Module 1 Human Organs and Systems

Where are our major organs?

Home learning Where are our organs? Page 8

Brain
Heart
Lungs
Liver
Kidneys
Stomach
Intestines

Class activity Cleaning our blood Page 10

Students should appreciate that they are modelling how the kidney works to filter materials out of the blood. They will see some materials remaining in the blood (too large to fit through the filter) and some being removed and passed along to the bladder.

Home learning Lung capacity Page 11

Going further

400 cm²

Students should learn that by folding surfaces it is possible to fit a larger surface area into a smaller space. This should inform students that the numerous small air sacks (alveoli) in the lungs increase the surface area to more than would be the case if the lungs were empty balloons.

What happens if our major organs don’t work?

Home learning You are the doctor Page 12

Heart problems

Heart problems may include high blood pressure. This can cause blood vessels to burst.

Blood vessels in the heart can get narrow and block up. This can cause a heart attack.

Blood vessels to the brain can get narrow and block up. This can cause a stroke.

Doctors give people medicines to lower their blood pressure.

© Oxford University Press 2018
Lung problems
Diseases can reduce the flow of oxygen to the lungs. This can make it difficult for a person to breathe.

Kidneys and liver
The kidneys and liver help the body to excrete poisons. If the kidneys and liver are damaged, these poisons build up inside the body. A person may need dialysis to clean their blood.

Class activity  How a pulse works
Page 13
Doctors call the pulse at the wrist the radial pulse.
Students should find a range of pulse rates. The mean (average) pulse rates for children aged 10–11 is between 60 and 100 beats per minute.
It would not be a fair test to take the pulse rate of a student who has just run to school as exercise will raise the pulse rate and none of the other students had their pulse taken after exercise.

Home learning  Pulse rates in your family
Page 14
No, the heart rates for males and females are not the same. At each age range until between 40 and 50 years old, the female resting heart rate is higher.
Yes, heart rate does alter with age. The data shows that heart rate falls as people get older until between 40 and 50 years old in females and between 10 and 20 in males.
Pulse rate and heart rate are the same as the pulse is only felt as the heart beats. The beating pushes blood through the arteries and this is felt when arteries pass over a bone close to the skin.

Class activity  Exercise, pulse rates and fitness
Page 15
Sprinting > 140 bpm
Reading > 78 bpm
Jogging > 120 bpm
Sleeping > 67 bpm
Walking fast > 105 bpm
Walking slowly > 95 bpm

Students may exercise at different times, unless they include a physical education or sports lesson at school.
Students should appreciate that exercise raises their pulse rate as working muscles need the extra oxygen and energy (glucose). This is provided by increasing the heart rate, and therefore pulse rate, to provide the extra blood supply that brings the oxygen and glucose.

Home learning  Recovery rates
Page 16
Having a lower heart rate indicates a higher level of fitness because the heart muscles have developed so the pumping action of the heart is more efficient and powerful. Also, the body is more effective at using oxygen and glucose.
Ways that people can get fitter and lower their heart rate: do more exercise, eat more healthily, lose weight.
Ways that people can become less fit: do less exercise, eat unhealthy (fatty and sugary) foods, put on weight.

Students should find that recovery rates vary, but fitter people have quicker recovery rates. The average recovery rate is a fall of between 15 and 25 beats per minute. Less than 12 beats per minute is regarded as abnormal. Values at or near 25 indicate a high level of fitness.

Scientific names for the major organs

Home learning  Name the organs in the human body
Page 17
Students should create a large and clear poster. The shadow version of drawing a line is easier than drawing around a person lying on the poster paper and also reviews work on shadows.
The poster should include the organs shown below:

- Liver - makes chemicals such as hormones that help to control the body (hepatic)
- Brain - the control centre of the body (cerebral)
- Heart - pumps blood around the body (cardiac)
- Kidneys - filter the blood and remove waste materials (renal)
- Lungs - part of the respiratory system (pulmonary)
- Stomach and intestines - digest or break down food (gastro)
- Liver - makes chemicals such as hormones that help to control the body (hepatic)

Students’ own answers.

Going further

Students’ own answers.

Class activity  Organ name game

Page 18

Four possible questions:
1. Does the organ pump blood?
2. Do the ribs protect the organ?
3. Does the organ remove waste?
4. Do these organs fill with air?

