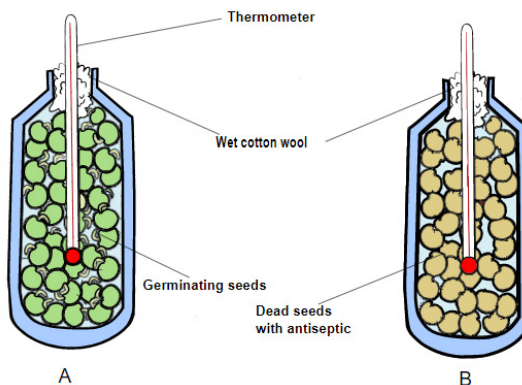
After the students finish the experiment, the teacher asks the following questions. (Brainstorming: students discuss the question in groups.)

- What was the variable factor that you changed in this laboratory experiment?
- What was the variable factor that you measured in this experiment?
- What were the two variables that were kept the same in this experiment?
- What is the explanation for the results that you obtained?

The teacher elicits answers from students.

The teacher says: *From this experiment, it can be concluded that the germinating peas are undergoing aerobic respiration as their oxygen consumption level is considerably high. The non-germinating peas did not consume much oxygen at all.*

### Attachment 1



Graphic: Emilia Kawka

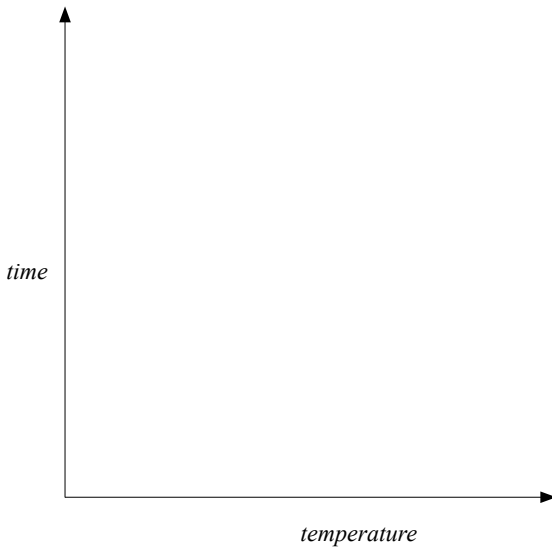
### Attachment 2

**Experiment:** Germinating peas

**Aim:** Experiment demonstrating the fact that germinating seeds produce carbon dioxide.

**Results:**

Time	Flask 1	Flask 2



**5. Presentation**

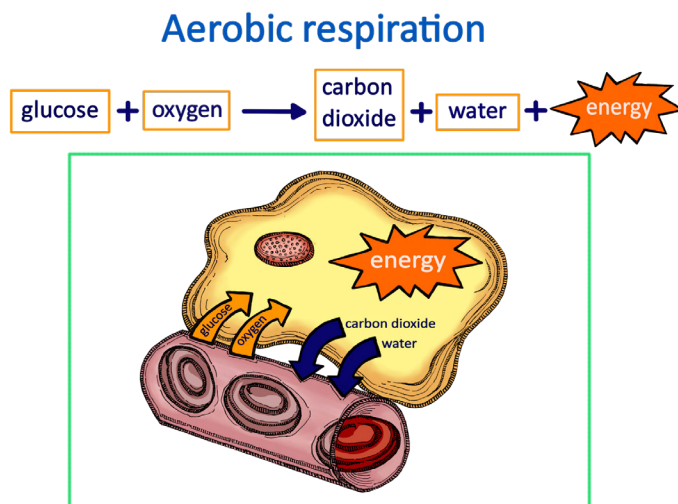
The teacher says: *As you can see based on the experiment, living cells, in this case in pea seeds, need energy to live. Their energy comes from nutrients, mainly glucose. Glucose contains chemical potential energy. Inside cells, glucose takes part in a chemical reaction which is called respiration. Please look at the diagram on the projector which shows this reaction. (see attachment 3). The glucose is combined with oxygen. The chemical potential energy which is in the glucose merges with oxygen. As a result, the chemical potential energy present in the glucose is released, so that it can be used by the cells.*

*The oxygen which is combined with the glucose in this reaction comes from the air. That is why this process is sometimes labelled as aerobic respiration. To sum up, the aerobic respiration is the release of energy coming from glu-*

cose by reacting it with oxygen inside living cells. Some of the energy turns into heat energy. As you can see based on the temperature and time axes, everything that respire releases heat energy.

Source: Jones, M., Fellowes-Freeman, D., Sang, D. (2013), Cambridge Checkpoint. Science. Coursebook 8, Cambridge University Press, p. 46.

### Attachment 3



Graphic: Mikołaj Siciarz

### 6. Practice

The teacher says: *You're going to work in pairs. In each of these groups of statements, only one is correct. Decide which statement is true* (see attachment 4).

Teacher gives 10 minutes for this exercise.

### Attachment 4

1.

A Only human cells respire.

B All living cells respire.

C The way in which human cells respire is called gas exchange.

2.

A In the respiration process, the glucose combines with the oxygen.

B In the respiration process, the oxygen combines with the carbon dioxide.

C In the respiration process, the water combines with the glucose.

3.

A glucose + carbon dioxide  $\longrightarrow$  water + oxygen

B glucose + oxygen  $\longrightarrow$  water + glucose

C water + oxygen  $\longrightarrow$  glucose + carbon dioxide

4.

A Aerobic respiration is the release of glucose from oxygen.

B Aerobic respiration is the release of carbon dioxide from blood.

C Aerobic respiration is the release of energy from glucose.

5.

A Aerobic respiration takes place inside glucose.

B Aerobic respiration takes place inside living cells.

C Aerobic respiration takes place inside blood.

Answers: 1. B 2. A 3. B 4. C 5. B

The teacher elicits answers from students.

## 7. Summary

The teacher says: *What did you learn today?* (The teacher should write students' answers in the *learned* column of the poster board from the introduction.)

## 8. The ending

The teacher says: *I would like you to remember the definition of aerobic respiration and how it works. I believe you found this lesson interesting and useful. See you next time.*

## VII The human excretory system

### Lesson plan 1. The structure and functions of the human excretory system

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the structure and function of the human excretory system.

**Objectives:** At the end of the lesson the students will be able to:

- describe the structure of the organs of the excretory system;
- describe the functions of the organs of the excretory system;
- explain how the excretory system works.

**Students' background knowledge:** Students should know the basic function of the excretory system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** pair work; group work; brainstorming; listening for specific information; gap-filling; labelling.

**Didactic support:** youtube video; handouts (copies for each student); image of 'Garbage City'.

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

Teacher displays a picture of a city infested with garbage (available at: <https://www.freeimages.com/pl/photo/landfill-1543880>) and gives students 5 seconds for observation.

The teacher says: *What do you think would happen if our garbage were never picked up and removed?*

Students' anticipated answer: the city would become dirty, it would lead to infection and many diseases.

After brainstorming ideas, the teacher asks the students: *How do you think wastes are removed from our bodies?*

#### 4. Lead-in

The teacher says: *Our body gets rid of wastes through the excretory system.*

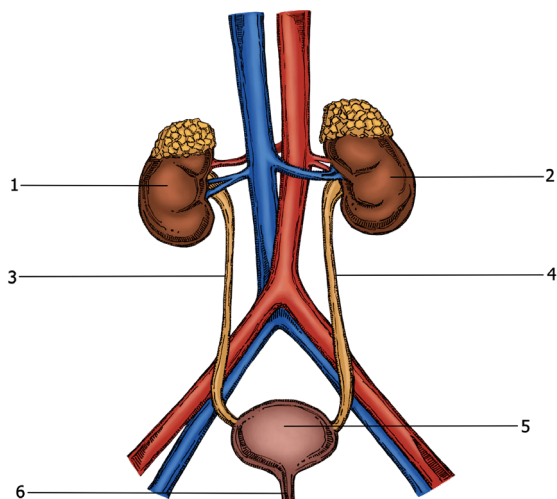
The teacher writes the topic on the whiteboard: **The human excretory system.**

The teacher says: *Before we learn more about the structure and functions of the excretory system, I would like you to look at the worksheet (see attach-*

ment 1). Please try to label the parts of the human excretory system. Don't worry if you don't know the answers. Do it in pairs.

Teacher gives 3–4 minutes to do this exercise.

### Attachment 1



Graphic: Mikołaj Siciarz

right kidney

left kidney

right ureter

left ureter

urinary bladder

urethra

Answers: 1. right kidney 2. left kidney 3. right ureter 4. left ureter 5. urinary bladder 6. urethra

The teacher elicits answers from students.

### 5. Presentation

The teacher says: *Now I would like you to watch a short video presenting how our excretion system works. I want you to listen carefully and try to remember as much information as you can.*

Available at: <https://www.youtube.com/watch?v=EhnRhFLyOg>

After watching the video, the teacher asks the students: *Did you find the video easy or difficult? What can you remember?* (Brainstorming: students discuss the question in pairs.)

The teacher writes the students' answers on the whiteboard.

## 6. Practice

The teacher says: *You are going to listen to the video once again. I would like you to try to answer the questions in worksheet (see attachment 2).*

### Attachment 2

Complete the questions based on the 'Excretion in humans' video.

1) Excretion is defined as \_\_\_\_\_

\_\_\_\_\_.

2) The process that results in wastes being removed from body surface to water in unicellular organisms is called \_\_\_\_\_

\_\_\_\_\_.

3) The chief organ of the excretory system is called \_\_\_\_\_

\_\_\_\_\_.

4) The organs that make up the excretory system are: \_\_\_\_\_

\_\_\_\_\_.

5) The kidney is the basic \_\_\_\_\_ unit.

6) Draw a kidney including the NEPHRONS.



7) Nephrons are crucial for kidney function because \_\_\_\_\_

\_\_\_\_\_.

8) Urine contains \_\_\_\_\_

\_\_\_\_\_.

9) We are able to control the urge to urinate because

\_\_\_\_\_.

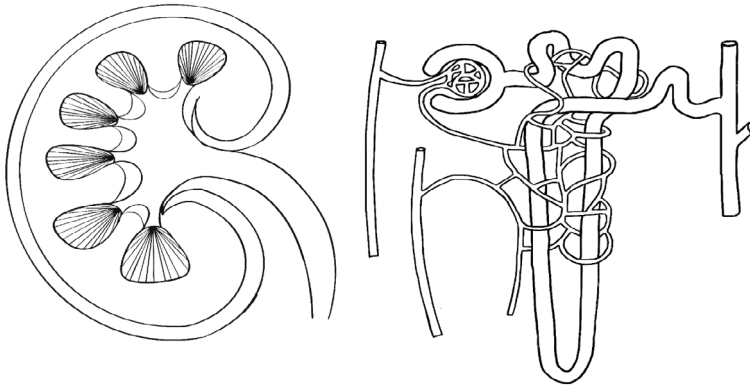
10) How is urine removed from our body?

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Answers:

1. Excretion is defined as *a biological process involved in the removal of harmful metabolic wastes from the body.*
2. The process that results in wastes being removed from body surface to water in unicellular organisms is called *diffusion.*
3. The chief organ of the excretory system is called *kidney.*
4. The organs that make up the excretory system are:
  - 1) *a pair of kidneys*
  - 2) *a pair of ureters*
  - 3) *a urinary bladder*
  - 4) *a urethra*
5. The kidney is the basic *filtration unit.*
6. Draw a kidney including the NEPHRONS.



Graphic: Emilia Kawka

7. Nephrons are crucial for kidney function because *they are filtration units.*
8. Urine contains *waste products or nitrogenous wastes.*
9. How is urine removed from our body? *The produced urine passes through ureters into the urinary bladder. The urine is stored in the urinary bladder and the urine is released to the outside through the urethra.*
10. We are able to control the urge to urinate because *the urinary bladder is muscular and it is under the control of the nervous system.*

Source: <https://quizlet.com/460163158/kidney-and-nephron-diagrams-diagram/>

The teacher elicits answers from the students.

## 7. Summary

The teacher gives the students copies of the worksheet (see attachment 3).

### Attachment 3

Each of the following statements is false. Replace the underlined word(s) to make the statement true by using a term from the list below. Write your changes on the lines provided. NOTE: You may need to change a term to its plural form.

**area / bladder / excretory system / kidney / nephron / ureter / urethra / urine**

- \_\_\_\_\_ 1. Urine is stored in a muscular sac called the ureter.  
\_\_\_\_\_ 2. A bean-shaped organ called the bladder filters wastes from the blood.  
\_\_\_\_\_ 3. Urine leaves the kidneys through the urethra.  
\_\_\_\_\_ 4. Some wastes exit the body in a fluid called area.  
\_\_\_\_\_ 5. The organs of the digestive system regulate fluid levels and eliminate wastes from the body.  
\_\_\_\_\_ 6. The actual filtration of blood occurs within the millions of ureters in the kidneys.  
\_\_\_\_\_ 7. Urine leaves the bladder through a duct called the excretory system.  
\_\_\_\_\_ 8. Each nephron of the excretory system has a function.

Answers: 1. bladder 2. kidney 3. ureters 4. urine 5. excretory system 6. nephrons 7. urethra 8. area

## 8. The ending

The teacher says: *I would like you to remember the structure and functions of the organs of the human excretory system. I believe you found this lesson interesting and useful. See you next time.*

## Lesson plan 2. Excretory system diseases

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the common diseases and disorders of the human excretory system.

**Objectives:** At the end of the lesson the students will be able to:

- identify three disorders of the excretory system;
- assess the effects of excretory system disorders on the functions of the body;
- explain strategies to promote renal health.

**Students' background knowledge:** Students should know the basic function of the excretory system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** pair work; group work; reading for specific information; word search.

**Didactic support:** handouts (copies for each student); photographs of kidney stones and dialysis machine.

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher says: *We will start this lesson with a riddle that will help you to guess today's subject of our lesson. Are you ready? I will show you two pictures. Try to guess what they show* (The teacher's own resources: an image of human kidney stones and a dialysis machine).

Students' anticipated answers (key-words): kidney stones and dialysis machine

### 4. Lead-in

The teacher says: *As we learnt in the previous lesson, the excretory system controls the amount of water in the body and removes wastes. Any problem with the urinary system can also affect many other body systems. Today we will learn about three most common diseases of excretory system: kidney stones (kamienie nerkowe), kidney failure (niewydolność nerek) and urinary tract infections (zakażenie dróg moczowych).* (The teacher should write these phrases on the whiteboard.) *Before we learn more about these problems, I would like you to look at the worksheet. Please try to find as many words connected with today's topic as possible* (see attachment 1).

The teacher gives 3–4 minutes to do this exercise.

## Attachment 1

X	V	E	D	E	T	S	T	O	N	E	K	F	Z
T	S	J	O	N	V	C	M	K	V	L	A	T	A
U	S	B	A	C	T	E	R	I	A	X	L	K	I
Z	V	P	D	V	F	U	R	I	N	A	T	E	N
J	H	M	I	N	E	R	A	L	O	L	E	N	F
G	H	F	M	D	I	A	L	Y	S	I	S	P	E
U	L	T	R	A	S	O	U	N	D	S	Y	A	C
O	U	H	B	V	W	N	E	B	R	T	N	I	T
W	K	R	D	B	L	A	D	D	E	R	F	E	I
S	H	J	I	C	X	I	K	I	D	N	E	Y	O
P	S	N	Q	N	N	V	S	S	G	U	X	E	N
P	K	T	X	F	A	I	E	M	K	F	U	T	I
D	R	Y	H	O	Z	R	D	E	R	B	A	B	B
X	O	W	A	S	T	E	Y	W	J	Z	J	W	B

UTI  
 STONE  
 ULTRASOUNDS  
 WASTE  
 INFECTION  
 KIDNEY  
 MINERAL  
 BLADDER  
 URINATE  
 URINARY  
 DIALYSIS  
 BACTERIA

Answers:

X	V	E	D	E	T	S	T	O	N	E	K	F	Z
T	S	J	O	N	V	C	M	K	V	L	A	T	A
U	S	B	A	C	T	E	R	I	A	X	L	K	I
Z	V	P	D	V	F	U	R	I	N	A	T	E	N
J	H	M	I	N	E	R	A	L	O	L	E	N	F
G	H	F	M	D	I	A	L	Y	S	I	S	P	E
U	L	T	R	A	S	O	U	N	D	S	Y	A	C
O	U	H	B	V	W	N	E	B	R	T	N	I	T
W	K	R	D	B	L	A	D	D	E	R	F	E	I
S	H	J	I	C	X	I	K	I	D	N	E	Y	O
P	S	N	Q	N	N	V	S	S	G	U	X	E	N
P	K	T	X	F	A	I	E	M	K	F	U	T	I
D	R	Y	H	O	Z	R	D	E	R	B	A	B	B
X	O	W	A	S	T	E	Y	W	J	Z	J	W	B

UTI  
 STONE  
 ULTRASOUNDS  
 WASTE  
 INFECTION  
 KIDNEY  
 MINERAL  
 BLADDER  
 URINATE  
 URINARY  
 DIALYSIS  
 BACTERIA

The teacher elicits answers from the students.

## 5. Presentation

The teacher says: *Now you will hear a recording (see recording 3) which explains three main problems of the excretory system. I want you to listen carefully and look at the transcript (see attachment 2). Don't worry if you don't understand everything, we'll explain it later.*

### Attachment 2



#### [RECORDING 3]

#### KIDNEY STONES

Certain mineral wastes can form kidney stones. Stones form in the kidneys and may be found anywhere in the urinary system. Often, stones form when the urine becomes concentrated, allowing minerals to crystallize and stick together. They can vary in size, from small stones that can flow through your urinary system, to larger stones that cannot. Some stones may need to be removed by surgery or ultrasound treatments.

What are the symptoms of kidney stones? You may have a kidney stone if you have pain while urinating, see blood in your urine, and/or feel a sharp pain in your back or lower abdomen. The pain may last for a long or short time. You may also have nausea and vomit with the pain. If you have a small stone that passes on its own easily, you may not experience any symptoms. If you have any of these symptoms, you should see your doctor.

To prevent kidney stones, you should drink plenty of water, control intake of sodium and choose a diet low in proteins and salts.

#### KIDNEY FAILURE

Kidney failure happens when the kidneys cannot remove wastes from the blood. If the kidneys are unable to filter wastes from the blood, the wastes build up in the body. Kidney failure can be caused by an accident that injures the kidneys, the loss of a lot of blood, or by some drugs and poisons. If your kidneys fail, you feel fatigue and you may lose your appetite. Other symptoms are: shortness of breath, chest pain or pressure and irregular heartbeat.

Chronic kidney disease is the slow decrease in kidney function that may lead to permanent kidney failure. A person who has lost kidney function may need to get kidney dialysis. During dialysis, a patient's blood is sent through a filter that removes waste products. The clean blood is returned to the body. Remember to care for your kidneys by eating healthy food, being active and see your doctor for regular check-ups. Smoking and drinking alcohol have a bad impact on your kidneys.

## URINARY TRACT INFECTIONS (UTIs)

Urinary tract infections (UTIs) are bacterial infections of any part of the urinary tract. When bacteria get into the bladder or kidney and produce more bacteria in the urine, they cause a UTI. The most common type of UTI is a bladder infection. UTIs are often treated with antibiotics.

Most UTIs are not serious, but some infections can lead to serious problems. Long lasting kidney infections can cause permanent damage, including kidney scars, poor kidney function, high blood pressure, and other problems.

What are the signs and symptoms of a UTI? These include: a burning feeling when you urinate, frequent or intense urges to urinate, even when you have little urine to pass, pain in your back or side below the ribs, cloudy, dark, bloody, or foul-smelling urine, fever or chills.

To avoid UTIs you should drink an adequate amount of water every day, wear cotton underwear and enrich your diet with cranberries. You should also remember to urinate when you need to – do not hold it in.

Source: <https://www.ck12.org/biology/excretory-system-diseases/lesson/Excretory-System-Problems-MS-LS>

### 6. Practice

Teacher asks: *Did you find the text easy or difficult? What can you remember?* (The students attempt to answer as much as they can).

The teacher says: *Now you are going to work in pairs. I would like you to try to fill in the columns from the excretory system disorders summary worksheet with appropriate information from the text* (see attachment 3).

The teacher gives 10 minutes for this exercise.

### Attachment 3

DISORDER	CAUSE	SYMPTOMS	PREVENTION
KIDNEY STONES			
KIDNEY FAILURE			
URINARY TRACT INFECTIONS (UTIs)			

Answers:

Kidney stones

Cause: mineral wastes

Symptoms: pain while urinating, blood in urine, sharp pain in your back or abdomen, nausea and vomiting with the pain

Prevention: drinking water, control intake of sugar, diet low in proteins and salts

Kidney failure

Cause: accident, loss of a lot of blood, drugs, poisons

Symptoms: fatigue, loss of appetite, shortness of breath, chest pain or pressure, irregular heartbeat

Prevention: eating healthy food, being active, regular check-ups with doctor, do not smoke, do not drink alcohol

Urinary tract infections (UTIs)

Cause: bacterial infections

Symptoms: a burning feeling when you urinate, frequent or intense urges to urinate, even when you have little urine to pass, pain in your back or side below the ribs, cloudy, dark, bloody, or foul-smelling urine, fever or chills

Prevention: drinking water, wearing cotton underwear, eating cranberries, urinating when you need to

The teacher elicits answers from the students.

## 7. Summary

The teacher gives the students a list of links with brochures about urinary system diseases (see attachment 4). Ideally, the teacher sends the links to a shared mailbox so that the students can use them from their devices. The teacher asks the students to work in groups of 3–4 to create an informative pamphlet on kidney disorders. The teacher hands out a layout of a pamphlet that students can use (see attachment 5).

## Attachment 4

### Excretory system disorders (brochures)

### Links

Natural kidney help and kidney  
function restoration program review

<https://pl.pinterest.com/pin/635922409861430896/>

Causes of kidney failure in humans

<https://pl.pinterest.com/pin/354728908139797649/>

Chronic kidney disease photo sheet

[https://kidney.org.au/resources/factsheets -and-photosheets/chronic-kidney-disease-photosheet](https://kidney.org.au/resources/factsheets-and-photosheets/chronic-kidney-disease-photosheet)

**Attachment 5**

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**8. The ending**

The teacher says: *As your homework, read the text again and try to remember the most important information. Revise vocabulary.*

## VIII The neuro-hormonal regulation

### Lesson plan 1. The endocrine system

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the major structures and functions of the endocrine system.

**Objectives:** At the end of the lesson the students will be able to:

- identify the structures of the endocrine system;
- describe the function of the endocrine system;
- identify the location and function of each major gland in the body.

**Students' background knowledge:** Students should know the basic function of the human neuro-hormonal system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** gap-filling; labelling; pair work; brainstorming; group work; listening for specific information.

**Didactic support:** youtube video; handouts (a tape script of the recording; copies for each student); cut-out puzzles.

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher pairs students with a partner. Then the teacher passes out puzzle pieces (see attachment 1), one per student, but tells the students not to look at the label on their piece. The students scatter throughout the entire classroom and then freeze. The teacher tells the students to look at their pieces: students who are *receptors* must remain frozen in place; the *hormone* students may now move throughout the classroom. *Hormone* students must try to match their piece with each receptor piece until they successfully find a match. Once all students have found their match, have each pair act out together the action written on their puzzle pieces. The teacher can repeat the activity if time permits.

After students finish the experiment, the teacher asks the following questions. (Brainstorming: students discuss the question in groups.)

- What did you learn about hormone-receptor interactions?
- Hormones are part of a body system – which one?
- What are some examples of body functions that are triggered by hormones?

- Why it is such a good thing that the hormones in our bodies only match up with specific receptors?

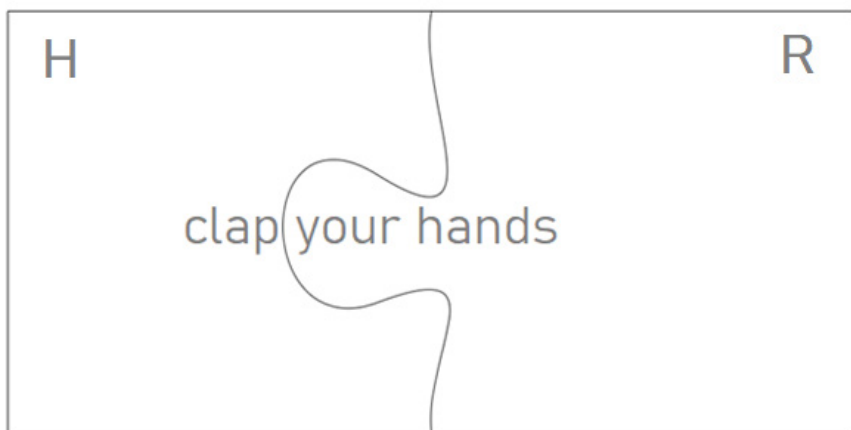
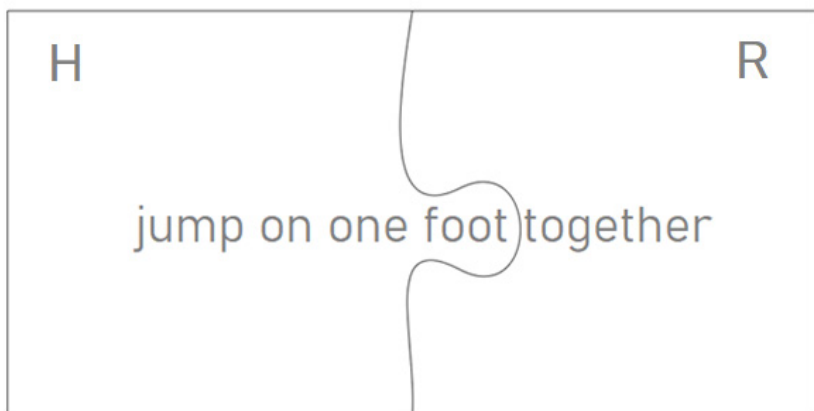
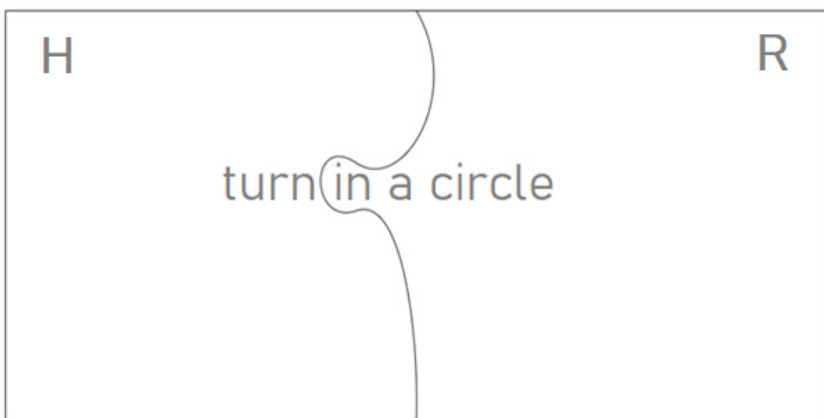
The teacher elicits answers from the students.

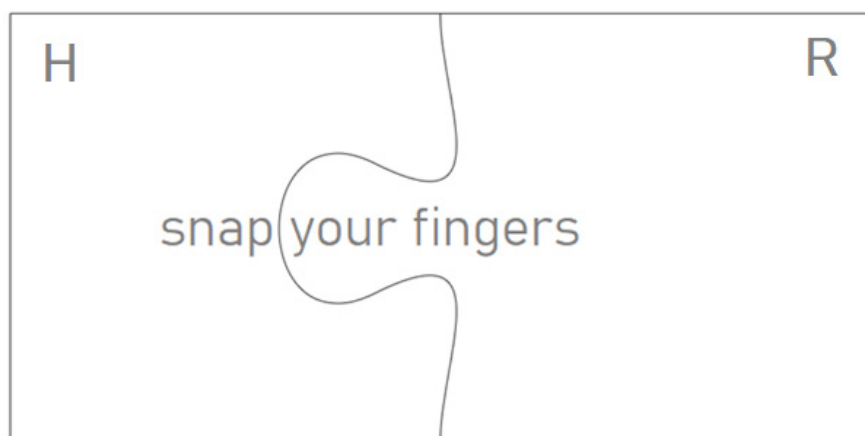
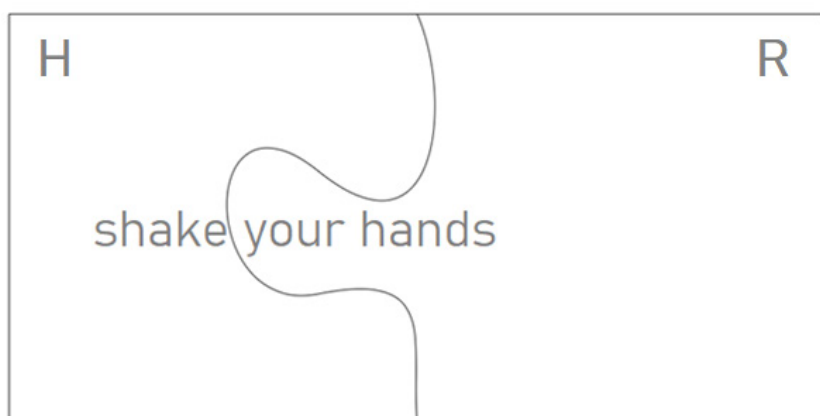
The teacher summarizes: *As you could see in the previous activity, hormones help in communication in our body. They have a high level of specificity, which means that they will only react with a specific receptor site in your body. The lock and key analogy is often used to explain this specificity, and it is a great way to think about how hormones work. Hormones convey important information to the body, including such instructions as cell division and growth, appetite suppression, acid secretion, calcium absorption, and red and white blood cell production. Hormones are secreted by endocrine glands. Together they create the system called the endocrine system, which means 'uklad hormonalny'.*

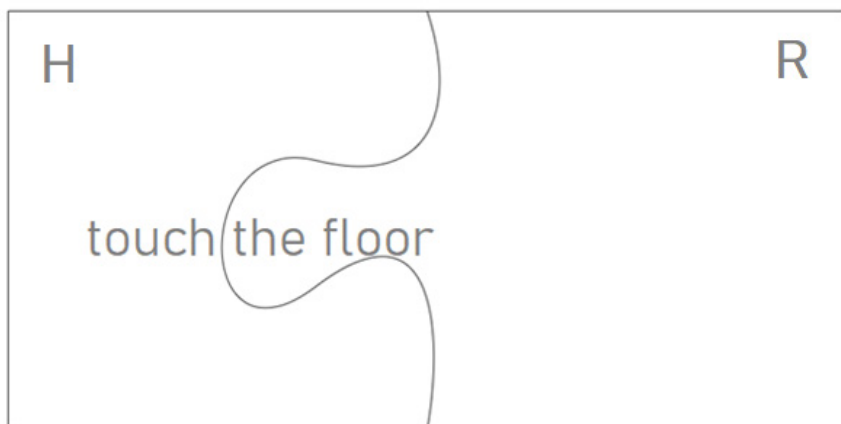
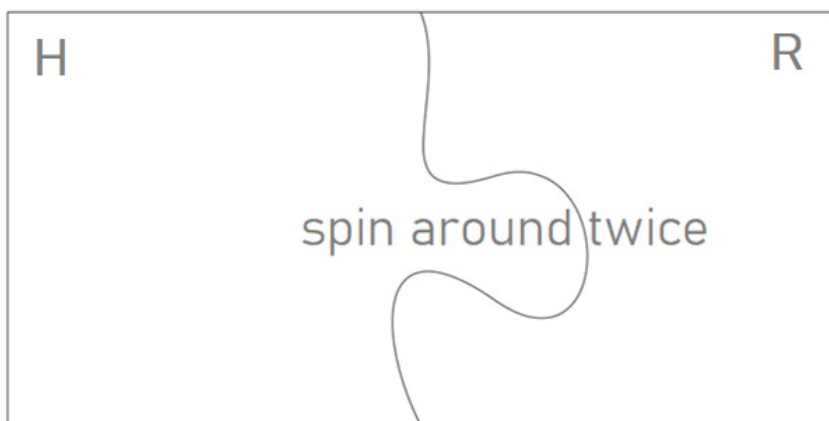
The teacher writes the topic on the whiteboard: **The endocrine system.**

### Attachment 1







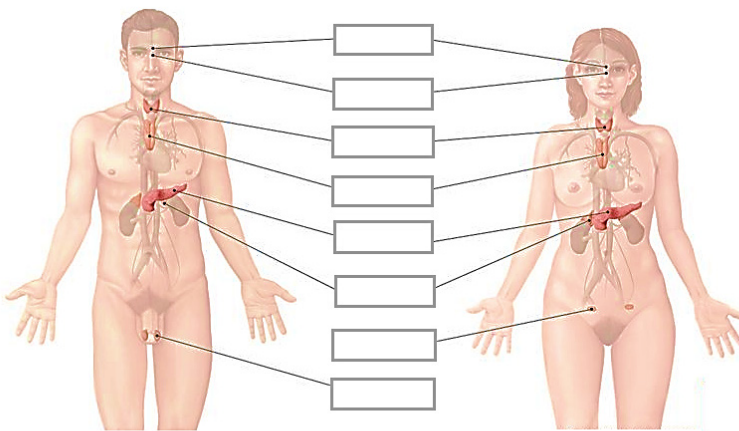


#### 4. Lead-in

The teacher says: *Before we learn more about the endocrine system I would like you to look at the worksheet (see attachment 2). Study the diagram in pairs and identify the main glands of the endocrine system. Then use each answer to correctly label the diagram. Don't worry if you don't understand everything, we'll explain it later.*

Teacher gives 3–4 minutes to label the parts.

#### Attachment 2



pineal gland      thymus      testis      pituitary gland  
thyroid gland    pancreas      ovary      adrenal gland

Graphic: Judyta Pawliszko

Source: <https://www.kenhub.com/en/library/learning-strategies/endocrine-system-quiz-questions-diagrams-study-tools>

Answers: pineal gland, pituitary gland, thyroid gland, thymus, pancreas, adrenal gland, ovary, testis

The teacher elicits answers from the students.

#### 5. Presentation

The teacher says: *Now I would like you to watch a short video presenting the location and function of each major gland in the body. I want you to listen carefully and try to remember as much information as you can.*

Available at: <https://www.youtube.com/watch?v=BvpPCnIrwsW>

After watching the video, the teacher asks the students: *Did you find the video easy or difficult? What can you remember?* (Brainstorming: students discuss the question in pairs.)

The teacher writes the students' answers on the whiteboard.

## 6. Practice

The teacher says: *You are going to listen to the video once again. I would like you to try to answer the questions in the worksheet* (see attachment 3).

### Attachment 3

Complete the questions based on the 'Endocrine System' video.

- 1) The endocrine system allows parts of our body to \_\_\_\_\_  
\_\_\_\_\_.
- 2) What all glands have in common is that they \_\_\_\_\_  
\_\_\_\_\_.
- 3) Which gland is sometimes called the 'master gland'? \_\_\_\_\_  
\_\_\_\_\_.
- 4) The thyroid gland is located in our \_\_\_\_\_.
- 5) When blood concentrations of thyroid hormones increase above a certain threshold, TRH-secreting neurons are inhibited and stop secreting TRH. This process is called \_\_\_\_\_.
- 6) The gland located in our kidneys is called \_\_\_\_\_.
- 7) The pancreas secretes a hormone called \_\_\_\_\_.
- 8) Testosterone secreted by the testes is responsible for \_\_\_\_\_  
and \_\_\_\_\_.
- 9) Oestrogen secreted by the ovaries is responsible for \_\_\_\_\_  
and \_\_\_\_\_.
- 10) What is the main difference between the endocrine system and the nervous system?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Answers:

1. communicate with each other
2. secrete hormones

3. pituitary gland
4. neck
5. negative feedback
6. adrenal gland
7. insulin
8. puberty/reproduction
9. puberty/menstrual cycle
10. The endocrine system relies on hormones which spread more slowly but their effects last longer. The nervous system relies on electrical impulses which are very fast but their effects do not last long.

The teacher elicits answers from the students.

## 7. Summary

The teacher gives the students the copies (see attachment 4).

### Attachment 4

FUNCTION	GLAND
1. master gland, controls many vital physical functions and processes (i.e. blood pressure, metabolism, growth)	
2. regulates metabolic rate and controls growth and development	
3. secretes a hormone called insulin that regulates how the body uses and stores sugars	
4. secretes stress hormones (adrenaline, norepinephrine), and cortisol	
5. controls maturation and reproduction in females	
6. controls maturation and reproduction in males	
7. makes white blood cells, called T-lymphocytes, that fight infection and are crucial in children's immune system development	
8. makes melatonin hormone, which helps regulate reproductive hormones and the timing of the body clock	

Answers: 1. pituitary gland 2. thyroid gland 3. pancreas 4. adrenal gland 5. ovary 6. testis 7. thymus 8. pineal gland

## 8. The ending

The teacher says: *I would like you to remember the structure and functions of the endocrine system.*

## Lesson plan 2. The nervous system

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the parts and functions of the nervous system.

**Objectives:** At the end of the lesson the students will be able to:

- identify the different parts of the nervous system;
- determine the functions of the nervous system;
- explain the parts of a neuron.

**Students' background knowledge:** Students should know the basic function of the human neuro-hormonal system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** gap-filling; labelling; pair work; brainstorming; group work.

**Didactic support:** youtube video; cut-out puzzles; handouts (copies for each student).

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher says: *We will start this lesson with a riddle that will help you to guess today's subject of our lesson. Are you ready? I am going to give you some hints as to what system we are going to learn about today.*

The teacher reads aloud as the students listen and try to guess:

*You need me to swallow your food.*

*You need me to digest your food.*

*You need me to ride a bike.*

*You need me to breathe.*

*You need me to run.*

*You need me to watch tv.*

*You need me to use a computer.*

*You need me to read a book.*

*You need me to hear right now – who am I?*

Students' anticipated answer: the nervous system

The teacher writes the topic on the whiteboard: **The nervous system.**

#### 4. Lead-in

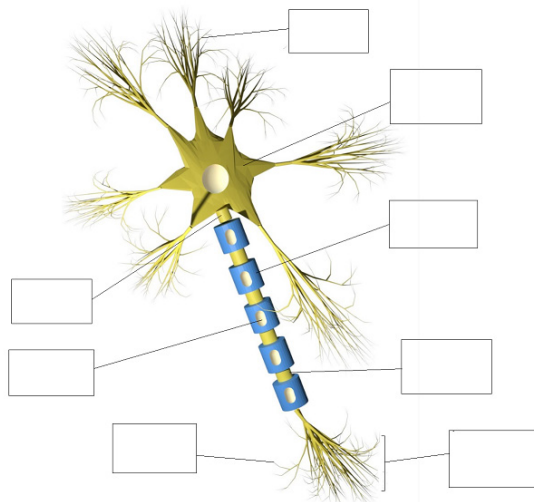
Students are given copies with the nerve cell diagram and the cut up phrases and definitions (see attachment 1).

The teacher says: *Before we learn more about the nervous system, we will analyse the basic unit of communication in the nervous system that is the nerve cell (neuron). You are going to work in small groups of 3 or 4. I would like you to put the cut up parts of the nerve cell in the correct place in a diagram. Work in pairs. You have three minutes to do this exercise.*

Teacher gives 3–4 minutes for this exercise.

#### Attachment 1

<b>Dendrites (dendryt)</b> Short extensions of the cell. They receive signals from other neurons.	<b>Myelin Sheath (osłonka mielinowa)</b> An insulating layer around the axon.
<b>Schwann Cell (komórka Schwanna)</b> It produces the myelin sheath.	<b>Node of Ranvier (węzeł Ranviera)</b> A gap in the myelin sheath. It appears between Schwann cells.
<b>Synaptic Gap (szczelina synaptyczna)</b> A gap between axon terminals and neurons.	<b>Cell Body (ciało komórkowe)</b> Part where chemicals and proteins are made for the cell.
<b>Axon (akson/neuryt)</b> The long and thin part of a neuron.	<b>Axon Terminals (rozgałęzienie końcowe neuronu)</b> The end of axon. Also called a synaptic bulb.



Graphic: Klaudia Kozuszek

Answers (given clockwise from the top right): dendrites, cell body, myelin sheath, node of Ranvier, axon terminals, synaptic gap, Schwann cell, axon  
The teacher elicits answers from students.

## 5. Presentation

The teacher says: *Now I would like you to watch a short video presenting the components of the human nervous system and the way it works. I want you to listen carefully and try to remember as much information as you can.*

Available at: <https://www.youtube.com/watch?v=WHxJJ2jduHU>

After watching the video, the teacher asks the students: *Did you find the video easy or difficult? What can you remember?* (Brainstorming: students discuss the question in pairs.)

The teacher writes the students' answers on the whiteboard.

## 6. Practice

The teacher says: *Now I'll give you copies of the text you have just heard. You are going to listen to the video once again. I would like you to try to fill in the gaps with appropriate words from what you hear. Use words/phrases below the text to fill in the gaps (see attachment 2).*

### Attachment 2

#### The nervous system

What happens when you see a mosquito sitting on your hand? You quickly shake your hand. What happens when you eat an orange? You feel a tangy taste.

You breathe automatically. Every single action that you perform is because of the coordination of the nervous system.

#### The components of the nervous system and their functions

The nervous system is made up of the brain, spinal cord and a large network of nerves that are spread throughout the body. Let's understand the functions of the different parts of our nervous system.

1. The human brain is the messaging centre of the nervous system. It is protected by the (1) \_\_\_\_\_. It consists of cerebrum, cerebellum and the brain stem or medulla.
  - a. The grey wrinkly upper part of the brain is the (2) \_\_\_\_\_. It is divided into four areas, and each area controls different parts of

the body. The back area controls the vision while other areas control functions like movement, speech, memory, emotions and touch.

- b. The (3) \_\_\_\_\_ located below the cerebrum coordinates voluntary movements like balance, movement and speech. It controls motor functions and muscular activity.
  - c. Below the cerebrum and in front of the cerebellum lies a stem shaped structure called (4) \_\_\_\_\_. The brain is connected to the spinal cord through the medulla. It transmits the messages or impulses that the brain and the rest of the body send back and forth. The medulla is in charge of all the automatic functions of the body like respiration, digestion and blood circulation.
2. Nerves are cylindrical bundles of nerve fibres that run from the brain to the different parts of the body. Nerve cells are called (5) \_\_\_\_\_. They transmit nerve impulses. The brain has more than (6) \_\_\_\_\_ billion nerve cells.