What we have learned about human organs and systems

Home activity  What I have learned...

Page 19

1. Correct order from top to bottom: a, c, d, b.
2. a stroke, b oxygen, c stomach and intestines, d heart rate, e very fit

Module 2 Reversible and Irreversible Reactions

Reversible and irreversible changes

Class activity  Investigate rusting

Page 22

Most students will predict that the nail in Jar B will rust the most because rusting needs air and water.

Example answers:

<table>
<thead>
<tr>
<th>Jar</th>
<th>Appearance of nail at the start of the investigation</th>
<th>Appearance of nail at the end of the investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Shiny silver</td>
<td>No change</td>
</tr>
<tr>
<td>B</td>
<td>Shiny silver</td>
<td>Red/brown colour as rust begins to form</td>
</tr>
<tr>
<td>C</td>
<td>Shiny silver</td>
<td>More rust as salt water speeds up the change</td>
</tr>
<tr>
<td>D</td>
<td>Shiny silver</td>
<td>No rust as boiled water has little or no oxygen and the oil prevents any more entering</td>
</tr>
<tr>
<td>E</td>
<td>Shiny silver</td>
<td>No rust as no moisture</td>
</tr>
</tbody>
</table>

Rust needs air and water. The salty water (Jar C) should have resulted in the most rusting. Students’ predicted answers will vary.

Home learning  Temporary and permanent changes at home

Page 23

Students’ answers will vary.

Possible answers:

<table>
<thead>
<tr>
<th>Examples of temporary changes</th>
<th>Examples of permanent changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>B, C, F</td>
<td>A, D, E</td>
</tr>
<tr>
<td>Dissolving sugar</td>
<td>Baking a cake</td>
</tr>
<tr>
<td>Freezing water</td>
<td>Burning charcoal</td>
</tr>
</tbody>
</table>

Students could draw any of the examples shown in the Workbook on page 23 or ones of their own.

Home learning  Cooking

Page 24

Reversible changes: 1 boiling water, 2 cutting up carrots.
(Note: the actual structure of a chopped-up carrot does not change, only the shape of it. Scientifically, it is still a carrot and not a new product. You could put the pieces together and it would still look like a carrot.)

Irreversible changes: 1 cooking rice, 2 cooking in the microwave.

The foods students see being cooked will vary.

Cooking processes that could be reversed: chopping, slicing and peeling.

Cooking processes that could not be reversed: any form of applying heat.

Cooking needs energy from fuels.

Students’ answers may vary, but an important reversible change could be freezing to make ice cream and an important irreversible change could be baking in order to make cakes.

Class activity Comparing different fuels
Page 25

- It is a good idea to wear safety goggles because they protect the eyes.
- It is a good idea to have a fire extinguisher close by in case anything catches fire.
- It is a good idea to burn fuels near an open window to let any fumes escape.

Students’ observations will vary. Possible answers:

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Appearance before burning</th>
<th>Appearance during burning</th>
<th>Appearance after burning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>White flat</td>
<td>Orange flames</td>
<td>Grey/white ash</td>
</tr>
<tr>
<td>Twigs</td>
<td>Brown and shiny</td>
<td>Burning slowly</td>
<td>Grey ash with bits of unburned twig</td>
</tr>
<tr>
<td>Cardboard</td>
<td>Beige and clean</td>
<td>Going black</td>
<td>White ashes</td>
</tr>
<tr>
<td>Wood chippings</td>
<td>Cream flakes</td>
<td>Turning black with lots of smoke</td>
<td>Grey ashes</td>
</tr>
<tr>
<td>Coal</td>
<td>Black and crumbly</td>
<td>Glows yellow with lots of smoke</td>
<td>White ash with bits of unburned coal</td>
</tr>
</tbody>
</table>

Easiest fuel to light: paper.

Cleanest flame: coal.

Most waste left after burning: wood chippings and twigs.

Preferred fuel to burn at home: coal because it produces the least smoke and waste.

Going further

They would run out of oxygen and not be able to burn.

Home learning Fire safety survey
Page 26

Students’ answers will vary according to the type of building.