### **How does the nervous system work?**

When you see a mosquito sitting on your hand or feel its bite neurons are stimulated by the sensation and an (7) \_\_\_\_\_ is generated. It travels the length of the neuron and is transferred to the next neuron with the help of chemicals known as neurotransmitters. This sequence is repeated across thousands of neurons to transmit information to the brain. The brain processes this information and sends a message back which is transmitted by the neurons to the hand. This message from the brain is your body's (8) \_\_\_\_\_ to the mosquito on your hand. You respond by shaking your hand. There are three types of neurons:

1. (9) \_\_\_\_\_ are responsible for physical stimuli such as light, sound, and touch. They carry messages from the sense organs to the nervous system about the environment surrounding the body.
2. The brain controls the muscles through the motor nerves, for example, we are able to move because the brain signals the motor nerves to contract the muscles.
3. Spinal nerves perform the functions of both sensory nerves and (10) \_\_\_\_\_, that is, they carry messages to the brain as well as take orders from the brain to other parts of the body. They are also called mixed nerves.

The nervous system helps different parts of our body communicate and allows the brain to control our body.

motor nerves (nerwy ruchowe)	medulla (pień mózgu)	skull (czaszka)	ten
impulse (impuls)	cerebrum (mózdzek)	sensory nerves (nerwy czuciowe)	
response (reakcja)	neurons (neurony)	cerebellum (kresomózgowie)	

Answers: 1. skull 2. cerebrum 3. cerebellum 4. medulla 5. neurons 6. ten 7. impulse 8. response 9. sensory neurons 10. motor nerves

The teacher says: *Now try to read this text and we will discuss it together.* The teacher attempts to elicit answers from the students. He/She can also show the full text on a projector to make sure each student is able to check the correct answers).

## 7. Summary

The teacher displays two functions and ask the students to analyse and determine which among the two functions is a function of the nervous system. The students work in pairs (see attachment 4).

### Attachment 4

#### Function #1

- A. It exchanges gases between the external environment and the blood.
- B. It gathers information both from the outside world and from the inside of the body.

#### Function #2

- A. It transmits information to the processing areas in the brain and spinal cord.
- B. It produces hormones that regulate the activities of cells and organisms.

#### Function #3

- A. It processes information to determine the best response.
- B. It digests and absorbs nutrients from the food.

#### Function #4

- A. It maintains posture and position of the body.
- B. It sends information to muscles, glands, and organs so they can respond correctly.

Answers:

1.B 2.A 3.A 4.B

## **8. The ending**

The teacher says: *I would like you to remember the functions and components of the nervous system. I believe you found this lesson interesting. See you next time.*

### Lesson plan 3. Central and peripheral nervous system

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the major structures and functions of the central and peripheral nervous system.

**Objectives:** At the end of the lesson the students will be able to:

- identify the two main divisions of the nervous system;
- determine the functions of central and peripheral nervous system.

**Students' background knowledge:** Students should know the basic function of the human neuro-hormonal system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** labelling; pair work; brainstorming; group work.

**Didactic support:** diagram of the nervous system; cut-out cards; handouts (copies for each student).

**Procedure and stages of the lesson:**

**1. Greeting**

**2. Checking attendance**

**3. Warm-up**

**Warm-up**

The teacher says: *We will start this lesson with a riddle that will help you to guess today's subject of our lesson. Are you ready?*

The teacher writes two expressions on the whiteboard. The students need to unscramble the letters to reveal the topic of the lesson.

1. CERANTL OUNERVS SYMETS
2. IPHEPERRAL RVOUSNE YTESSM

Students' anticipated answer: 1. central nervous system 2. peripheral nervous system

The teacher writes the topic on the whiteboard: **Central and peripheral nervous system.**

**4. Lead-in**

Students are given copies with the cut up cards (see attachment 1).

The teacher says: *Before we learn more about the two main divisions of the nervous system, I will give you a set of statements. Analyse them in pairs whether they are true or false. I will read the statements aloud. If it you think it is true, raise the paper with the word 'fact' and 'bluff' if otherwise.*

Teacher gives 3–4 minutes to analyse the statements.

## Attachment 1

CNS and PNS stands for the two main divisions of the nervous system.	Nervous System consists of the Central Nervous System and Peripheral Nervous System.
The Central Nervous System consists of six parts.	The cerebellum coordinates voluntary muscle movements, maintains balance and muscle tone.
The Peripheral Nervous System is divided into four systems.	The cranial nerves carry information only into the body.

Answers:

CNS and PNS stands for the two main divisions of the nervous system. – FACT

Nervous System consists of the Central Nervous System and Peripheral Nervous System. – FACT

The Central Nervous System consists of six parts. – BLUFF – The Central Nervous System consists of **two parts: brain and spinal cord**.

The cerebellum coordinates voluntary muscle movements, maintains balance and muscle tone. – FACT

The Peripheral Nervous System is divided into four systems. – BLUFF – The Peripheral Nervous System is divided into **two systems: the Somatic System and the Autonomic System**.

The cranial nerves carry information only into the body. – BLUFF – The cranial nerves carry information **into and out of the body**.

The teacher elicits answers from the students and provides correct answers to the false statements.

## 5. Presentation

The teacher says: *Now we will learn about the structure of the nervous system. I would like you to help me: based on the previous activity try to answer my questions.*

*I want you to look at diagrams presenting the structure of the nervous system (see attachment 2). What are the two main divisions of the Nervous System?*

(students answer: The Central Nervous System and Peripheral Nervous System.)

That's correct! What does the CNS and PNS stand for?

(students answer: CNS stands for the Central Nervous System. PNS stands for the Peripheral Nervous System.)

*The Central Nervous System means 'centralny układ nerwowy' and it is the main processing centre for the entire nervous system, while the Peripheral Nervous System, which means 'obwodowy układ nerwowy' connects the Central Nervous System to the organs. What are the two parts of the Central Nervous System?*

(students answer: The Central Nervous System consists of the brain and the spinal cord.)

*The brains functions as organiser and distributor of information for the body. The brain is divided into three major parts: the cerebrum, cerebellum, and brainstem. The cerebrum is the largest part of our brain; it is where learning, intelligence, and judgement occur. What are the main functions of cerebellum?*

(students answer: The cerebellum coordinates voluntary muscle movements and maintains balance and muscle tone.)

*The brainstem (pień mózgu) controls the heartbeat, breathing and blood pressure and coordinates involuntary muscle movements. The Peripheral Nervous System has two main divisions. What are these?*

(students answer: The Somatic System and the Autonomic System.)

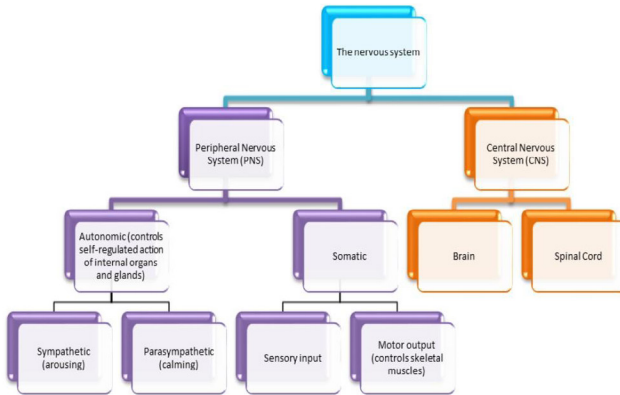
*The Somatic System means 'somatyczny układ nerwowy' or 'układ somatyczny' and it is associated with the voluntary control of body movements while the Autonomic System, which means 'autonomiczny układ nerwowy' is associated with the involuntary control of body movements. The Somatic System has two main parts: the spinal nerves (nerwy rdzeniowe) and cranial nerves (nerwy czaszkowe). The spinal nerves carry motor and sensory signals between the spinal cord of the body. What is the function of the cranial nerves?*

(students answer: The cranial nerves carry information into and out of the body.)

*The other division, which is the Autonomic System, has subdivisions: the Sympathetic division (współczulny) and the Parasympathetic division (przywspółczulny). The Sympathetic division is activated in times of physical or emotional stress or whenever the body requires action. It controls the fight-or-flight response that you experience during a stressful situation. The Parasympathetic division maintains body functions and restores the body to normal or relaxed mode.*

Source: <https://www.slideshare.net/JerilynDelosSantos/detailed-lesson-plan-the-nervous-system>

## Attachment 2



Graphic: Klaudia Kozuszek

### 6. Practice

The teacher says: *You're going to work in small groups of 3 or 4. I would like you to complete exercises 1 and 2 from the worksheet (see attachment 3).*

Teacher gives 10 minutes for this exercise.

### Attachment 3

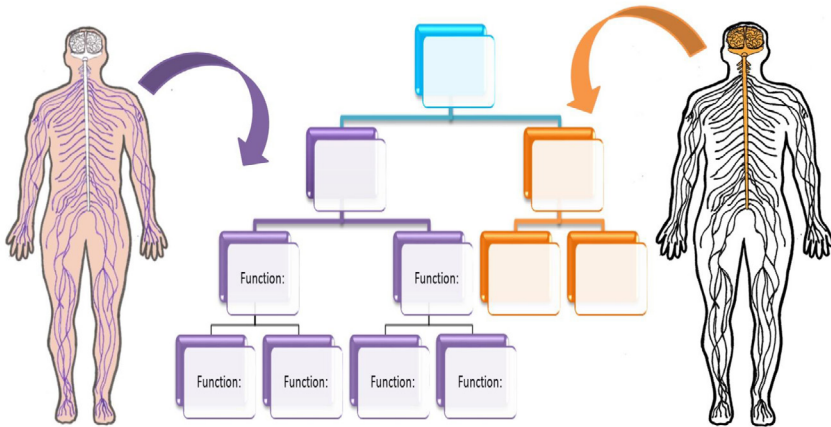
Exercise 1. Decide whether the following parts of the nervous system are part of the Central Nervous System (write: CNS) or the Peripheral Nervous System (write: PNS).

Part	System
1. Brain	
2. Spinal cord	
3. Cranial nerves	
4. Autonomic nervous system	
5. Somatic nervous system	

Exercise 2. Label the parts and functions of the nervous system on this diagram.

Nervous system	Central nervous system	brain	spinal cord
Sensory nervous system	Peripheral nervous system	Parasympathetic division	
Autonomic nervous system	Sympathetic division	Sensory nervous system	
	Somatic nervous system		

motor output	calming	communication with internal organs and glands	
communication with sense organs and voluntary muscles		sensory input	arousing



Graphic: Klaudia Kozuszek

Answers:

1. CNS 2. CNS 3. PNS 4. PNS 5. PNS 6. PNS
- 2.

Nervous system:

Right: Central nervous system

1. brain
2. spinal cord

Left: Peripheral nervous system

1. Autonomic nervous system (function: communication with internal organs and glands)
  - a. Sympathetic (function: arousing)
  - b. Parasympathetic (function: calming)

2. Somatic nervous system
  - a. Sensory nervous system (function: sensory input)
  - b. Motor nervous system (function: motor output)

The teacher elicits answers from the students.

## **7. Summary**

The teacher shows five sentences on the projector. The students have to provide the correct answer for each sentence (see attachment 4).

### **Attachment 4**

1. It consists of cranial and spinal nerves.
2. It controls the heartbeat, breathing, and blood pressure and coordinates involuntary muscle movements.
3. It is the main processing centre for the entire nervous system.
4. It carries information into and out of the body.
5. It restores the body to normal mode and maintains body functions.

Answers: 1. somatic system 2. brainstem 3. the Central Nervous System  
4. cranial nerve 5. the Parasympathetic division

## **8. The ending**

The teacher says: *I would like you to remember the functions and structure of the central and peripheral nervous system. I believe you found this lesson interesting. See you next time.*

## IX The human senses organs

### Lesson plan 1. The sense of sight

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the human organ of sight.

**Objectives:** At the end of the lesson the students will be able to:

- identify the parts of the eye;
- identify the functions of the eye organs;
- explain how our eyes work.

**Students' background knowledge:** Students should know the basic function of the eyes. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; pair work; word search; sequencing; labelling.

**Didactic support:** youtube video; diagram of eye anatomy; handouts (copies for each student).

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher says: *Today we will learn about one of your senses. We will start the lesson with an activity that will help you to guess which organ we will talk about.* (The teacher pairs the students with a partner. One student in each pair wears a blindfold and the sighted student acts as a guide by taking a short walk around the classroom. Remember to ask the student's permission for wearing a blindfold and make sure the student is comfortable doing this. After the activity is finished, the teacher asks the students how it felt to be blindfolded and which sense were they missing during their walk.)  
Students' anticipated answer: sight, the sense of sight

The teacher writes the topic on the whiteboard: **The sense of sight.**

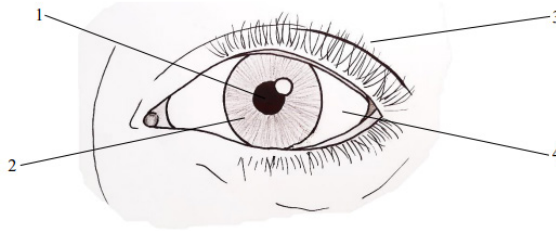
#### 4. Lead-in

The teacher says: *Before we learn more about eyesight I would like you to look at the worksheet (see attachment 1). Please try to label the parts of the human external and internal eye anatomy and try to guess their functions. Don't worry if you don't know the answers. Do it in pairs.*

The teacher gives 3–4 minutes to do this exercise.

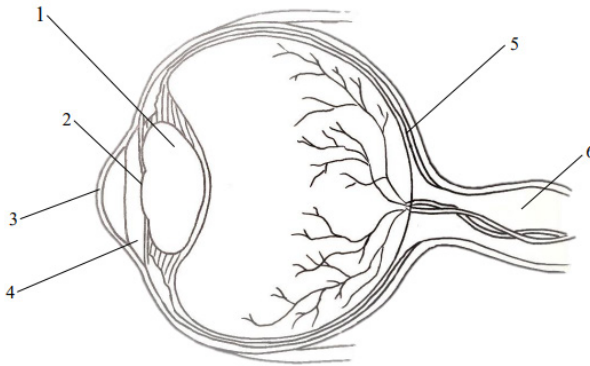
## Attachment 1

Exercise 1. Label the internal and external parts of eye anatomy.



**pupil   eyelid   sclera   iris**

Graphic: Milena Rzońca



**iris   cornea   retina   optic nerve   pupil   lens**

Graphic: Milena Rzońca

Exercise 2. Fill in the part of the eye that fits the description and function.

1. \_\_\_\_\_ The transparent skin covering the front of your eye. It allows light to enter the eye for vision.
2. \_\_\_\_\_ The tough skin covering the outside of the eyeball. It is commonly known as 'the white' and it maintains the shape of the eyeball.
3. \_\_\_\_\_ This is the hole in the coloured iris. It lets light into the eye. It gets very small in bright light and bigger in dull light.
4. \_\_\_\_\_ This is the coloured part of the eye. It controls the amount of light that enters the eye.
5. \_\_\_\_\_ The thin fold of skin covering the eye when it is closed. It protects the eye and keeps out foreign bodies.

6. \_\_\_\_\_ The nerve that connects the eye to the brain. It sends signals from eye to the brain which interprets these into what we see.
7. \_\_\_\_\_ The muscle whose contraction turns the eyeball medially.
8. \_\_\_\_\_ The transparent structure in the eye that, together with cornea, focuses light onto the retina.
9. \_\_\_\_\_ The muscle whose contraction turns the eyeball outward.
10. \_\_\_\_\_ The thin layer of tissue that lines the back of the eye on the inside. It receives light and converts it into neural signals for the brain.

Answers:

Exercise 1: 1. pupil 2. iris 3. eyelid 4. sclera; 1. lens 2. pupil 3. cornea 4. iris 5. retina 6. optic nerve

Exercise 2: 1. cornea 2. sclera 3. pupil 4. iris 5. eyelid 6. optic nerve 7. medial rectus muscle 8. lens 9. lateral rectus muscle 10. retina

The teacher elicits answers from students.

## 5. Presentation

The teacher says: *Now I would like you to watch a short video presenting how our eyes work.*

Available at: <https://www.youtube.com/watch?v=9OS-9pG1IT0>

After watching the video, the teacher asks the students the following questions (brainstorming: students discuss the question in pairs.):

- Which parts protect the eye?
- Which parts are in charge of vision?
- How do the eyes and brain work together to give humans the sense of sight?
- How does the sense of sight work step by step?

The teacher writes the students' answers on the whiteboard.

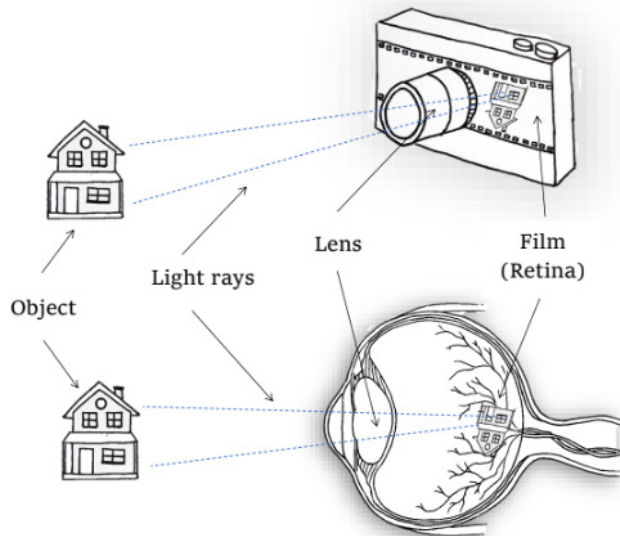
The teacher says: *Now I would like you to look at the diagram presenting how our eyes work (see attachment 2). Your eyes work in a similar way to a camera. (The teacher should point at the first part of the diagram.) The light rays from an object that the camera is pointed at pass through the lens of the camera, show up on the screen of the camera (or smart phone) and get recorded in the computer in the camera or phone. Do you notice something about this drawing? Yes, the picture that is recorded by the camera is upside down. Of course, when*

you look at the picture on the phone or camera screen, it is not upside down. Your eye works in a similar way to a camera. Light rays enter the eye through the cornea which bends the light rays in such a way that they pass freely through the pupil. The iris works like a shutter in a camera. It has the ability to enlarge and shrink, depending on how much light is entering the eye. After passing through the iris, the light rays pass through the eye's lens. Light rays pass through a dense, transparent gel-like substance, called the vitreous and reach the retina. The retina receives the image that the cornea focuses through the eye's internal lens and transforms this image into electrical impulses that are carried by the optic nerve to the brain.

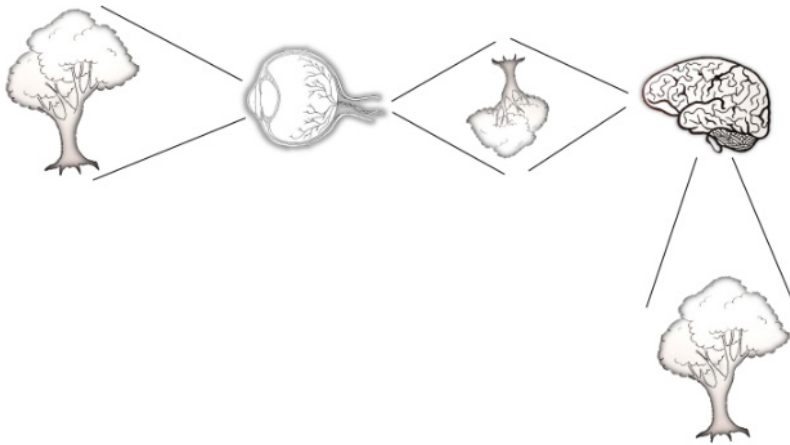
Do you notice something about this drawing? (The teacher should point at the second part of the diagram.) Yes, the 'picture' that your eye 'takes' is upside down too! Why don't you see things upside down? Well, your eye sends the picture to the visual processing part of your brain, and your brain turns that picture the right way up so you see things the right way up.

Source: <http://www.cyh.com/HealthTopics/HealthTopicDetailsKids.aspx?p=335&np=152&id=1730>

## Attachment 2



Graphic: Milena Rzońca



Graphic: Milena Rzońca

## 6. Practice

Students are given copies with a worksheet (see attachment 3).

The teacher says: *Now I would like you to complete the worksheet. Work in pairs. You have ten minutes to do this exercise.*

### Attachment 3

Exercise 1. Order the process of seeing by matching the numbers to the correct steps.

	The electrical impulses are carried to the brain by the optic nerve.
	Light rays enter the eye through the cornea.
	The visual centre of the brain interprets impulses as what we see.
	The light then reaches the back of the eye and hits the retina.
	The light passes through a watery fluid and then enters the pupil to get to the lens.
	The retina transforms the light into electrical impulses.
	Light reflects the object that we are looking at.

Exercise 2.

- Draw a simple diagram of the human eye.
- Label the parts of the eye.
- Mark the path of light rays through the eye to the optic nerve.



Exercise 3. How does the eye adjust itself to deal with light of different intensity?

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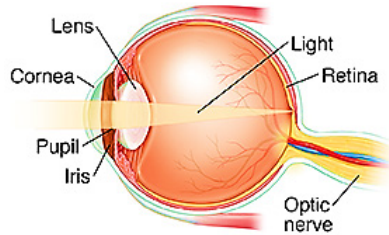
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Answers:

Exercise 1.

1. Light reflects the object that we are looking at.
2. Light rays enter the eye through the cornea.
3. The light passes through a watery fluid and then enters the pupil to get to the lens.
4. The light then reaches the back of the eye and hits the retina.
5. The retina transforms the light into electrical impulses.
6. The electrical impulses are carried to the brain by the optic nerve.
7. The visual centre of the brain interprets impulses as what we see.

## Exercise 2.



Graphic: Milena Rzońca

Exercise 3. The iris regulates the amount of light entering the human eye. It automatically adjusts the size of the pupil depending on the intensity of light that the eye receives.

Source: <https://www.mounmittany.org/articles/healthsheets/4009>

The teacher elicits answers from the students.

## 7. Summary

The teacher gives the students copies of a word search task (see attachment 4).

### Attachment 4

Z	M	P	H	Q	F	L	E	Y	E	B	R	O	W
E	R	C	X	G	A	Q	L	B	A	A	S	E	B
X	Y	E	V	O	R	E	O	J	C	N	C	T	N
B	O	E	C	P	N	P	C	A	D	Z	L	H	U
F	P	Q	L	T	U	E	D	X	M	X	E	R	T
I	T	E	C	I	U	P	Y	H	D	L	R	F	L
R	I	Y	C	B	D	S	I	E	M	S	A	V	Q
I	C	E	D	C	O	P	M	L	L	L	E	N	S
S	N	S	R	M	C	A	M	U	W	A	C	K	U
O	E	E	E	E	C	O	Q	M	S	C	S	P	B
A	R	X	T	Y	J	N	R	H	E	C	D	H	Y
I	V	I	I	S	V	I	W	N	Y	Y	L	G	Q
X	E	A	N	W	G	B	N	G	E	W	V	E	V
O	O	K	A	M	V	Q	X	Z	N	A	F	K	S

EYELID  
 IRIS  
 LENS  
 EYEBROW  
 SCLERA  
 CORNEA  
 RETINA  
 EYELASH  
 PUPIL  
 OPTICNERVE  
 RECTUSMUSCLE  
 EYES

Answers:



- EYELID
- IRIS
- LENS
- EYEBROW
- SCLERA
- CORNEA
- RETINA
- EYELASH
- PUPIL
- OPTICNERVE
- RECTUSMUSCLE
- EYES

### 8. The ending

The teacher says: *As your homework, watch the video again and try to remember the most important information. Revise vocabulary.*

## Lesson plan 2. Ear – organ of hearing and balance

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the human organ of hearing and balance.

**Objectives:** At the end of the lesson the students will be able to:

- identify the parts of the human ear;
- explain how sound waves travel through the ear;
- explain how the inner ear supports the system of hearing and balance.

**Students' background knowledge:** Students should know the basic function of ears. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; pair work; word search; gap-filling; listening for specific information; labelling.

**Didactic support:** youtube video; diagram of ear anatomy; handouts (a tape script of the recording; copies for each student).

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher says: *Today we will learn about one of your senses. We will start the lesson with an activity that will help you to guess which organ we will talk about.* The teacher puts the students into a circle with one person blindfolded in the middle. Remember to ask the student's permission for wearing a blindfold and make sure the student is comfortable doing this. The teacher explains that he/she is going to silently point to students around the circle and that when she/he points at someone, the student is to say the name of the person blindfolded in the middle. The blindfolded person must then try to point in the direction of the voice and identify the name of the person who said his/her name. The teacher should try this experiment with the blindfolded person using both ears and then again with one hand over one of them to block the sound.

The teacher asks the students to reflect with the following questions:

- What is it like to try to identify where and from whom the sound is coming?
- Do some people have a harder time with this than others? Why do you think that is?
- Is it easier with one ear? Both ears? (Some people have a dominant ear.)

After activity is finished, the teacher asks the students which sense they will learn today.

Students' anticipated answer: hearing, the sense of hearing, the ears

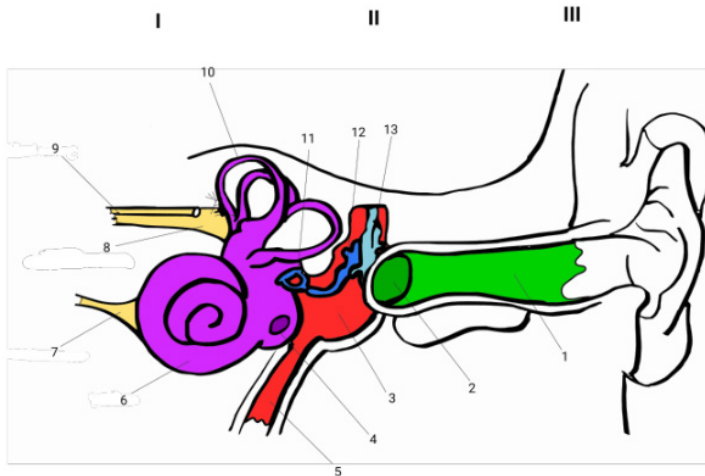
The teacher writes the topic on the whiteboard: **Ear – organ of hearing and balance.**

#### 4. Lead-in

The teacher says: *Before we learn more about our ears and balance, I would like you to look at the worksheet (see attachment 1). Study the diagram in pairs and identify parts of the hearing system. Then use each answer to correctly label the diagram. Don't worry if you don't understand everything, we'll explain it later.*

Teacher gives 5 minutes to label the parts.

#### Attachment 1



cochlear nerve vestibular nerve round window stapes cochlea INNER EAR  
ear canal MIDDLE EAR facial nerve tympanic cavity EXTERNAL EAR  
ear drum Eustachian tube malleus incus semicircular canals

Graphic: Emilia Kawka

Answers: I INNER EAR, II MIDDLE EAR III EXTERNAL EAR

1. ear canal 2. ear drum 3. tympanic cavity 4. round window 5. Eustachian tube 6. cochlea 7. cochlear nerve 8. vestibular nerve 9. facial nerve 10. semicircular canals 11. stapes 12. incus 13. malleus

The teacher elicits answers from the students.

## 5. Presentation

The teacher says: *Now I would like you to watch a short video presenting how our ears work. I want you to listen carefully. Don't worry if you don't understand everything, we will explain it later.*

Available at: [https://www.youtube.com/watch?v=RiVx5Lih\\_44](https://www.youtube.com/watch?v=RiVx5Lih_44)

After watching the video, the teacher asks the students: *Did you find the video easy or difficult? What can you remember?* (Brainstorming: students discuss the question in pairs.)

The teacher writes the students' answers on the whiteboard.

## 6. Practice

The teacher says: *Now I'll give you copies of the text you have just heard. You are going to listen to the video once again. I would like you to try to fill in the gaps with appropriate words from what you hear. Use words/phrases below the text to fill in the gaps (see attachment 2).*

### Attachment 2

#### What are the functions of the ears?

The ears collect sounds and turn them into messages for the brain to interpret. They also send information about (1) \_\_\_\_\_ to the brain.

#### How do the ears work?

Three sections of the ear work together to make this happen: they are the outer ear, the middle ear, and the inner ear.

The (2) \_\_\_\_\_ is made up of the pinna and the ear canal. These parts gather sounds from the environment and funnel them into the (3) \_\_\_\_\_.

The middle ear takes these sounds and turns them into vibrations. Sounds that come into the middle ear hit the eardrum, causing it to move. The Eustachian tube helps the (4) \_\_\_\_\_ to work well by keeping the air pressure balanced on both sides.

When the eardrum moves, it makes three small bones, called ossicles, vibrate. The vibrations are then transmitted to the inner ear. The inner ear receives the vibrations and changes them into messages that go to the brain. These messages are called (5) \_\_\_\_\_.

The inner ear is made up of the cochlea and vestibule, which includes the (6) \_\_\_\_\_. The cochlea has fluid in it that moves like a wave. This happens when vibrations come in from the middle ear. The moving fluid

causes hair cells to make nerve signals signifying sound.

Semicircular canals also use moving fluid to create nerve signals that help with (7) \_\_\_\_\_. Then, the signals from the cochlea travel along the (8) \_\_\_\_\_. The signals from the semicircular canals travel along the vestibular nerve.

These two nerves come together and lead to the brain. There, the brain decodes the signals to obtain information about sound and balance.

auditory nerve	signals	semicircular canals	balance x 2
	eardrum	middle ear	outer ear

Answers: 1. balance 2. outer ear 3. middle ear 4. eardrum 5. nerve signals 6. semicircular canals 7. balance 8. auditory nerve

The teacher says: *Now we will read this text and discuss the answers together.* (The teacher attempts to elicit answers from the students. He/She can also show the full text on a projector to make sure each student is able to check the correct answers).

## 7. Summary

The teacher shows five sentences on the projector. The students have to decide in groups of 3–4 which statements are true or false (see attachment 3).

### Attachment 3

Decide which statements are true or false. Write T for true and F for the false answers.

1. The outer ear turns sounds into vibrations.
2. The function of the bones in the middle ear is to amplify vibrations from the ear canal and transmit them to the inner ear.
3. The three bones in the ear are called the malleus, incus, and sclera.
4. The cochlea is a snail-shaped, fluid filled structure in the outer ear.
5. Sound waves cause the tympanic membrane to vibrate.
6. The function of the semicircular canals is also to create nerve signals that help with balance.

Answers: 1. F 2. T 3. F 4. F 5. T 6. T

## 8. The ending

The teacher says: *As your homework, watch the video again and try to remember the most important information. Revise vocabulary.*

### Lesson plan 3. The senses of smell, taste and touch

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the human senses of smell, taste and touch.

**Objectives:** At the end of the lesson the students will be able to:

**Students' background knowledge:** Students should know the basic information on human senses. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; pair work; matching; labelling.

**Didactic support:** diagram of the anatomy of the senses of smell, taste and touch; handouts (copies for each student).

**Procedure and stages of the lesson:**

#### 1. Greeting

#### 2. Checking attendance

#### 3. Warm-up

The teacher says: *We will start this lesson with three riddles that help us to guess today's subject of our lesson. Are you ready?*

*1. Fresh-baked bread and flowers, too,  
are very nice to sniff.  
From dirty socks to sweet perfume,  
I let you take a whiff.  
Which sense am I?*

*2. Cookies, pizza, brussels sprouts,  
liver, brownies, peas –  
what you like and what you don't  
is all because of me.  
Which sense am I?*

*3. Whether a stove is hot,  
or water icy cold,  
a cat soft, a tack sharp –  
through me you are told.  
Which sense am I?*

Source: [https://teachables.scholastic.com/teachables/books/the-five-senses-science-riddle-9780590644617\\_020.html](https://teachables.scholastic.com/teachables/books/the-five-senses-science-riddle-9780590644617_020.html)

Students' anticipated answers: 1. smell 2. taste 3. touch

The teacher writes the topic on the whiteboard: **The human senses of smell, taste and touch.**

#### 4. Lead-in

The teacher says: *Before we learn more about the anatomy of these senses, I would like you to look at the worksheet (see attachment 1). Please try to match words to their definitions. Don't worry if you don't know the answer. Do it in pairs.*

Teacher gives 3–4 minutes to do this exercise.

#### Attachment 1

Word	Definition
free nerve endings (wolne zakończenia nerwowe)	Sensory organs that are found on your tongue and allow you to experience tastes.
taste buds (kubki smakowe)	They can detect temperature, mechanical stimuli (touch, pressure, stretch) or danger.
Ruffini endings (zakończenia Ruffiniego)	They detect stretch, deformation within joints and warmth.
nasal cavity (jama nosowa)	They detect pressure and high-frequency vibrations.
olfactory bulb (opuszka węchowa)	It gives the tongue its texture and they are responsible for the sensation of touch.
papilla (brodawka)	A neural structure which sends smell information to the brain.
Pacinian corpuscles (ciałko blaszkowate/ciałko Vatera Paciniego)	It houses the receptors responsible for olfaction.
tongue (język)	It is the sensory system used for smelling.
olfaction (powonienie/węch)	Its main function includes the sensation of taste.
saliva (ślina)	It transports taste substances and protects the taste receptors.

Answers: 1. taste buds 2. free nerve endings 3. Ruffini endings 4. Pacinian corpuscles 5. papilla (sing. papillae) 6. olfactory bulb 7. nasal cavity 8. olfaction 9. tongue 10. saliva

The teacher checks students' answers by asking them the following questions:  
What is the definition of a taste bud?

What is a free nerve ending?

What is a Ruffini ending?

What's the definition of Pacinian corpuscles?

Can you define papilla?

What is an olfactory bulb?

Can you define nasal cavity?

What is one of the functions of the tongue?

The teacher says: *On the basis of these definitions we are now ready to see how the human senses of smell, taste and touch work.*

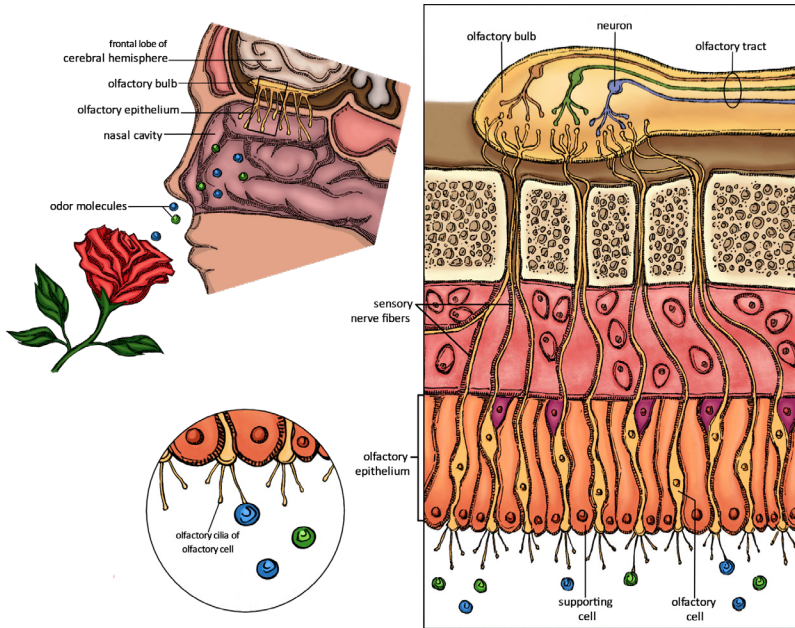
## **5. Presentation**

The teacher says: *Now I want you to look at diagrams presenting the anatomy of the human senses of smell, taste and touch. The first diagram shows the sense of smell (see attachment 2). The sense of smell is called olfaction. We smell with our nose. Our nose can detect hundreds of different types of smell. These smells are actually tiny odour molecules that our eyes cannot see. These odour particles will pass through our nasal cavity to the olfactory epithelium and reach the olfactory bulb. When information reaches nerve cells, the signal is sent to the brain. The brain in turn interprets what we smell.*

*The second diagram shows the sense of taste (see attachment 3). We taste with our tongue. The little raised bumps on our tongue are the taste buds. Our taste buds can recognize different types of tastes like sweet, sour, salty, spicy and bitter. When we eat something, the saliva in our mouth breaks down the food. The cells in the taste buds will send the messages to our brain, which will tell us what the food tastes like. Certain parts of the tongue are more sensitive to certain types of tastes. Our senses of taste and smell work closely together. Our sense of smell affects our sense of taste. They help us to enjoy the food as we eat. When our nose smells the food, it sends a signal to the brain, which causes the salivary glands in our mouth to release saliva. Saliva helps to digest the food that we put in our mouths.*

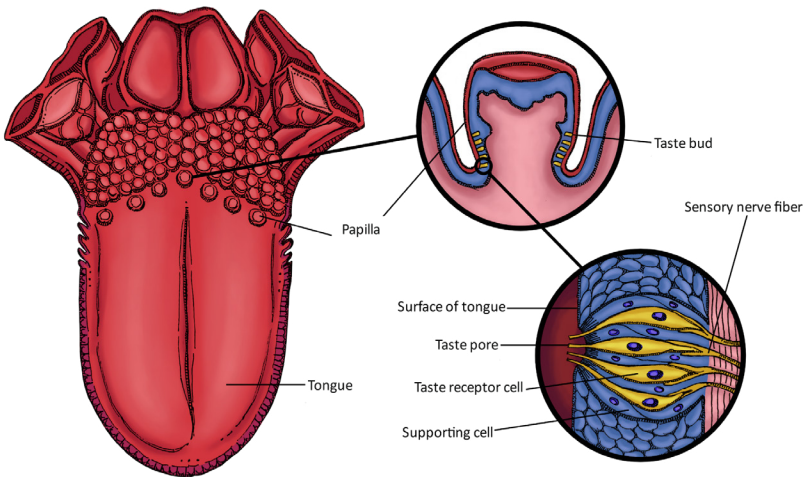
*The third diagram shows the sense of touch (see attachment 4). We use our hands to feel but it is our skin that gives us the sense of touch. The skin is the largest sense organ of our body. The nerve endings, also known as receptors, are located under the skin. These receptors give the brain information on what the body is in contact with. The main types of nerve endings are heat, cold, pain and touch. Some parts of our bodies are more sensitive than others. This is because they have more receptors. For example, our tongue and fingertips are more sensitive than other parts of the body. We can also feel if things are heavy or light. However, we cannot determine the exact weight of an object unless we weigh them with a scale.*

## Attachment 2



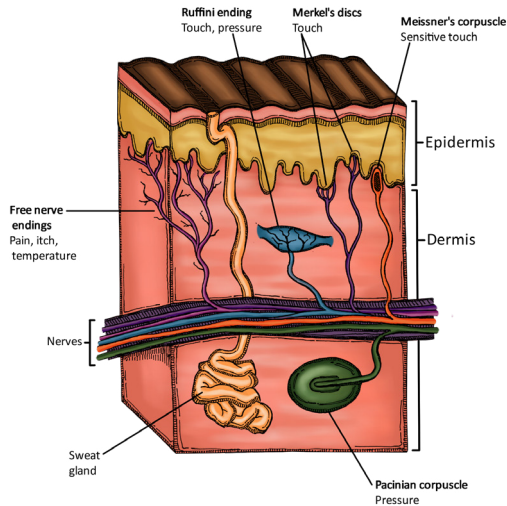
Graphic: Mikołaj Siciarz

## Attachment 3



Graphic: Mikołaj Siciarz

## Attachment 4



Graphic: Mikołaj Siciarz

### 6. Practice

The teacher says: *You're going to work in small groups of 3 or 4. I would like you to complete exercises 1 and 2 from the worksheet (see attachment 5).*

The teacher gives 10 minutes for this exercise.

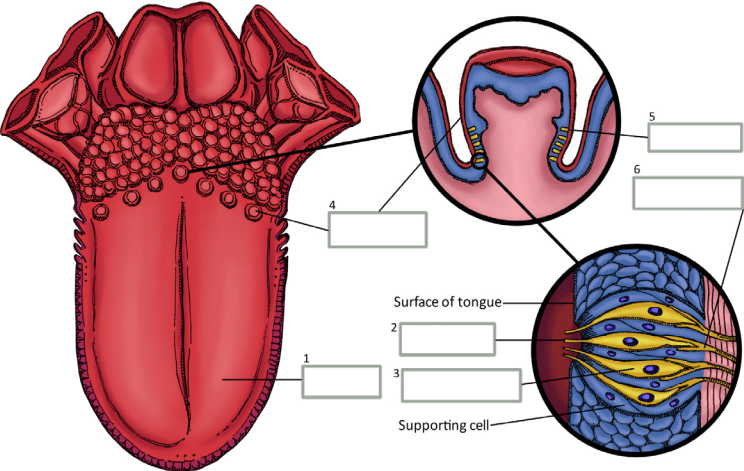
### Attachment 5

Exercise 1. Match the sensory organs to the correct sense.

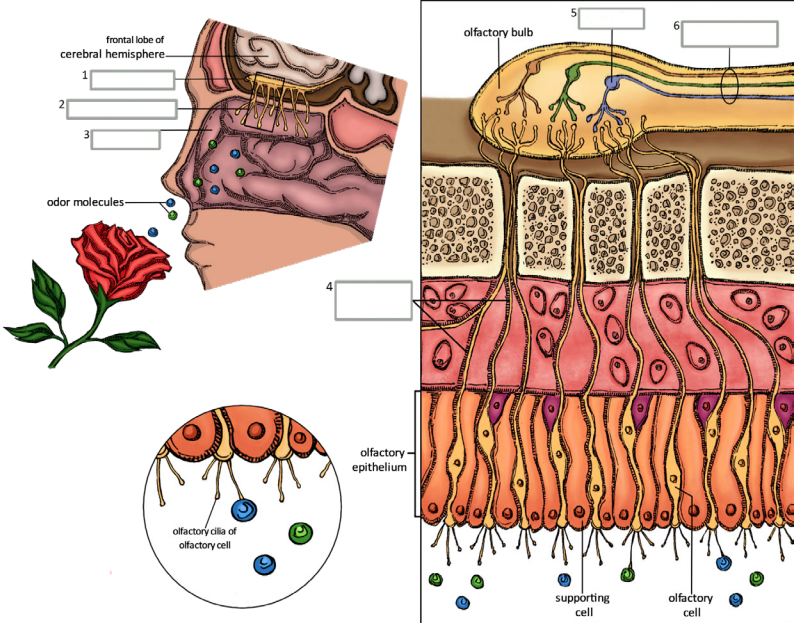
*epidermis    papilla    olfactory bulb    nasal cavity*  
*Ruffini ending    taste pore    dermis    tongue*  
*2 x sensory nerve fibres    olfactory tract    Merkel's disc*  
*taste bud    neuron    free nerve endings    taste receptor cell*  
*Pacinian corpuscle    olfactory epithelium*

TASTE	SMELL	TOUCH

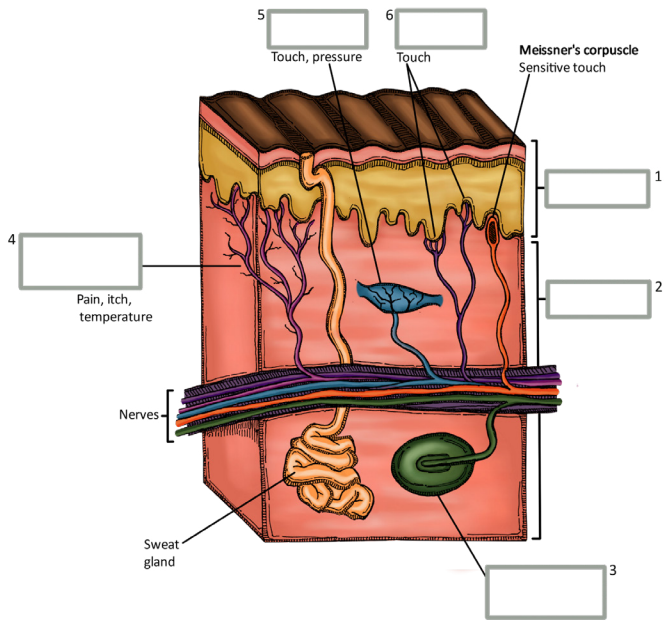
Exercise 2. Label the diagrams using the words from exercise 1.