<table>
<thead>
<tr>
<th>Item</th>
<th>Location seen</th>
<th>Number seen</th>
<th>Item</th>
<th>Location seen</th>
<th>Number seen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire extinguisher</td>
<td>Hall/kitchen</td>
<td></td>
<td>Emergency exit</td>
<td>Stairways</td>
<td></td>
</tr>
<tr>
<td>Fire blanket</td>
<td>Kitchen</td>
<td></td>
<td>Sprinkler system</td>
<td>Function room</td>
<td></td>
</tr>
<tr>
<td>Fire bucket (sand or water)</td>
<td>Any public room</td>
<td></td>
<td>Smoke detectors</td>
<td>Every room</td>
<td></td>
</tr>
<tr>
<td>Fire alarm button</td>
<td>All public places</td>
<td></td>
<td>Fire information poster</td>
<td>Entrance</td>
<td></td>
</tr>
</tbody>
</table>

Students’ own answers.

Class activity Make your own fire extinguisher
Page 27

Instructions for making a fire extinguisher, so no students’ answers.

Example conclusion: Yes, carbon dioxide is a useful gas to use for a fire extinguisher as it prevents oxygen reaching the flame so the fuel cannot burn.

Home learning Local fires
Page 28

Students’ answers will vary.
Can mixtures be separated?

Home learning  Can we mix oil and water?
Page 29

Going further

Students' predictions will vary.
The oil floats on top of the water.
Students' predictions will vary.

Box A: the oil should spread across the water and mix.
Box B: the reaction will be the same but not as efficient.

Adding solids to water

Home learning  Soluble or insoluble?
Page 30

Substances that dissolve in water are **soluble**.
Substances that do not dissolve in water are **insoluble**.

Control variables could be: Measure the water in a clear container and add two spoonfuls of substance. Stir this 20 times and observe. Use the same substance and the same temperature of water. Stir each for the same amount of time.

Students' predictions will vary.

Example results:

<table>
<thead>
<tr>
<th>Substances that dissolved in water</th>
<th>Substances that did not dissolve in water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
<td>Talcum powder</td>
</tr>
<tr>
<td>Sugar</td>
<td>Flour</td>
</tr>
<tr>
<td>Coffee</td>
<td>Sand</td>
</tr>
<tr>
<td>Milk powder</td>
<td>Pepper</td>
</tr>
<tr>
<td>Gravy powder</td>
<td>Soil</td>
</tr>
</tbody>
</table>

Possible results (1 = most energy): Potato chip (1), Biscuit (2), Cracker (3), Rice cake (4), Bread (5), Banana (6).

Students' own answers.

Home learning  How much sugar is there in soft drinks?
Page 32

Students' answers will vary, but they should recognise that this is not an accurate method as there are too many errors and it is hard to measure. They should see a varied amount of sugar for each drink.

To get more accurate results, students could use less of the drink and place it in a saucer or the lid of a jar. This will speed up the process. The investigation could then be repeated and the results compared. Students could also use a more accurate scale, for example, a top pan balance. This will give a much more accurate digital reading.

What we have learned about reversible and irreversible reactions

Home activity  What I have learned...
Page 33

© Oxford University Press 2018
Module 3 Food Chains

Along the chain we go!

Class activity Paper plate food chain

What do food chains have in common? Possible answers: energy from the Sun is required; all food chains start with a producer (plant); consumers eat plants.

How are food chains different? Possible answers: the specific living things differ; food chains are partly dependent on their habitat; the number of levels (trophic levels) in the chain vary (for example, some chains have a producer and a primary consumer, but others can have a producer, a primary consumer, a secondary consumer and beyond).

Home learning Feeding relationships

Students have many options for food chains but possible examples could include:

Food chain 1: K → M → A
Food chain 2: D → B → F → Q (marine example)
Food chain 3: K → O → L → H

Students should realise that all chains start with the Sun providing energy for a producer, but the Sun need not be included in the chains.

Students should construct their own examples of chains using cut-out pictures. The chains must start with a producer and contain arrows pointing in the correct direction – from what is being eaten to what is eating it.

Home learning Food webs

If the seed-eating birds all died out, then the animals that eat these birds (such as snakes, hawks and owls) would lack food and either: move, die out or turn to alternative foods if possible. Also, if the seed-eating birds died out, the other animals that ate seeds (such as mice, plant-eating insects and squirrels) would have more food and could be more successful.