Graphic: Mikołaj Siciarz



Graphic: Mikołaj Siciarz



Graphic: Mikołaj Siciarz

Answers:

Exercise 1.

Taste: 1. tongue 2. taste pore 3. taste receptor cell 4. papilla 5. taste bud 6. sensory nerve fiber

Smell: 1. olfactory bulb 2. olfactory epithelium 3. nasal cavity 4. sensory nerve fibers 5. neuron 6. olfactory tract

Touch: 1. epidermis 2. dermis 3. Pacinian corpuscle 4. free nerve endings 5. Ruffini ending 6. Merkel's discs

Exercise 2. (answers given clockwise from the top right)

Touch: Ruffini ending, Merkel's disc, epidermis, dermis, Pacinian corpuscle, free nerve endings

Taste: papilla, taste bud, sensory nerve fibres, taste receptor cell, taste pore, tongue

Smell: neuron, olfactory tract, sensory nerve fibres, nasal cavity, olfactory epithelium, olfactory bulb

The teacher elicits answers from the students.

## 7. Summary

The teacher shows five sentences on the projector. The students have to complete each sentence by circling the correct word from each pair in italics (see attachment 6).

### Attachment 6

1. The sense of smell is called *olfaction* / *reception*.
2. Salivary glands in our mouth release *taste buds* / *saliva*.
3. The nerve endings in the skin are also known as *receptors* / *neurons*.
4. The little raised bumps on our tongue are the *taste pores* / *taste buds*.
5. The *olfactory bulb* / *papilla* transmits smell information from the nose to the brain.

Answers: 1. olfaction 2. salivary glands 3. receptors 4. taste buds 5. olfactory bulb

The teacher elicits answers from the students.

## 8. The ending

The teacher says: *I would like you to learn the organs of the human senses of smell, taste and touch as well as their functions.*

## X The human reproductive system

### Lesson plan 1. Gametes

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the process of fertilisation.

**Objectives:** At the end of the lesson the students will be able to:

- identify the role of gametes in human fertilisation;
- explain the process of fertilisation;
- enumerate functions of chromosomes, egg cells and sperm cells.

**Students' background knowledge:** Students should know the basic function of the human reproductive system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** pair work; listening for specific information; gap-filling.

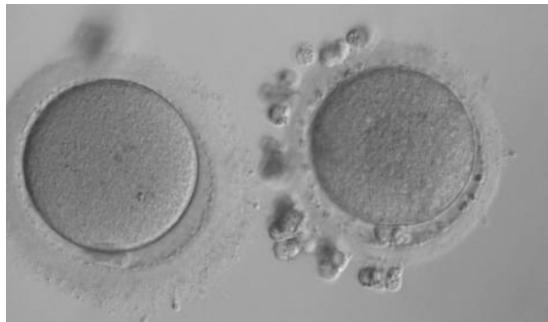
**Didactic support:** recording; handouts (a tape script of the recording); diagram of an egg cell and sperm cell (copies for each student); diagram of the fertilisation process.

**Procedure and stages of the lesson:**

1. Greeting
2. Checking attendance
3. Warm-up

The teacher says: *We will start this lesson with a riddle that will help you to guess today's subject of our lesson. Are you ready? I will show you two magnified photographs. Try to guess what they show* (see attachment 1 and attachment 2).

#### Attachment 1



Source: <http://atlas.eshre.eu/es/14555410245416920>

## Attachment 2



Source: [https://www.researchgate.net/figure/Boar-semen-sample-images-acquired-using-a-phase-contrast-microscope\\_fig1\\_224001711](https://www.researchgate.net/figure/Boar-semen-sample-images-acquired-using-a-phase-contrast-microscope_fig1_224001711)

Students' predicted answers (key-words):

Attachment 1. human egg cells

Attachment 2. human sperm cells

The teacher writes the topic on the whiteboard: **Gametes.**

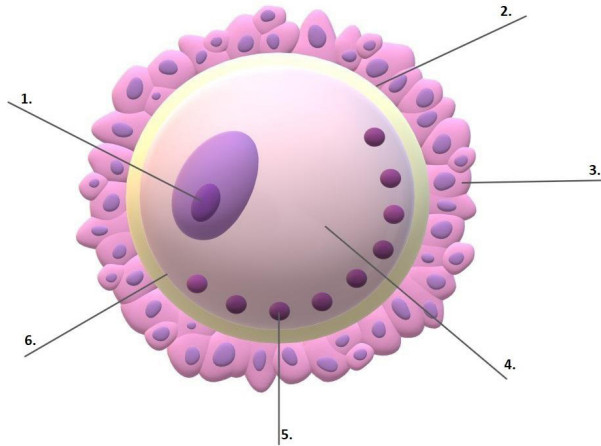
### 4. Lead-in

The teacher says: *That's correct! Your body is made up of millions of cells, but you have to remember that you began your life as a single cell. This single cell was created when an egg cell, which means 'komórka jajowa' was joined with a sperm cell (plemnik).* (The teacher should write these phrases on the whiteboard.) *Before we learn more about this process, I would like you to look at the worksheet (see attachment 3). Please try to label the parts of the human reproductive cells. Don't worry if you don't know the answers. Do it in pairs.*

Teacher gives 3–4 minutes to do this exercise.

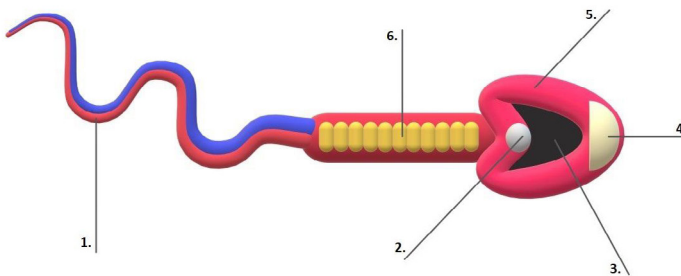
### Attachment 3

## Egg



1. Nucleus  
 2. Zona Pellucida (jelly coat)  
 3. Corona radiata (follicular cells)  
 4. Cytoplasm  
 5. Cortical granule  
 6. Plasma Membrane

## Sperm



1. Axoneme  
 2. Centriole  
 3. Nucleus  
 4. Acrosome  
 5. Head  
 6. Mitochondria

Graphic: Klaudia Kozuszek

Answers:

Egg: 1. Nucleus 2. Zona Pellucida (jelly coat) 3. Corona radiata (follicular cells) 4. Cytoplasm 5. Cortical granule 6. Plasma membrane

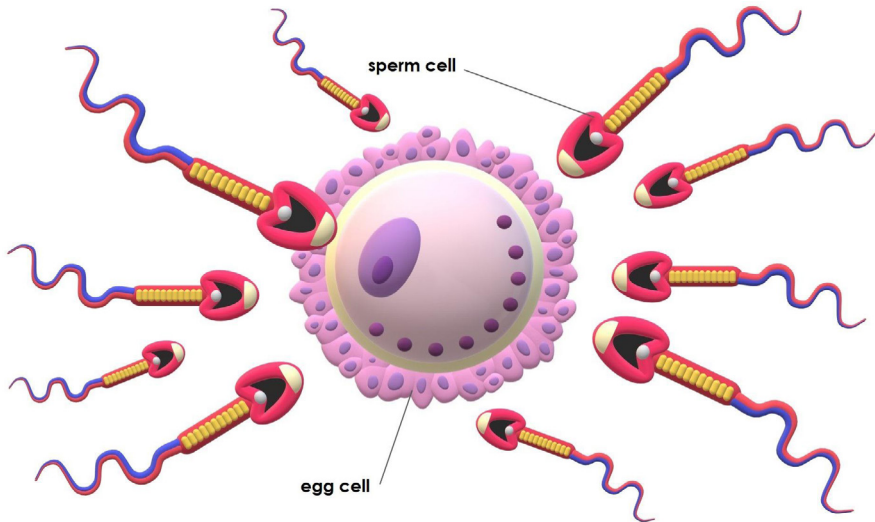
Sperm: 1. Axoneme 2. Centriole 3. Nucleus 4. Acrosome 5. Head 6. Mitochondria

The teacher elicits answers from the students.

## 5. Presentation

The teacher says: *Now I will give you a diagram which presents the process of joining a human egg cell and sperm cell, which is called fertilisation (zapłodnienie). In the meantime, you will hear a recording which explains how this process takes place. I want you to listen to it and look at the diagram carefully. Don't worry if you don't understand everything, we'll explain it later. (see attachment 4 and 5 recording 4).*

### Attachment 4



Graphic: Klaudia Kozuszek

## 6. Practice

The teacher asks: *Did you find the text easy or difficult? What can you remember? (The students attempt to answer as much as they can).*

The teacher says: *Now I'll give you the copies of the text you have just heard. You are going to listen to the recording once again. I would like you to try to fill in the gaps with appropriate words from what you hear. Use words/phrases below the text to fill in the gaps (see attachment 6).*

## Attachment 6

### ▶ [RECORDING 4]

#### GAMETES

Your body is made up of millions of cells. But you began your life as a single cell. That single cell was made when two very special cells joined together. The special cells were an (1) \_\_\_\_\_ and a (2) \_\_\_\_\_.

Egg cells and sperm cells are called (3) \_\_\_\_\_. Gametes are cells that are adapted for reproduction.

#### CHROMOSOMES

Every cell has (4) \_\_\_\_\_ in its nucleus. Chromosomes are long, thread-like structures. They are made up of the genetic material, which contains information about how the cell will develop.

You have (5) \_\_\_\_\_ chromosomes in every cell in your body. But gametes have only (6) \_\_\_\_\_ chromosomes.

#### EGG CELLS AND SPERM CELLS

Egg cells are the female gametes. They are bigger than most other cells. They are about the size of the full stop at the end of this sentence. Egg cells need to be quite large to make space for food stores in the (7) \_\_\_\_\_.

Sperm cells are the male gametes. They are smaller than most other cells. They have only a tiny amount of cytoplasm. They have a long (8) \_\_\_\_\_, so that they can swim.

#### FERTILISATION

When a sperm cell meets an egg cell, the head of the sperm cell goes into the egg cell. The (9) \_\_\_\_\_ of the sperm cell and the nucleus of the egg cell join together. This is called (10) \_\_\_\_\_.

The new cell that is produced is called a (11) \_\_\_\_\_.

tail	egg cell	gametes	zygote	46	sperm cell
chromosomes	nucleus	fertilisation		23	cytoplasm

Source: Jones, M., Fellowes-Freeman, D., Sang, D. (2013), *Cambridge Checkpoint. Science. Coursebook 8*, Cambridge University Press, pp. 55–56.

Answers: 1. egg cell 2. sperm cell 3. gametes 4. chromosomes 5. 46 6. 23  
7. cytoplasm 8. tail 9. nucleus 10. fertilisation 11. zygote

The teacher says: *Now read this text.* (The teacher attempts to elicit answers

from the students. He/She can also show the full text on a projector to make sure each student is able to check the correct answers).

## **7. Summary**

Teacher shows two questions on the projector. The students have to provide answers in pairs (see attachment 7).

### **Attachment 7**

1. What are the differences between an egg cell and other cells in the human body? List two differences.
2. What are the differences between a sperm cell and other cells in the human body? List three differences.

Answers:

1. it is bigger; it contains a lot of cytoplasm
2. it is smaller than other cells; it has less cytoplasm; it has a tail

## **8. The ending**

The teacher says: *As your homework, read the text again and try to remember the most important information. Revise vocabulary.*

## Lesson 2. The human reproductive system

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with the human reproductive system.

**Objectives:** At the end of the lesson the students will be able to:

- enumerate the parts of the human reproductive system;
- explain functions of male and female reproductive organs;
- explain the role of the reproductive system.

**Students' background knowledge:** Students should know the basic function of the human reproductive system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** brainstorming; matching words to their definitions; gap-filling; pair work; group work.

**Didactic support:** diagram of the human reproductive systems; handout.

**Procedure and stages of the lesson:**

### 1. Greeting

### 2. Checking attendance

### 3. Warm-up

The teacher says: *We will start this lesson with a riddle that will help you to guess today's subject of our lesson. Are you ready?* (The teacher draws an appropriate number of blank letters that match a phrase and students have to guess what these letters are to reveal the hidden word – Hangman Game.)

Students' anticipated answer: human reproductive system

The teacher writes the topic on the whiteboard: **The human reproductive system.**

### 4. Lead-in

The teacher says: *I would like you to work in small groups of 3 or 4. Each group is going to get a set of 12 words or phrases. 6 of them are used to describe the female reproductive system and 6 of them are used to describe the male reproductive system. Please try to choose the correct words for each system. Don't worry if you don't understand some of the phrases (see attachment 1).*

## Attachment 1

prostate gland	cervix
uterus	scrotum
testis	urethra
vagina	ovary
seminal vesicle	penis
oviduct	fallopian tube

Teacher gives 3–4 minutes to do this exercise.

Answers:

The male reproductive system: prostate gland, testis, scrotum, urethra, penis, seminal vesicle

The female reproductive system: uterus, vagina, cervix, ovary, oviduct, fallopian tube

The teacher elicits answers from the students.

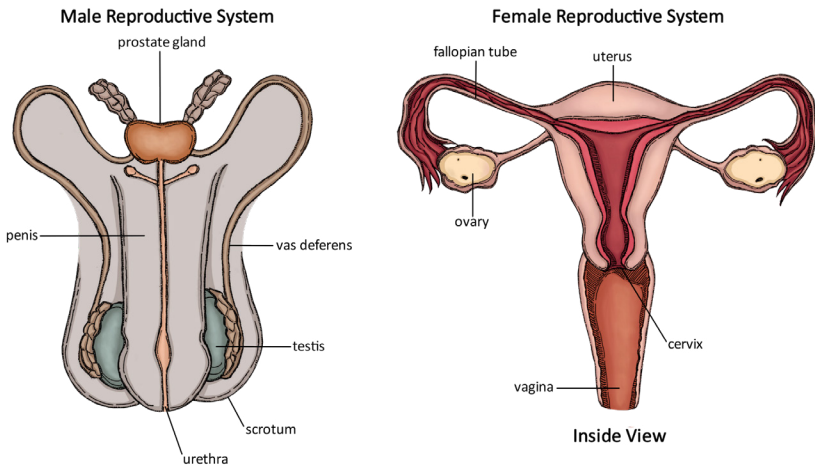
## 5. Presentation

The teacher says: *Now I want you to look at a diagram presenting the human reproductive systems (see attachment 2). The first diagram shows the male reproductive system. Sperm cells are made in the testes (singular: testis), which means 'jądra'. They travel along the sperm duct (nasieniowód), into the urethra (cewka moczowa). The seminal vesicles (pęcherzyki nasienne) and the prostate gland (prostata) make a sugary fluid for the sperm cells to swim in. The sugar helps to give the sperm cells energy to swim.*

*The second diagram shows the female reproductive system. Egg cells are made in the ovaries (jajniki). In an adult woman, one egg cell leaves one of the ovaries approximately each month. This is called ovulation, which means 'owulacja'. The egg cell goes into the oviduct (jajowód). Tiny hairlike structures on the oviduct walls called cilia (rzęski) move the egg cell slowly along the oviduct. This is where fertilisation can happen, if there are any sperm cells there. The zygote that is formed by fertilisation carries on travelling down the oviduct, until it gets to the uterus (macica). This is where it will develop and grow into a baby.*

Source: Jones, M., Fellowes-Freeman, D., Sang, D. (2013), Cambridge Checkpoint. Science. Coursebook 8, Cambridge University Press, pp. 56–57.

## Attachment 2



Graphic: Mikołaj Siciarz

### 6. Practice

Teacher: *Now I would like you to work in pairs and match the terms connected to the human reproductive system with their correct definitions. When you finish, discuss together with your partner the route taken from the testes by sperm. You have five minutes to do this exercise (see attachment 3).*

### Attachment 3

Draw lines to match each word to its correct definition.

Word	Definition
cervix (szyjka macycy)	An organ which is sometimes called 'the womb'. Its main function is to protect the developing foetus.
uterus (macica)	The lower part of the uterus. Its function is to facilitate the passage of sperm into the uterine cavity.
sperm (sperma)	The connection of the cervix to the outside of the body. One of its functions is to deposit sperm during sex and provide a passage for childbirth.
vagina (pochwa/wagina)	A female reproductive cell. Its function is to carry a set of chromosomes and provides nutrients for the developing zygote until it sinks into the uterus.
ovum (jajeczko)	A female reproductive organ which produces eggs.
oviduct (jajowód)	A paired organ which is essential for fertility. It also called 'Fallopian tube' and its main function is to transport the ova from the ovary to the uterus.

testes (sing. testis) (jądra)	A male reproductive cell. Its function is to pass on the necessary genetic information.
scrotum (moszna)	Male reproductive organs which produce sperm and testosterone.
ovary (jajnik)	The bag of skin that holds and helps to protect the testicles.

Answers: 1. uterus 2. cervix 3. vagina 4. ovum 5. ovary 6. oviduct 7. sperm 8. testes 9. scrotum

The teacher elicits answers from the students.

## 7. Summary

The teacher shows 2 tasks on the projector. The students have to work in groups of 3-4 to provide the answers (see attachment 4).

### Attachment 4

1. Name the part of the male reproductive system that:
  - a. produces sperm cells;
  - b. transports sperm cells from where they are made into the urethra;
  - c. produces a sugary fluid for sperm cells to swim in.
2. Name the part of the female reproductive system:
  - a. that produces egg cells;
  - b. where fertilisation happens;
  - c. where the zygote develops into a baby.

Answers:

1. a) testis b) uterus c) prostate gland and seminal vesicle
2. a) ovary b) fallopian tube c) uterus

## 8. The ending

The teacher says: *I would like you to remember the structure of the male and female reproductive systems. I believe you found this lesson interesting. See you next time.*

### Lesson 3. From embryo to baby

**Form:** students of the 7th grade of primary school

**Realization time:** 45 minutes

**General aim:** The students will get familiar with embryonic and foetal development.

**Objectives:** At the end of the lesson the students will be able to:

- explain embryonic and foetal development;
- enumerate organs which take part in embryo and foetal development;
- explain the process of birth.

**Students' background knowledge:** Students should know the basic function of the human reproductive system. Their English level should be A2+/B1 (pre-intermediate or intermediate).

**Methods and forms of work:** pair work; listening for specific information; gap-filling; labelling.

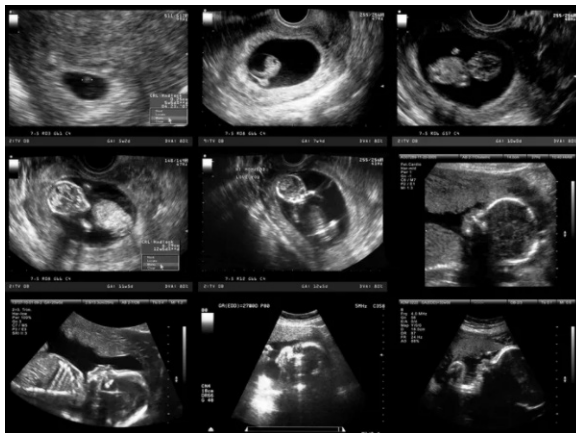
**Didactic support:** recording; handouts (a tape script of the recording); diagram of embryonic development (copies for each student).

**Procedure and stages of the lesson:**

1. Greeting
2. Checking attendance
3. Warm-up

The teacher says: *We will start this lesson with a riddle that will help you to guess today's subject of our lesson. Are you ready? What is it?* (see attachment 1)

#### Attachment 1



Source: <https://www.verywellfamily.com/fetal-development-a2-2758768>

Students' anticipated answer: the ultrasound of a baby, foetal development

The teacher writes the topic on the whiteboard: **From embryo to a baby.**

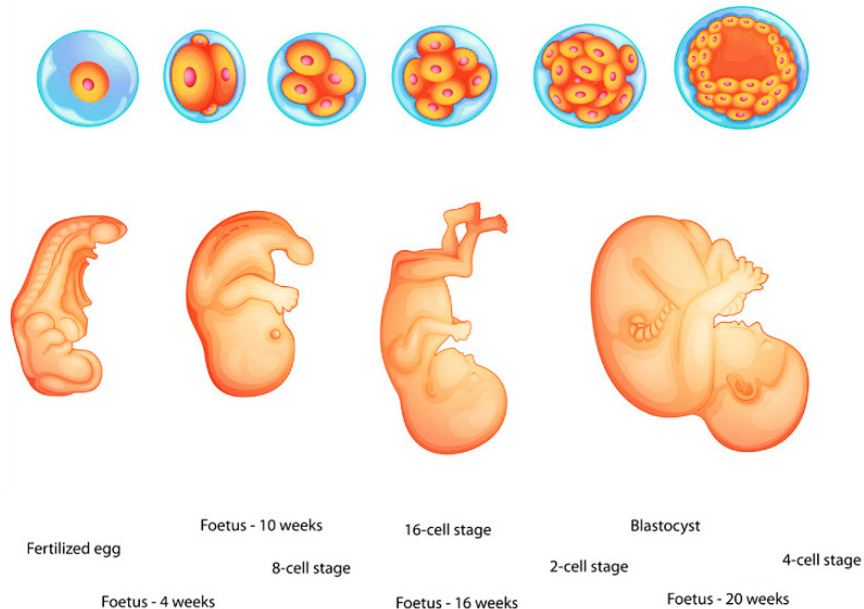
#### 4. Lead-in

The teacher says: *I would like you to look at the worksheet (see attachment 2). Please try to label the steps of embryonic and foetal development. Don't worry if you don't know the answers. Do it in pairs.*

The teacher gives 3–4 minutes to do this exercise.

#### Attachment 2

### Human Embryonic and Foetal Development



Graphic: Judyta Pawliszko

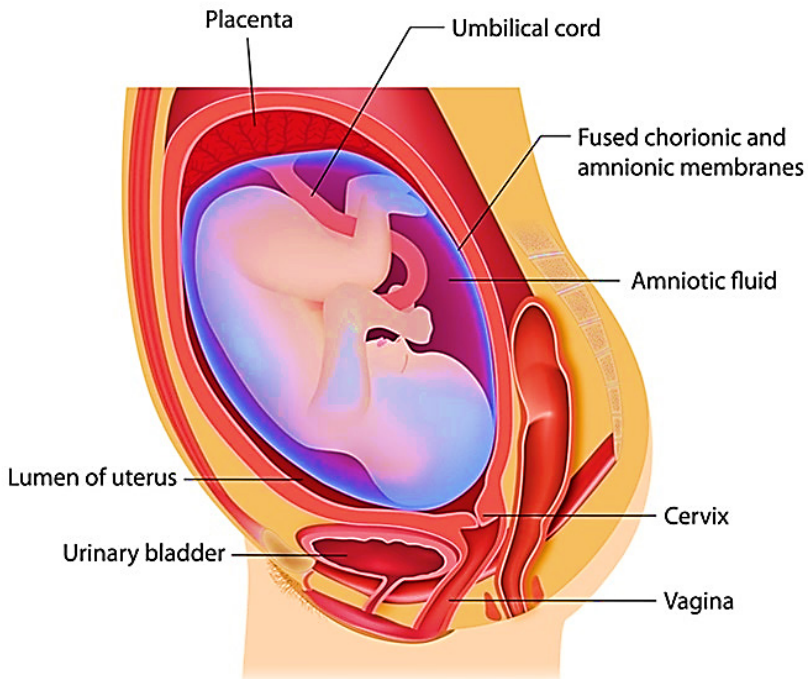
Answers (left to right): Fertilized egg, 2-cell stage, 4-cell stage, 8-cell stage, 16-cell stage, Blastocyst, Foetus-4 weeks, Foetus-10 weeks, Foetus-16 weeks, Foetus-20 weeks

The teacher elicits answers from the students.

## 5. Presentation

The teacher says: *Now I will give you a diagram which presents a foetus inside the uterus in the final month of pregnancy. In the meantime, you will hear a recording which explains how an embryo becomes a baby. I want you to listen to it and look at the diagram carefully. Don't worry if you don't understand everything, we'll explain it later (see attachment 3 and recording 5).*

## Attachment 2



Graphic: Judyta Pawliszko

## 6. Practice

The teacher asks the students: *Did you find the text easy or difficult? What can you remember?* (The students attempt to answer as much as they can).  
Teacher: *Now I'll give you copies of the text you have just heard. You are going to listen to the recording once again. I would like you to try to fill in the gaps with appropriate words from what you hear. Use words/phrases below the text to fill in the gaps (see attachment 5).*

## Attachment 5

### [RECORDING 5]



The zygote sinks into the thick, spongy lining of the uterus. This will be its home for the next nine months. It is safe here, protected by its mother's body.

### THE PLACENTA AND AMNION

When it sinks into the uterus wall, the zygote, now a blastocyst is only the same size as the egg cell from which it was formed. It has not grown at all. However, it is now made up of many tiny cells, rather than one big cell. These smaller cells are made as the blastocyst divides, over and over again, to form an embryo. The food stores in the egg cell provide the energy for it to do this. To grow and develop, the embryo now needs more food. A special organ develops that allows it to obtain food and oxygen from its mother's blood. This organ is the (1) \_\_\_\_\_ . The embryo is attached to the placenta by the (2) \_\_\_\_\_ .

The little embryo floats in its own private pond, containing (3) \_\_\_\_\_ . This fluid is made by a bag called the (4) \_\_\_\_\_ , which grows around the embryo. The amniotic fluid supports the embryo, and protects it from bumps and knocks.

### FOETAL DEVELOPMENT

By the time it is 6 weeks old, the embryo is about 4 mm long. All its major organs have begun to grow. At 8 weeks old, the embryo is about 13 mm long. It is already beginning to move.

At 11 weeks old, all the body organs have developed. The embryo has now become a (5) \_\_\_\_\_ . It is about 50 mm long. It is moving quite vigorously now.

From 11 weeks onward, the foetus grows steadily. Most foetuses have finished growing and developing about 38 or 39 weeks after fertilisation took place. The baby is now ready to be born.

### BIRTH

A couple of weeks before it is born, the baby usually turns so that it is lying head downwards. The muscles in the wall of the (6) \_\_\_\_\_ contract (get shorter). They make the opening for the uterus wider, so that the baby can pass through. Then the muscles (7) \_\_\_\_\_ in a different way, to push the baby out through the opening of the uterus, and through the vagina.

amniotic fluid	contract	foetus	placenta
umbilical cord	amnion	uterus	

Source: Jones, M., Fellowes-Freeman, D., Sang, D. (2013), *Cambridge Checkpoint. Science. Coursebook 8*, Cambridge University Press, pp. 60–61.

Answers: 1. placenta 2. umbilical cord 3. amniotic fluid 4. amnion 5. foetus  
6. uterus 7. contract

The teacher says: *Now try to read this text together.* (The teacher attempts to elicit answers from the students. He/She can also show the full text on a projector to make sure each student is able to check the correct answers).

## 7. Summary

The teacher shows six sentences on the projector. The students have to decide in groups of 3–4 which statements are true or false (see attachment 6).

### Attachment 6

Decide which statements are true or false. Write T for true and F for the false answers.

1. The placenta is the growing embryo's life support system.
2. The placenta allows the embryo to obtain food from its mother's blood.
3. The amnion is a bag surrounding the uterus.
4. The embryo's organs have all developed by 6 weeks after fertilisation.
5. After 11 weeks the embryo is called a foetus.
6. Birth happens when the strong muscles in the uterus wall push the baby out through the vagina.

Answers: 1. T 2. T 3. F 4. F 5. T 6. T

## 8. The ending

The teacher says: *As your homework, read the text again and try to remember the most important information. Revise vocabulary.*

# Glosariusz

## I Biology the study of life

### Lesson 1. How the organism is organised

- 🔊 **cell**/sel/ the smallest basic unit of a plant or animal; **komórka**
- tissue**/'tʃ.u:/ a group of connected cells in an animal or plant that are similar to each other, have the same purpose, and form the stated part of the animal or plant; **tkanka**
- organ**/'ɔ:.gən/ a part of the body of an animal or plant that performs a particular job; **organ, narząd**
- homeostasis** /,həʊ.mi.əs'teɪ.sɪs/ the ability or tendency of a living organism, cell, or group to keep the conditions inside it the same despite any changes in the conditions around it, or this state of internal balance; **homeostaza**
- integumentary system** /ɪn'teg.jə.mənt(ə)r.i ,sɪs.təm/ includes the skin, hair, and nails, as well as skin glands; **układ powłokowy**
- muscular system** /'mʌs.kjə.lə(r) ,sɪs.təm/ includes muscle cells and muscle tissues; **układ mięśniowy**
- skeletal system** /'skel.ə.t(ə)l ,sɪs.təm/ consists of bones and connective tissue, including cartilage, tendons, and ligaments; **układ szkieletowy**
- endocrine system** /'en.də.krɪn ,sɪs.təm/ consists of the endocrine glands, and is responsible for the production and secretion of hormones; **układ hormonalny**
- circulatory system** or **cardiovascular system** /,sɜ:.kjə'leɪ.t(ə)r.i ,sɪs.təm/ /,kɑ:.di.əs'væs.kjə.lə(r) 'sɪs.təm/ the organ system responsible for the circulation and transport of oxygen, carbon dioxide, amino acids, electrolytes, hormones, blood cells, or other molecules and nutrients throughout the body; **układ sercowo-naczyniowy, układ krwionośny, układ krążenia**
- lymphatic system** /lɪm'fæt.ɪk ,sɪs.təm/ the network of vessels through which lymph drains from the tissues into the blood; **układ limfatyczny, układ chłonny**
- respiratory system** /rɪ'spɪr.ə.t(ə)r.i ,sɪs.təm/ the organs that make it possible for you to breathe; **układ oddechowy**
- digestive system** /daɪ'dʒes.tɪv ,sɪs.təm/ the organs in your body involved with the digestion of food; **układ pokarmowy, system trawienny**
- excretory system** or **urinary system** /ɪk'skri:t(ə)r.i ,sɪs.təm/ /'jʊə.rɪ.n(ə)r.i ,sɪs.təm/ the organs that make urine and remove it from the body; **układ moczowy, układ wydalinczy**
- reproductive system** /rɪ:.prə'dʌk.tɪv ,sɪs.təm/ the tissues, glands, and organs involved in producing offspring (children); **układ rozrodczy**

## II The human skin

### Lesson 1. It's all about our skin

- 🔊 **epidermis** /,ep.ɪ'dɜː.mɪs/ the thin outer layer of the skin; **naskórek, skóra, epiderma**  
**dermis** /'dɜː.mɪs/ the thick layer of skin under the epidermis (= thin outer layer) that contains blood vessels, sweat glands and nerve endings; **skóra właściwa**  
**Pacinian corpuscle** /pə'sɪmɪən 'kɔː.pʌs.(ə)l/ an encapsulated ending of a sensory nerve that acts as a receptor for pressure and vibration; **cialko Paciniego**  
**sweat gland** /'swet ,glænd/ one of the small organs under the skin that produce sweat; **gruczoł potowy**  
**nerve** /nɜːv/ a group of long, thin fibres (= structures like threads) that carry information or instructions between the brain and other parts of the body; **nerw**  
**free nerve ending** /fri:'nɜːv ,en.dɪŋ/ an unspecialized, afferent nerve fiber sending its signal to a sensory neuron; **wolne zakończenie nerwowe**

### Lesson 2. The pathologies of the integumentary system

- 🔊 **acne** /'æk.ni/ a skin disease common in young people, in which small, red spots appear on the face and neck; **trądzik**  
**sunburn** /'sʌn.bɜːn/ a condition in which your skin is sore and red because you have spent too long in the strong heat of the sun; **oparzenie słoneczne**  
**folliculitis** /fɒ,lɪkjʊ's'laɪtɪs/ a common skin condition that happens when hair follicles become inflamed. It's often caused by an infection with bacteria; **zapalenie mieszków włosowych**  
**sebaceous cyst** /sɪ'beɪ.jəs 'sɪst/ typically harmless, slow-growing bumps under the skin. They often appear on the scalp, face, ears, trunk, back, or groin area; **kaszak**  
**miliaria** /,mɪlɪ'ɛ:riə/ **prickly heat/heat rash** /,prɪk.(ə)l.i 'hi:t/'hi:t ,ræʃ/ a condition in which the skin feels uncomfortable and is covered with red spots; **potówka (reakcja skóry na nadmiar słońca)**  
**ecchymosis** /,ekɪ'məʊsɪs/ discoloration of the skin through bruising; **krwawy wylew podskórny, wybroczyna**  
**pustule/pimple** /'pʌs.tʃu:l/'pɪm.p(ə)l/ a small raised area on the skin that contains pus (= thick liquid); **krosta, pryszcz**  
**melanosis** /,melə'nəʊsɪs/ a skin condition characterized by excessive deposits of melanin; **melanizm**

## III The human skeleton and muscles

### Lesson 1. Body without skin: the human skeleton

- 🔊 **skull** /skʌl/ the bones of the head that surround the brain and give the head its shape; **czaszka**  
**clavicle** /'klæv.ɪ.k(ə)l/ the technical word for the collarbone (= the bone between the shoulder and neck); **obojczyk**  
**rib cage** /'rɪb ,keɪdʒ/ the structure in the body formed by the ribs (= bones in the chest that protect the heart, lungs and other organs); **klatka piersiowa**  
**ulna** /'ʌl.nə/ a long, thin bone in the lower part of your arm; **kość łokciowa**  
**radius** /'reɪ.di.əs/ the thicker of the two bones in the lower arm; **kość promieniowa**

**femur**/'fi:mə(r)/the long bone in the upper part of the leg; **kość udowa**  
**tibia**/'tib.i.ə/the large bone at the front of the lower leg; **piszczel, kość piszczelowa**  
**fibula**/'fib.jə.lə/the outer of the two bones in the lower part of the human leg; **kość strzałkowa, strzałka**  
**patella**/pə'tel.ə/the bone at the front of the knee joint; **rzepka (kość)**  
**pelvis**/'pel.vɪs/the bones that form a bowl-shaped structure in the area below the waist at the top of the legs, and to which the leg bones and spine are joined; **miednica**  
**spine**/spaɪn/the line of bones down the centre of the back that provides support for the body and protects the spinal cord; **kręgosłup**  
**humerus**/'hju:məs/the long bone in the upper half of your arm, between your shoulder and your elbow (= the middle part of the arm where it bends); **kość ramienna**  
**scapula/shoulder blade**/'skæp.jə.lə/'ʃəʊl.də ,bleɪd/a large, flat bone on each side of your back below your shoulder that helps to increase the range of movement of your arm; **łopatka**

## Lesson 2. Bones and their types

- 🔊 **bone marrow**/'bəʊn ,mær.əʊ/soft tissue containing a lot of fat in the centre of a bone; **szpik kostny**  
**ossein**/'ɒsiːn/a protein that forms the organic matrix of bone, constituting about 40 per cent of its matter; **osseina**  
**periosteum** ,per.i'ɒs.ti.əm/a thin layer of tissue surrounding the outer layer of all bones;; **okostna**

## Lesson 3. What moves our bones? A look at the muscular system

- 🔊 **cardiac muscle tissue**/'kɑ:di.æk ,mʌs.əl ,tɪf.u:/a specialized type of muscle tissue that forms the heart. This muscle tissue, which contracts and releases involuntarily, is responsible for keeping the heart pumping blood around the body; **tkanka mięśniowa sercowa**  
**skeletal muscle tissue**/'skel.ə.t(ə)l ,mʌs.əl ,tɪf.u:/a specialized contractile tissue found in animals which functions to move an organism's body. Skeletal muscle is comprised from a series of bundles of muscle fibers, surrounded by protective membranes; **tkanka mięśniowa szkieletowa**  
**smooth muscle tissue**/'smu:ð ,mʌs.əl ,tɪf.u:/muscle that shows no cross stripes under microscopic magnification. It consists of narrow spindle-shaped cells with a single, centrally located nucleus. Smooth muscle tissue, unlike striated muscle, contracts slowly and automatically; **tkanka mięśniowa gładka**  
**pectoral/chest**/'pek.t(ə)r.(ə)l/'tʃest ,mʌs.(ə)l/muscle either of two large chest muscles (pectoralis major and pectoralis minor), that assist in movements of the shoulder and upper arm; **mięsień klatki piersiowej**  
**abdominal/belly muscles**/'æb'dɒm.i.n(ə)l/'bel.i ,mʌs.(ə)l/z/a set of strong bands of muscles lining the walls of your abdomen (trunk of your body). They are located toward the front of body, between ribs and pelvis; **mięsień brzucha**  
**quadriceps/thigh muscle**/'kwɒd.rɪ.seps/'θaɪ ,mʌs.(ə)l/z/a large muscle in the front of the thigh that is divided into four parts; **mięsień uda**  
**deltoid/shoulder muscle**/'del.tɔɪd/'ʃəʊl.də(r) ,mʌs.(ə)l/a muscle in the shoulder, shaped like a triangle and used for lifting the arm; **mięsień naramienny**  
**bicep/muscle**/'baɪ.sep/'mʌs.(ə)l/the large muscle at the front of the upper arm; **biceps, mięsień dwugłowy**

## IV The human digestive system

### Lesson 1. Nutrients: carbohydrates, fats, proteins. How do we know that they are in our food?

- 🔊 **carbohydrate** /ˌkɑː.bəʊˈhaɪ.dreɪt/ one of several substances, such as sugar or starch, that provide the body with energy, or foods containing these substances such as bread, potatoes, pasta, and rice; **węglowodany**
- fat** /fæt/ the substance under the skin of humans and animals that stores energy and keeps them warm;  **tłuszcz**
- protein** /ˈprəʊ.tiːn/ one of the many substances found in food such as meat, cheese, fish, or eggs, that is necessary for the body to grow and be strong;  **białko**

### Lesson 2. Vitamins, minerals, water: is this all we need to survive?

- 🔊 **vitamin** /ˈvɪt.ə.mɪn/ any of a group of natural substances that are necessary in small amounts for the growth and good health of the body;  **witamina**
- mineral** /ˈmɪn.(ə)r.(ə)l/ a substance that exists naturally in foods, water, or the ground, and is not a living organism;  **minerał**
- thiamine/vitamin B1** /ˈθaɪ.ə.miːn//,vɪt.ə.mɪn ,biːˈwʌn/ a vitamin found in foods such as whole grains, brown rice, nuts, and liver. It is important for the production of energy from sugar and starch in the body and helping the heart, muscles, and nervous system to work well;  **tiamina, witamina B1**
- niacin** /ˈnaɪ.ə.sɪn/ one of the vitamin B complex found in foods such as wheat, beef, chicken, and milk, important for producing energy from food and for keeping the digestion and nervous system healthy;  **niacyna**
- biotin** /ˈbaɪ.ə.tɪn/ (= one of a group of natural substances necessary for good health) found in foods such as eggs, liver (= an animal organ), and yeast (= a fungus that makes bread rise). It helps the body use fats and carbohydrates and is important for healthy hair, nails, and skin;  **biotyna**
- calcium** /ˈkæl.si.əm/ a chemical element present in teeth, bones, and chalk;  **wapń**
- sodium** /ˈsəʊ.di.əm/ a soft, silver-white chemical element that is found in salt;  **sól**
- potassium** /pəˈtæs.i.əm/ a silver-white chemical element that, when combined with other elements, is used in the production of soap, glass, and fertilizers (= substances that help plants to grow);  **potas**
- trace mineral** /ˈtreɪs ,mɪn.ər.əl/ a chemical element such as iron or zinc that occurs in very small amounts in living things and is necessary for normal growth and development;  **pierwiastek śladowy, mikroelement**
- chromium** /ˈkrəʊ.mi.əm/ a chemical element that is a hard, blue-grey metal, used in combination with other metals to make chrome;  **chrom**
- copper** /ˈkɒp.ə(r)/ a chemical element that is a reddish-brown metal, used especially for making wire and coins;  **miedź**
- fluoride** /ˈflɔː.raɪd/ a chemical substance sometimes added to water or toothpaste (= substance for cleaning teeth) in order to help keep teeth healthy;  **fluorek**
- iron** /aɪən/ a chemical element that is a common greyish-coloured metal. It is strong, used in making steel, and exists in very small amounts in blood;  **żelazo**

**manganese** /'mæŋ.gə.ni:z/ a chemical element that is a grey-white metal, used in the process of making steel; **mangan**  
**molybdenum** /mɒl'ɪb.də.nəm/ a chemical element that is a very hard, silver-coloured metal, used especially to make steel stronger; **molibden**  
**iodine** /'aɪ.ə.di:n/ a chemical element that is found in small amounts in sea water and used to prevent infection; **jodyna, jod**  
**selenium** /sə'li:.ni.əm/ a chemical element used in photocells and photographic devices and also necessary in small amounts in the body; **selen**  
**zinc** /zɪŋk/ a chemical element that is a bluish-white metal, used in making other metals or for covering other metals to protect them; **cynk**

### Lesson 3. How your digestive system works

- 🔊 **oesophagus** /'ɒsf.ə.gəs/ the tube in the body that takes food from the mouth to the stomach; **przelyk**  
**liver** /'lɪv.ə(r)/ a large organ in the body that cleans the blood and produces bile, or this organ from an animal used as meat **wątroba**  
**small intestine** /,smɔ:l ɪn'tes.tɪn/ the upper part of the bowels between the stomach and the large intestine; **jelito cienkie**  
**large intestine** /,lɑ:dʒ ɪn'tes.tɪn/ the lower part of the bowels in which water is removed from digested food before it is passed out of the body as solid waste; **jelito grube**  
**mouth** /maʊθ/ the opening in the face of a person or animal, consisting of the lips and the space between them, or the space behind containing the teeth and the tongue; **usta**  
**stomach** /'stʌm.ək/ an organ in the body where food is digested, or the soft front part of your body just below the chest; **żołądek**  
**gastrointestinal tract** /,gæs.trəʊ, ɪn'tes'taɪ.n(ə)l ,trækt/ the organs that food and liquids travel through when they are swallowed, digested, absorbed, and leave the body as feces; **prze-wód pokarmowy**  
**pancreas** /'pæŋ.kri.əs/ an organ in the body that produces insulin (= a chemical substance that controls the amount of sugar in the blood) and substances that help to digest food so that it can be used by the body; **trzustka**  
**gall bladder** /'gɔ:l ,blæd.ə(r)/ a small organ in the body, connected to the liver, that stores bile (= a bitter liquid that helps to digest food); **pełcherzyk żółciowy**  
**mesentery** /'mes.ən.t(ə)r.i/ the membrane that connects the bowel to the back wall of the abdomen; **krezka**  
**saliva** /sə'laɪ.və/ the liquid produced in your mouth to keep the mouth wet and to help to prepare food to be digested; **ślina**  
**peristalsis** /,per.ɪ'stæl.sɪs/ the repeated movements made by the muscle walls in the digestive tract tightening and then relaxing that push food and waste through the body; **perystaltyka**  
**bile** /baɪl/ the bitter, yellow liquid produced by the liver that helps to digest fat; **żółć**  
**chyme** /kaɪm/ the thick, wet mass of partly digested food that leaves the stomach; **miazga pokarmowa**  
**jejunum** /dʒɪ'dʒu:.nəm/ the middle part of the bowels, between the duodenum and the ileum; **jelito czcze**  
**ileum** /'ɪl.i.əm/ the last and narrowest part of the small intestine (= part of bowels after the stomach), where substances from food are absorbed; **jelito kręte**  
**villi** /'vɪl.aɪ/ very small finger-like parts that are found on the inside surface of the small intestine and help food to be absorbed; **kosmki**

**stool**/stu:l/ a piece of solid waste from the body; **stolec**  
**rectum**/'rek.təm/ the lowest end of the bowels, down which solid waste travels before leaving the body through the anus; **odbytnica**  
**anus**/'eɪ.nəs/ the opening at the end of the alimentary canal through which solid waste leaves the body; **odbyt**

## Lesson 4. Digestive disorders

- » **constipation** /,kən.stə'peɪ.ʃən/ unable to empty your bowels as often as you should; **zatwardzenie**  
**lactose intolerance** /,læk.təʊs ɪn'tɒl.(ə)r.(ə)n(s)/ the inability to digest lactose (= a substance in milk); **nietolerancja laktozy**  
**ulcer**/'ʌl.sər/ a break in the skin, or on the surface of an organ inside the body, that does not heal naturally **wrzód**  
**botulizm**/'bɒtʃ.ə.lɪ.zəm/ a serious type of food poisoning caused by bacteria in badly preserved food; **zatrucie jadem kielbasianym**  
**cholera**/'kɒl.ər.ə/ a serious infection of the bowels caused by drinking infected water or eating infected food, causing diarrhoea, vomiting, and often death; **cholera**  
**e-coli** /,i:'kəʊ.laɪ/ a bacterium (= small organism) that can exist in food that has not been cooked enough and can cause serious illness or death; **bakteria e-coli**  
**salmonella** /,sæl.mə'nel.ə/ a type of bacteria that exists in several forms, some of which live in food and make the people who eat it ill; **salmonella**  
**nausea** /'nɔ:.si.ə/ the feeling that you are going to vomit; **nudności**  
**diarrhoea** /,daɪ.ə'ri:.ə/ an illness in which the body's solid waste is more liquid than usual and comes out of the body more often; **biegunka**  
**acid indigestion (heartburn)** /'æ.sɪd ɪn.dɪ'dʒes.tʃən/ /'hɑ:t.bɜ:n/ a painful burning feeling in the lower chest caused by the stomach not digesting food correctly; **zgaga**  
**gastroesophageal reflux disease (GERD)** /,gæs.trəʊ.ɪ,sɒf.ə,dʒɪ.əl 'ri:.flʌks dɪ.zi:z/ a medical condition in which acid from the stomach frequently goes back up into the esophagus (= the tube through which food passes to the stomach) causing pain and damage to the digestive system; **zarzucanie żołądkowo-przelykowe (refluks)**  
**colorectal polyps/colorectal cancer** /kəʊ.ləʊs'rek.təl ,pɒl.ɪps/ /kəʊ.ləʊs'rek.təl ,kæn.sə(r)/ a disease in which cells in the colon or rectum grow out of control; **rak jelita grubego**

## V The human circulatory system

### Lesson 1. What colour is blood?

- » **asma** /'æz.mə/ the pale yellow liquid that forms 55% of human blood and contains the blood cells; **osocze**  
**red blood cell** /,red 'blʌd ,sel/ any of the cells that carry oxygen around the body; **czerwona krwinka**  
**white blood cell** /,waɪt 'blʌd ,sel/ a cell in the blood that has no red colour and is involved in the fight against infection; **biała krwinka**  
**atelet** /'eɪ.təʊt/ a very small cell in the blood that makes it thicker and more solid in order to stop bleeding caused by an injury; **plytka krwi**

## Lesson 2. The human circulatory system – how does it work?

- 🔊 **artery** /'ɑ:.tə:r.i/ one of the thick tubes that carry blood from the heart to other parts of the body; **tętnica**
- vein** /veɪn/ a tube that carries blood to the heart from the other parts of the body; **żyła**
- carbon dioxide** /,kɑ:.bən dar'ɒk.said/ the gas formed when carbon is burned, or when people or animals breathe out; **dwutlenek węgla**
- oxygen** /'ɒk.sɪ.dʒən/ a chemical element that is a gas with no smell or colour. Oxygen forms a large part of the air on earth, and is needed by animals and ants to live; **tlen**
- capillary** /kə'pɪl.ə:r.i/ a very thin tube, especially one of the smaller tubes that carry blood around the body; **naczynie włosowate**
- aorta** /eɪ'ɔ:.tə/ the main artery (= thick tube carrying blood from the heart) that takes blood to the other parts of the body; **aorta**
- valve** /vælv/ a structure in the heart and the veins that controls the flow of blood; **zastawka**
- atrium** /'eɪ.trɪ.əm/ one of the two spaces at the top part of the heart that receive blood from the veins and push it down into the ventricles (= lower spaces); **przedsionek serca**
- ventricle** /'ven.trɪ.k(ə)l/ either of two small, hollow spaces, one in each side of the heart, that force blood into the tubes leading from the heart to the other parts of the body; **komora serca**
- anterior vena cava** /æn'tɪ.ə.rɪ.ər vi:.nə 'kɑ:.və/ also known as the precava, drains the head end of the body; **żyła główna górna**
- posterior vena cava** /pɒs'tɪ.ə.rɪ.ə(r) vi:.nə 'kɑ:.və/ or postcava, drains the tail, or rear, end of the body; **żyła główna dolna**
- pulmonary artery** /'pʊl.mə.n(ə)r.i 'ɑ:.t(ə)r.i/ either of the two arteries that convey oxygen-depleted blood from the heart to the lungs; **tętnica płucna**
- lung** /lʌŋ/ either of the two organs in the chest with which people and some animals breathe; **płuco**
- pulmonary vein** /'pʊl.mə.n(ə)r.i veɪn/ any one of the four veins that convey oxygen-rich blood from the lungs to the heart; **żyła płucna**
- pulmonary circulation** /'pʊl.mə.n(ə)r.i ,sɜ:.kjə'leɪ.ʃən/ the circulation of blood from the heart to the lungs for oxygenation and back to the heart; **krążenie płucne, krwiobieg mały**
- systemic circulation** /sɪ'stem.ɪk ,sɜ:.kjə'leɪ.ʃən/ provides the functional blood supply to all body tissue. It carries oxygen and nutrients to the cells and picks up carbon dioxide and waste products; **krążenie ogólne, krwiobieg duży**

## Lesson 3. From the bottom of my heart

- 🔊 **systole** /'sɪs.təl.i/ the part of a heart's action where it pushes blood out; **skurcz serca**
- diastole** /dar'æ.s.t(ə)l.i/ the period of time when the heart is filling with blood after contraction (= when blood is pushed out of the heart); **rozkurcz serca**
- aorta** /eɪ'ɔ:.tə/ the main artery (= thick tube carrying blood from the heart) that takes blood to the other parts of the body; **aorta**
- valve** /vælv/ a structure in the heart and the veins that controls the flow of blood; **zastawka**
- artery** /'ɑ:.tə:r.i/ one of the thick tubes that carry blood from the heart to other parts of the body; **tętnica**
- atrium** /'eɪ.trɪ.əm/ one of the two spaces at the top part of the heart that receive blood from the veins and push it down into the ventricles (= lower spaces); **przedsionek serca**
- ventricle** /'ven.trɪ.k(ə)l/ either of two small, hollow spaces, one in each side of the heart, that force blood into the tubes leading from the heart to the other parts of the body; **komora serca**

**mitral valve** /'maɪ.trəl ,vælv/ the valve (= a structure that opens and closes) in the heart that stops blood from returning into the left atrium (= upper space) from the left ventricle (= lower space); **zastawka mitralna, zastawka dwudzielna**

**tricuspid valve** /traɪ'kʌs.pɪd ,vælv/ the valve (= structure that opens and closes) in the heart that stops blood from returning into the right atrium (= upper space) from the right ventricle (= lower space); **zastawka trójdzielna**

## Lesson 4. Immune system and its functions

- 🔊 **circulatory system** or **cardiovascular system** /,sɜː.kjə'leɪ.t(ə)r.i ,sɪs.təm// ,kɑː.di.ət'væs.kjə.lə(r) 'sɪs.təm/ the organ system responsible for the circulation and transport of oxygen, carbon dioxide, amino acids, electrolytes, hormones, blood cells, or other molecules and nutrients throughout the body; **układ sercowo-naczyniowy, układ krwionośny, układ krążenia**
- immune system** /ɪ'mjuːn ,sɪs.təm/ the cells and tissues in the body that make it able to protect itself against infection; **system immunologiczny, układ odpornościowy**
- leukocyte** /'luː.kə.saɪt/ a white blood cell; **leukocyt**
- cellular** /'sel.jə.lə(r)/ connected with the cells of a plant or animal; **komórkowy**
- phagocyte** /'fæg.ə.saɪt/ a type of cell in the body that can surround things and swallow them, especially a white blood cell that protects the body against infection by destroying bacteria; **fagocyt**
- lymphocyte** /'lɪm.fə.saɪt/ a type of white blood cell involved in fighting disease and infection in the body, some of which produce antibodies (= proteins that attack and kill harmful bacteria); **limfocyt**
- bone marrow** /'bəʊn ,mæɪ.ət/ soft tissue containing a lot of fat in the centre of a bone; **szpik kostny**
- antigen** /'æn.tɪ.dʒən/ a substance that causes the body's immune system (= the system for fighting infections) to react, especially by producing antibodies (= proteins that attack harmful bacteria, viruses, etc.); **antygen**

## VI The human respiratory system

### Lesson 1. Respiratory system

- 🔊 **air sac** (noun) /'er ,sæk/ also alveolus any of the many tiny air sacs of the lungs which allow for rapid gas exchange; **pęcherzyk płucny**
- bronchiole** (noun) /'brɔŋ.ki.əl/ a minute thin-walled branch of a bronchus/bronchil; **oskrzelik**
- bronchus** (noun) /'brɔŋkəs/ ural bronchi one of the two tubes that branch from the trachea (= tube that carries air from the throat to the lungs) and carry air into the lungs; **oskrzela**
- carbon dioxide** (noun) /kɑː(r)bən daɪ'ɒksaɪd/ the gas formed when carbon is burned, or when people or animals breathe out; formula CO<sub>2</sub>; **dwutlenek węgla**
- diaphragm** (noun) /'daɪ.ə.fræm/ a body partition of muscle and connective tissue separating the chest and abdominal cavities; **przepona**
- gas exchange** (noun) /'gæs ɪks'tʃeɪndʒ/ the process by which oxygen and carbon dioxide are transferred between a living thing and the environment; **wymiana gazowa**
- larynx** (noun) /'lær.ɪŋks/(UK) or /'ler.ɪŋks/(US) an organ in humans and animals between the nose and the lungs that contains the muscles that move very quickly to create the voice or animal sounds; **krtani**

**lung** (noun) /'lʌŋ/ either of the two organs in the chest with which people and some animals breathe; **pluco**

**nasal cavity** (noun) /neɪzəl kævɪti/ the space inside the nose above the bone that forms the roof of the mouth and curves down at the back to join the throat; it is divided into two sections called nasal passages; **jama nosowa**

**oxygen** (noun, often attributive) /'ɒksɪdʒ(ə)n/ a chemical element that is a gas with no smell or colour; oxygen forms a large part of the air on earth, and is needed by animals and plants to live; formula O<sub>2</sub>; **tlen**

**pharynx** (noun) /'fær.ɪŋks/(UK) /'fer.ɪŋks/(US) plural pharynges; also pharynxes the soft part at the top of the throat that connects the mouth and nose to the oesophagus (= the tube that takes food to the stomach) and the larynx (= the hollow organ between the nose and lungs); **gardło**

**respiration** (noun) /,res.pɪ'reɪ.fən/(UK) /,res.pə'reɪ.fən/(US) the movement of air or dissolved gases into and out of the lungs; 2 a single com ete act of breathing; **oddychanie**

**trachea** (noun) /trə'ki:.ə/ plural tracheae; also tracheas or trachea the main trunk of the system of tubes by which air passes to and from the lungs in vertebrates; **tchawica**

## Lesson 2. Gas exchange process

- 🔊 **air sac** (noun) /'er ,sæk/ also alveolus any of the many tiny air sacs of the lungs which allow for rapid gas exchange; **pęcherzyk płucny**
- blood asma** (noun) /'bləd ' æz.mə/ the pale yellow fluid of whole blood that consists of water and its dissolved constituents including especially proteins; **osocze krwi**
- capillary** (noun) /kə'pɪl.ər.i/ a very thin tube, especially one of the smaller tubes that carry blood around the body; **naczynie włosowate**
- carbon dioxide** (noun) /kɑ:(r)bən daɪ'ɒksaɪd/ the gas formed when carbon is burned, or when people or animals breathe out; formula CO<sub>2</sub>; **dwutlenek węgla**
- diffusion** (noun) /dɪ'fju:zən/ (of a gas or liquid) the process of spreading through or into a surrounding substance by mixing with it; **dyfuzja**
- gas exchange** (noun) /'gæs ɪkstʃeɪndʒ/ the process by which oxygen and carbon dioxide are transferred between a living thing and the environment; **wymiana gazowa**
- living tissue** (noun) /'lɪvɪŋ 'tɪʃu:/'tɪʃu:/ any tissue of a living organism containing cells that are being re aced when they die; **żywa tkanka**
- lung** (noun) /'lʌŋ/ either of the two organs in the chest with which people and some animals breathe; **pluco**
- oxygen** (noun, often attributive) /'ɒksɪdʒ(ə)n/ a chemical element that is a gas with no smell or colour; oxygen forms a large part of the air on earth, and is needed by animals and plants to live; formula O<sub>2</sub>; **tlen**
- pulmonary vein** (noun) /'pʌlmən(ə)rɪ veɪn/ a valveless vein that returns oxygenated blood from the lungs to the heart; **żyła płucna**
- red blood cell** (noun) /,red 'bləd ,sel/ any of the cells that carry oxygen around the body; **czerwona krwinka**

## Lesson 3. Aerobic respiration

- 🔊 **aerobic respiration** (noun) /eə'reʊbɪk/ /e'roʊ- ,respə'reɪfən/ the process by which organisms use oxygen to turn fuel, such as fats and sugars, into chemical energy; **oddychanie tlenowe**
- chemical reaction** (noun) /'kemɪkəl rɪ'ækʃən/ a natural process in which the atoms of chemicals mix and arrange themselves differently to form new substances; **reakcja chemiczna**

**germinate** (verb) /'dʒɜ:məneɪt/ to develop from a seed and begin to grow into a plant, or to make a seed develop in this way; **kielkować**  
**glucose** (noun) /'glu:kəʊs/ a type of sugar that is found in plants, especially fruit, and supplies an important part of the energy that animals need; **glukoza**  
**nutrient** (noun) /'nju:triənt/ a chemical or food that provides what is needed for plants or animals to live and grow; **substancja odżywcza**  
**respire** (verb) /rɪ'spaɪə(r)/ to breathe; **oddychać**

## VII The human excretory system

### Lesson 1. The human excretory system

- 🔊 **diffusion** (noun) /dɪ'fju:ʒən/ (of a gas or liquid) the process of spreading through or into a surrounding substance by mixing with it; **dyfuzja**  
**filtration** (noun) /fɪl'treɪʃ(ə)n/ a process that your kidneys use to filter excess fluid and waste products out of the blood into the urine collecting tubules of the kidney, so they may be eliminated from your body; **filtracja**  
**kidney** (noun) /'kɪdni/ one of the two organs in your body that clean your blood and remove waste; **nerka**  
**nephron** (noun) /'nefrən/ functional unit of the kidney, the structure that actually produces urine in the process of removing waste and excess substances from the blood; **nefron**  
**nitrogenous waste** (noun) /nɑɪ'trɒdʒ.ɪ.nəs weɪst/ the nitrogen compounds through which excess nitrogen is eliminated from organisms (ammonia, urea, uric acid, and creatinine); **odpady azotowe**  
**ureter** (noun) /jʊə'ri:tər/ a muscular tube which carries the urine from the kidneys to the urinary bladder ; **moczowód**  
**urethra** (noun) /jʊə'ri:θrə/ the membranous tube that extends from the urinary bladder to the exterior and that in the male conveys semen as well as urine; **cewka moczowa**  
**urinary bladder** (noun) /jʊə.rɪ.nər.i 'blædə(r)/ a round, bag-like organ that stores urine; **pecherz moczowy**

### Lesson 2. Excretory system diseases

- 🔊 **bacterial infection** (noun) /bæk'tɪəriəɪn'fekʃ(ə)n/ a proliferation of a harmful strain of bacteria on or inside the body; **infekcja bakteryjna**  
**dialysis** (noun) /daɪ'æləsɪs/ a medical treatment that removes waste substances from the blood of someone whose kidneys are not working properly; **dializa**  
**kidney failure** (noun) /'kɪdni 'feɪljə(r)/ a medical condition in which kidneys lose the ability to sufficiently filter waste from your blood; **niewydolność nerek**  
**kidney stone** (noun) /'kɪdni stəʊn/ a medical condition in which a solid piece of material (kidney stone) develops in the urinary tract; **kamień nerkowy**  
**Urinary Tract Infection (UTI)** (noun) /'jʊərɪn(ə)ri træktɪn'fekʃ(ə)n/ an infection of the urinary system kidneys, bladder, ureters, and urethra; **zakażenie dróg moczowych**

## VIII The neuro-hormonal regulation

### Lesson 1. The endocrine system

- 🔊 **adrenal gland** (noun)/ə'dri:n(ə)l ˌglænd/one of two small organs above your kidneys that produce adrenalin; **nadnercze**
- endocrine system** (noun)/'en.də.krɪn ˌglænd/a series of glands that produce and secrete hormones that the body uses for a wide range of functions; **układ hormonalny**
- hormone** (noun)/'hɔ:(r)məʊn/a chemical substance produced in animals and plants that controls things such as growth and sexual development; **hormon**
- ovary** (noun)/'æʊv(ə)ri/one of the two organs in the body of a woman or other female animal that produce eggs and the sex hormones progesterone and oestrogen. Eggs travel from the ovaries down the fallopian tubes to the uterus; **jajnik**
- pancreas** (noun)/'pæŋkriəs/the small organ in your body that produces substances that help your stomach to process food; **trzustka**
- parathyroid** (noun)/pərə'θaɪrɔɪd/a gland next to the thyroid which secretes a hormone (parathyroid hormone) that regulates calcium levels in a person's body; **przytarczycyca**
- pineal gland** (noun)/'pi:niəl ˌglænd/a small gland in the brain that produces melatonin; **szyszynka**
- pituitary gland** (noun)/pɪ'tʃu:ɪ.tɪəri ˌglænd/the small organ at the base of your brain that produces the substances your body needs to control its growth and development; **przysadka mózgową**
- receptor** (noun)/rɪ'septə(r)/a nerve, for example in your skin or your nose, that sends messages to your central nervous system; **receptor**
- testis** (noun)/'testɪs/ plural testes; also called a testicle; one of two egg-shaped glands inside the scrotum that produce sperm and male hormones; **jądro**
- thyroid gland** (noun)/'θaɪrɔɪd ˌglænd/part of the endocrine system and produces thyroid hormones, which are important for metabolic health; **tarczycyca**

### Lesson 2. The nervous system

- 🔊 **axon** (noun)/'æksən/a long thin part of a nerve cell that conducts impulses to and from the cell body; **akson (neuryt)**
- axon terminal** (noun)/'æksən 'tɜ:(r)mɪn(ə)l/also synaptic bulbs the end of axon in a nerve cell; **rozgałęzienie końcowe neuronu**
- brainstem** (noun)/'breɪn ˌstem/also medulla the part of the brain above the spinal cord between the left and right halves of the brain; **pień mózgu**
- cell body** (noun)/sel 'bɒdi/part of a nerve cell where chemicals and proteins are made for the cell; **ciało komórkowe**
- cerebellum** (noun)/ˌserə'beləm/the part of your brain that is responsible for your balance and movement; **móździec**
- cerebrum** (noun)/sə'ri:brəm/the front part of your brain that controls thinking, learning, and feeling; it is divided into two halves called cerebral hemispheres; **kresomóźgowie**
- dendrite** (noun)/'dendraɪt/a short branched part of a nerve cell that transmits impulses received from other nerve cells to the cell body; **dendryt**
- motor nerve** (noun)/'mɔ:tə(r) nɜ:(r)v/a nerve located in the central nervous system (CNS), usually the spinal cord, that sends motor signals from the CNS to the muscles of the body; **nerw ruchowy**

**Myelin Sheath** (noun) / 'maɪəlɪn ʃiθ/ the protective, fatty coating surrounding your nerve fibers; **osłonka mielinowa**

**nerve cell** (noun) / nɜː(r)ɪv sel/ also neuron; a type of cell that receives and sends messages from the body to the brain and back to the body; **komórka nerwowa**

**nervous system** (noun) / 'nɜː(r)vəs 'sɪstəm/ the system of nerves that sends and receives the signals that control your body and mind; **system nerwowy**

**neurotransmitter** (noun) / ,njʊərəʊstrænz'mɪtə(r)/ a chemical that is released at the end of a nerve fibre when a nerve impulse arrives, and sends the impulse on to other cells; **neuroprzekaznik**

**node of Ranvier** (noun) / ,nəʊd əv 'rɑːnvjeɪ/ a gap in the myelin sheath; it appears between Schwann cells in a nerve cell; **przewężenie (węzeł) Ranviera**

**Schwann cell** (noun) / ʃvɑːn sel/ a part of a nerve cell which produces the myelin sheath; **komórka Schwanna**

**sensory nerve** (noun) / 'sensəri nɜː(r)ɪv/ a nerve that carries impulses toward the central nervous system; **nerw czuciowy**

**spinal nerve** (noun) / 'spɑɪn(ə)l nɜː(r)ɪv/ a nerve that carries motor, sensory, and autonomic signals between the spinal cord and the body; **nerw rdzeniowy**

**synaptic gap** (noun) / sɪ' næptɪk ɡæp/ a gap between axon terminals and neurons; **szczelina synaptyczna**

### Lesson 3. Central and peripheral nervous system

- 🔊 **autonomic nervous system** (noun) / ,ɔːtə'nɒmɪk 'nɜː(r)vəs 'sɪstəm/ the part of the nervous system that controls automatic processes such as breathing, digestion, and the beating of the heart; **autonomiczny układ nerwowy**
- brain** (noun) / breɪn/ the organ inside your head that allows you to think and feel, and controls your body; **mózg**
- brainstem** (noun) / 'breɪn,stem/ also medulla; the part of the brain above the spinal cord between the left and right halves of the brain; **pień mózgu**
- central nervous system (CNS)** (noun) / 'sentrəl 'nɜː(r)vəs 'sɪstəm/ the part of your nervous system that consists of your brain and your spinal cord; **centralny układ nerwowy**
- cerebellum** (noun) / ,serə'beləm/ the part of your brain that is responsible for your balance and movement; **móźdzek**
- cerebrum** (noun) / sə'ri:brəm/ the front part of your brain that controls thinking, learning, and feeling; it is divided into two halves called cerebral hemispheres; **kresomózgowie**
- cranial nerve** (noun) / 'kreɪniəl nɜː(r)ɪv/ a nerve that arises directly from the brain and has a different function for sense or movement; there are 12 of them the first two nerves (olfactory and optic) arise from the cerebrum, whereas the remaining ten emerge from the brainstem; **nerw czaszkowy**
- nervous system** (noun) / 'nɜː(r)vəs 'sɪstəm/ the system of nerves that sends and receives the signals that control your body and mind; **system nerwowy**
- parasympathetic nervous system** (noun) / ,pær.ə.sɪm.pə'θet.ɪk 'nɜː(r)vəs 'sɪstəm/ the part of the involuntary nervous system that serves to slow the heart rate, increase intestinal and glandular activity, and relax the sphincter muscles; **przywspółczulny układ nerwowy (układ przywspółczulny)**
- peripheral nervous system (PNS)** (noun) / pə'rɪf(ə)rəl 'nɜː(r)vəs 'sɪstəm/ the system of nerves outside the brain and spinal cord; it connects the central nervous system to the organs, limbs, and skin; **obwodowy układ nerwowy (układ obwodowy)**

**somatic nervous system** (noun)/sə'mæt.ɪk'nɜ:(r)vəs'sɪstəm/the part of the peripheral nervous system that is responsible for carrying motor and sensory information both to and from the central nervous system; **somatyyczny układ nerwowy (układ somatyyczny)**

**spinal cord** (noun)/'spain(ə)l kɔ:(r)d/the inner part of your spine that contains nerves going from your brain to the other parts of your body; **rdzeń kręgowy**

**spinal nerve** (noun)/'spain(ə)l nɜ:(r)v/ a nerve that carries motor, sensory, and autonomic signals between the spinal cord and the body; **nerw rdzeniowy**

**sympathetic nervous system** (noun)/sɪmpə'tetɪk'nɜ:(r)vəs'sɪstəm/the part of the involuntary nervous system that regulates the body's involuntary processes and controls aspects of the body related to the flight-or-fight response, such as mobilizing fat reserves, increasing the heart rate, and releasing adrenaline; **współczulny układ nerwowy (układ współczulny)**

## IX The human sense organs

### Lesson 1. The sense of sight

- ▶ **cornea** (noun)/'kɔ:nə/the transparent layer forming the front of the eye; **rogówka**
- eyebrow** (noun)/'aɪbrəʊ/the curved area of hair on your face above each of your eyes which prevents sweat, water and other debris from falling down into the eye socket; **brew**
- eyelash** (noun)/'aɪ,læʃ/one of the hairs along the upper and lower edges of your eyes which protects the eyes from small particles such as dust, sand or debris from entering and harming the eye; **rzęsa**
- eyelid** (noun)/'aɪ,lɪd/one of the two pieces of skin that cover your eye when it is closed; it is are vital in promoting the spread of tears, lubricating the corneal surface, and protecting the eye from dust and foreign bodies; **powieka**
- iris** (noun)/'aɪrɪs/the coloured part of the eye which helps regulate the amount of light entering the eye; **tęczówka**
- lateral rectus muscle** (noun)/'læt(ə)rəl'rektəs'məs(ə)/the muscle on the eyeball in the orbit whose contraction turns the eyeball outward; **mięsień prosty boczny**
- lens** (noun)/lenz/the transparent structure inside the eye that focuses light rays onto the retina; **soczewka**
- medial rectus muscle** (noun)/'mi:diəl'rektəs'məs(ə)/the muscle on the eyeball in the orbit whose contraction turns the eyeball medially; **mięsień prosty przyśrodkowy**
- optic nerve** (noun)/'ɒptɪk nɜ:(r)v/the large nerve that sends signals relating to sight from the retina in the eye to your brain; **nerw wzrokowy**
- pupil** (noun)/'pjʊ:p(ə)l/the circular black area in the centre of an eye, through which light enters; **źrenica**
- rectus muscle** (noun)/'rektəs'məs(ə)/the muscle on the eyeball in the orbit whose contraction enables the movement of the eyeball; **mięsień prosty**
- retina** (noun)/'retɪnə/the area at the back of the eye that receives light and sends pictures of what the eye sees to the brain; **siatkówka**
- sclera** (noun)/'sklɪərə/the white outer layer of the eyeball; **twardówka**

## Lesson 2. Ear – organ of hearing and balance

- 🔊 **auditory nerve** (noun) /'ɔ:dit(ə)ri nɜ:(r)v/ a nerve in the ear that carries electrical signals from the inner ear to the brain; **nerw sluchowy**
- cochlea** (noun) /'kɒkliə/ a twisted tube inside the inner ear that is the main organ of hearing; **ślimak**
- ear canal** (noun) /iə(r) kə'neɪl/ a passage comprised of bone and skin leading to the eardrum; **kanal sluchowy**
- eardrum** (noun) /'iə(r)drʌm/ a thin piece of skin inside the ear that moves backwards and forwards very quickly when sound waves reach it, allowing you to hear sounds; **błona bębenkowa**
- Eustachean tube** (noun) /ju:steɪf(ə)n 'tju:b/ either of the two passages, located between the middle ear and the back of the nose, that open to allow pressure to be kept equal on both sides of the eardrum; **trąbka Eustachiusza (trąbka sluchowa)**
- facial nerve** (noun) /'feɪf(ə)l nɜ:(r)v/ a nerve that carries nerve fibers that control facial movement and expression; **nerw twarzowy**
- incus** (noun) /'ɪŋkəs/ one of three very small bones that carry sound from the eardrum to the inner ear; **kowadelko**
- inner ear** (noun) /'ɪnə(r) iə(r)/ the part inside the ear that controls balance and the ability to hear, and contains the cochlea; **ucho wewnętrzne**
- malleus** (noun) /'mæliəs/ one of three very small bones that carry sound from the eardrum to the inner ear; **młoteczek**
- middle ear** (noun) /'mɪd(ə)l iə(r)/ the central part of the ear, behind the eardrum, through which sound travels; **ucho środkowe**
- outer ear** (noun) /'aʊtə(r) iə(r)/ the part of the ear that can be seen on the side of the head; **ucho zewnętrzne**
- semicircular canal** (noun) /,semi'sɜ:(r)kjʊlə(r) kə'neɪl/ a tube in your inner ear that helps you keep your balance; **kanal półkolisty**
- stapes** (noun) /'steɪpi:z/ one of three very small bones that carry sound from the eardrum to the inner ear; **strzemiączko**
- vestibular nerve** (noun) /ves'tɪb.jə.lər nɜ:(r)v/ it is located in the inner ear and transmits sensory information from the three semicircular canals and vestibular hair cells which are responsible for vestibular sense; **nerw przedsionkowy**

## Lesson 3. The sense of smell, taste and touch

- 🔊 **dermis** (noun) /'dɜ:(r)mɪs/ the thick layer of skin under the epidermis (thin outer layer) that contains blood vessels, sweat glands and nerve endings; **skóra właściwa**
- epidermis** (noun) /,epɪ'dɜ:(r)mɪs/ the thin outer layer of the skin; **naskórek**
- epithelium** (noun) /,ep.ɪ'θi:li.əm/ uveal epithelia; the layer of cells covering all the surfaces of the body except the interior of blood and lymph vessels; **nabłonek**
- free nerve endings** (noun) /fri: nɜ:(r)v 'endɪŋ/ the afferent nerve fiber sending its signal to a sensory neuron; **wolne zakończenie nerwowe**
- Meissner's corpuscle** (noun) /'maɪsnɜ:(r)z 'kɔ:(r)pʌs(ə)l/ the principal receptors for touch in hairless skin; **ciałko Meissnera (ciałko dotykowe)**; **ciałko Meissnera (ciałko dotykowe)**
- Merkel's disc** (noun) /'mɜ:kəlz dɪsk/ the expanded end of a sensory nerve fiber found in the epidermis and in the epithelial root sheath of a hair; **dysk Merkela**
- nasal cavity** (noun) /'neɪz(ə)l 'kævəti/ a large, air-filled space above and behind the nose in the middle of the face; **jama nosowa**

**nerve cell** (noun)/nɜː(r)v sel/also neuron a type of cell that receives and sends messages from the body to the brain and back to the body; **komórka nerwowa**

**odor molecules** (noun)/'ɔːdə(r) 'mɒl.ɪ.kjuː.lz/ is a volatilized chemical compound, usually at a very low concentration, which humans and other animals perceive by the sense of olfaction; **cząsteczki zapachu**

**olfaction** (noun)/ɒl' fækʃ(ə)n/ the sense of smell; **powonienie (węch)**

**olfactory bulb** (noun)/ɒl' fækt(ə)ri bʌlb/ a rounded mass of tissue that contains several types of nerve cells that are involved in the sense of smell; **opuszka węchowa (bulawka węchowa)**

**olfactory tract** (noun)/ɒl' fækt(ə)ri trækt/ a long narrow triangular band of white tissue originating in the olfactory bulb and extending back to the point at which its fibres enter the base of the cerebrum; **pasmo węchowe**

**Pacinian corpuscle** (noun)/pə, sɪniən 'kɔː(r)pʌs(ə)l/ is an onion-shaped structure of nonneural tissue built up around the nerve ending that reduces the mechanical sensitivity of the nerve terminal itself; **cialko Vatera-Paciniiego (cialko blaszkowate)**

**papilla** (noun)/pə' pɪl.ə/ a small, round raised structure at the base of hair or teeth, or on the tongue, where it is involved in taste; **brodawka**

**receptor** (noun)/rɪ' septə(r)/ a nerve, for example in your skin or your nose, that sends messages to your central nervous system; **receptor**

**Ruffini ending** (noun)/rʊ' fiːni 'endɪŋ/ a small, spindle-shaped, slowly adapting receptor found throughout the dermis, subcutaneous tissue, and some connective tissues; **zakończenie Ruffiniiego**

**saliva** (noun)/sə' laɪvə/ the liquid produced in your mouth to keep the mouth wet and to help to prepare food to be digested; **śliny**

**salivary gland** (noun)/sə' laɪvəri 'glænd/ any of the organs that produce the saliva in your mouth; **ślinianka**

**sensory nerve fibre** (noun)/'sensəri nɜː(r)v 'faɪbə(r)/ a nerve fiber that carries impulses toward the central nervous system; **gruczoł nerwu czuciowego**

**taste bud** (noun)/teɪst bʌd/ also taste pore a sensory organ that is found on a tongue and allows to experience tastes that are sweet, salty, sour, and bitter; **kubek smakowy**

**tongue** (noun)/tʌŋ/ the large, soft piece of flesh in the mouth that you can move, and is used for tasting, speaking, etc.; **język**

## X The human reproductive system

### Lesson 1. Gametes



**cell membrane** (noun)/sel 'membreɪn/ also called the plasma membrane, is found in all cells and separates the interior of the cell from the outside environment; it regulates the transport of materials entering and exiting the cell;  **błona komórkowa**

**centriole** (noun)/'sentri, əl/ a self-replicating, small, fibrous, cylindrical-shaped organelle, typically located in the cytoplasm near the nucleus in cells of most animals; it is involved in the process of nuclear division; **centriole (organellum komórkowe)**

**chromosome** (noun)/'krɒsməsəʊm/ a structure that looks like a very small piece of string and that exists, usually as one of a pair, in the central part of all living cells; chromosomes contain genes; **chromosom**

**cortical granule** (noun)/'kɔːtɪk(ə)l 'grænjuːl/ membrane bound organelles located in the cortex of unfertilized oocytes; **granulki korowe**

**cytoplasm** (noun) /'saɪtəʊ,plæz(ə)m/ the substance inside the cells of living things, not including the nucleus; it contains several different chemicals and structures; **cytoplazma**

**egg cell** (noun) /eg sel/ female gamete; female sex cell; female reproductive cell; **komórka jajowa**

**fertilisation** (noun) /,fɜːtɪləɪ'zeɪʃ(ə)n/ the action or process of fertilizing an egg or a female animal or ant, involving the fusion of male and female gametes to form a zygote; **zapłodnienie**

**follicular cell** (noun) /fɒ'likjʊlə sel/ a type of cell in the thyroid; thyroid follicular cells make thyroid hormone; **komórka pęcherzykowa**

**gamete** (noun) /'gæmi:t/ a mature sexual reproductive cell, as a sperm or egg, that unites with another cell to form a new organism; **gameta**

**middle section** (noun) [of a sperm cell] /mɪd.(ə)l 'sek.ʃ(ə)n/ also called the body, middle piece or middle portion; it is packed with mitochondria to release energy needed to swim and fertilise the egg; **część główna (plemnika)**

**nucleus** (noun) /'njuːklɪəs/ a membrane-bound organelle that contains genetic material (DNA) of eukaryotic organisms; **jądrowo (plemnika)**

**protective layer** (noun) [of an egg cell] /prə'tektɪv 'leɪə(r)/ a thick outer coating known as the zona pellucida, a layer of carbohydrate-covered proteins that surrounds the zona membrane; the zona pellucida helps protect the egg and is responsible for mediating the initial meeting of sperm and egg; **osłonka przejrzysta**

**sperm cell** (noun) /spɜː(r)m sel/ a male reproductive cell of animals and plants that can unite with an egg cell to form a new individual cell; **plemnik**

**sperm head** (noun) /spɜː(r)m hed/ it contains the nucleus that holds the DNA of the cell; the head also contains enzymes that help the sperm break through the cell membrane of an egg; **glówka (plemnika)**

**sperm tail** (noun) /spɜː(r)m teɪl/ the tail of the sperm moves like a propeller, around and around; it is a long flagella that pushes the sperm forward; **witka (plemnika)**

## Lesson 2. Human reproductive system

🔊 **cervix** (noun) /'sɜː(r)vɪks/ the entrance to the womb; the part of a woman's body where a baby can grow; **szyjka macicy**

**cilium** (noun) /'sɪliəm/ plural cilia; minute hairlike processes that extend from a cell surface; **rzęska**

**fallopian tube** (noun) /fə,ləʊpiən 'tjuːb/ also oviduct, uterine tube either of the pair of tubes that carry the egg from the ovary to the uterus; **jajowód**

**ovary** (noun) /'əʊv(ə)ri/ one of the two organs in the body of a woman or other female animal that produce eggs and the sex hormones progesterone and oestrogen; **jajnik**

**ovulation** (noun) /'ɒvjʊ's'leɪʃ(ə)n/ the release of the ripe egg (ovum) from the ovary; **jajczkowanie**

**ovum** (noun) /'əʊ.vəm/ ural ova; an egg cell produced by a woman or female animal; **jajeczko**

**penis** (noun) /'piːnɪs/ an external male reproductive organ; it contains a tube called the urethra, which carries semen and urine to the outside of the body; **prącie**

**prostate gland** (noun) /'prɒstɪt glænd/ the organ in a man's body that produces a liquid that combines with and carries sperm; **gruczoł krokowy (prostata)**

**scrotum** (noun) /'skrɒtəm/ the bag of skin containing a man's testicles; **worek mosznowy (moszna)**

**seminal vesicle** (noun) /'semɪn(ə)l 'vesɪk(ə)l/ a pair of glands found in the male pelvis, which function to produce many of the constituent ingredients of semen; **pęcherzyk nasienny**

**sperm duct** (noun)/spɜ:(r)m dʌkt/a complex set of structures of various kinds whose main functions are twofold to allow the transit of sperm from the testicles to the outside of the body and allow the maturation of the sperm cells themselves; **nasieniowód**  
**testis** (noun)/'testɪs/ ural testes; also called a testicle; one of two egg-shaped glands inside the scrotum that produce sperm and male hormones; **jądro (u mężczyzny)**  
**urethra** (noun)/jʊ'ri:θrə/the membranous tube that extends from the urinary bladder to the exterior and that in the male conveys semen as well as urine; **cewka moczowa**  
**uterus** (noun)/'ju:t(ə)rəs/also called womb; the hollow, pear-shaped organ in a woman's pelvis; the uterus is where a fetus (unborn baby) develops and grows; **macica**  
**vagina** (noun)/və'dʒʌɪnə/a woman's main sex organ, consisting of a tube that connects the outer sex organs to the womb; **pochwa (wagina)**

### Lesson 3. From embryo to baby

- 🔊 **amnion** (noun)/æm.nɪ.ɒn/a thin, membranous sac filled with a watery fluid (called the amniotic fluid) in which the embryo or fetus is suspended during prenatal development; **pęcherz płodowy (owodnia)**  
**amniotic fluid** (noun)/.æmniɒtɪk 'flu:ɪd/a clear, slightly yellowish liquid that surrounds the unborn baby (fetus) during pregnancy; it is contained in the amniotic sac; **wody płodowe (płyn owodniowy)**  
**cervix** (noun)/'sɜ:(r)vɪks/the entrance to the womb; the part of a woman's body where a baby can grow; **szyjka macicy**  
**contract** (verb)/kən'trækt/[muscles] to shorten or reduce in size, esp. of the uterus during labor; **skurczyć się**  
**embryo** (noun)/'embri.əv/an animal or human before it is born, when it is beginning to develop and grow; **embrion (zarodek)**  
**embryonic development** (noun) /,embri'ɒnɪk dɪ'veləpmənt/the development and formation of the human embryo; **rozwój embrionalny**  
**foetal development** (noun)/'fi:t(ə)l dɪ'veləpmənt/the growth and maturation of the fetus in utero; **rozwój płodu**  
**lumen of uterus** (noun)/'lu(:)men əv 'ju:t(ə)rəs/ plural lumina; the inside space of a tubular structure; the part of female genital tract, starting with a single pathway of the vagina, splitting up in two lumina in the uterus, both of which continue through the fallopian tubes; **światło macicy**  
**acenta** (noun)/ə'sentə/the temporary organ that feeds a foetus (= developing baby) inside its mother's womb; **łożysko**  
**umbilical cord** (noun)/ʌm'bɪlɪk(ə)l ,kɔ:(r)d/a long tube that connects a baby to its mother before it is born and through which it receives food and oxygen; **pępowina**  
**urinary bladder** (noun)/jʊə.rɪ.nəri 'blædə(r)/ a round, bag-like organ that stores urine; **pęcherz moczowy**  
**uterus** (noun)/'ju:t(ə)rəs/also called womb; the hollow, pear-shaped organ in a woman's pelvis; the uterus is where a fetus (unborn baby) develops and grows; **macica**  
**vagina** (noun)/və'dʒʌɪnə/a woman's main sex organ, consisting of a tube that connects the outer sex organs to the womb; **pochwa (wagina)**  
**zygote** (noun)/'zɪgəʊt/a fertilized egg that has only just started developing and is not yet an embryo; **zygota**

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