It all begins with sunlight

Class activity Protecting food webs

Animals that eat only plants are called primary consumers or herbivores.

Plants get their food from using the Sun’s energy to help them make sugar (glucose) from water and carbon dioxide.
If all of the plants on Earth died out, then all of the plant-eating animals would die out, as their food supply would have been removed.

Then all of the carnivores would eventually die out, as their food supply would be removed.

We should protect the plants that live on Earth for many reasons: they provide habitats for other living things; bind soil to prevent erosion; remove carbon dioxide from the atmosphere; and are also the start of food chains. Without plants, animals, including humans, would die.

**Home learning  Make a food web**

Students will find many varied food chains depending on the area within which they live. Ensure that they begin each chain with a producer (green plant) and show arrows from what is being eaten to what is eating it. By convention, this is left to right along the chain.

When combining the food chains into a food web, students must also check that the arrows are in the correct direction. Though not left to right in a food web (normally from bottom to top), they must still be from what is being eaten to what is eating it. This reflects the direction of flow of energy and nutrients through the web.

The primary consumer can be any animal that eats plants.

If this animal died out, not as many producers would be eaten so this could allow the producers to thrive. However, if the animal only ate one type of plant, then this might grow more quickly and impact negatively on the growth of other producers. Some students may point out that some producers may no longer be dispersed in terms of seeds, so that could have a detrimental effect on the plants.

The secondary consumers that eat the primary consumer would also die out, have to move or find an alternative food source.

**Home learning  Energy in food chains**

Going further

When primary consumers eat producers 90% of the energy is lost.

When secondary consumers eat primary consumers 90% of the energy is lost.

**Class activity  Pyramids of biomass**

Going further

The link between the water passing task and energy in food chains is that at each stage some energy (or water, in the case of the task) is lost, so less is passed on to the next level.
Predators and prey

Class activity Protection against predation
Page 44

Both living things have spines or spikes to protect them from being eaten.

Students should produce a poster that includes the key words for their topic and gives examples of how the adaptation protects living things. For example, camouflage allows animals to remain hidden from predators and poison ensures predators do not eat the animal or they will die or be very ill.

Students must include pictures and examples of the predators that hunt the prey animals.

Going further

Animals living thousands of metres under the sea will have to cope with a lack of light (total darkness), very high water pressure and very little food.

What we have learned about food chains

Home learning What I have learned...
Page 47

Students will have a wide choice of producers and consumers to add to the food chains. Below are some examples:

1  a  grass  ➔ cow  ➔ human (or other carnivore such as a wolf, lion or tiger)
   b  grass (or other plant)  ➔ grasshopper ➔ insect-eating insect, frog or small bird ➔ falcon
   c  tree  ➔ bee  ➔ bee-eater ➔ large bird
   d  sea grass  ➔ turtle  ➔ shark

2  a  The levels in a food chain are called trophic levels.
   b  An animals that eats only plants is called a herbivore or a primary consumer.
   c  Plants are called producers.
   d  Only 10 per cent of the energy in a rabbit is passed on to a fox that eats the rabbit.
   e  Food chains can be joined together to form a complex food web.

Different habitats, different food chains

Home learning A tree food chain
Page 45

There are many examples of food chains within each of the habitats listed but examples could include:

1  A garden pond:
   Pondweed  ➔ Tadpole  ➔ Frog
   Crab

2  A sea shore:
   Seaweed  ➔ Limpet  ➔ Dog whelk
   Crab
   Dog whelk
   Crab

3  The deep sea:
   Plankton  ➔ Shrimp  ➔ Squid
   Tuna
   Fish

Home learning Deep sea vent food chains
Page 46

Producers: bacteria

Primary consumers: tube worms

Secondary consumers: crabs

The octopus in this food chain is a tertiary consumer.

Module 4 Electrical Conductors and Insulators

Good or poor conductors?

Class activity Investigating insulators and conductors
Page 50

Yes, the bulb should light.
Example answers:

<table>
<thead>
<tr>
<th>Material</th>
<th>Good conductor</th>
<th>Poor conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal (paperclip)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Paper</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Metal spoon</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Card</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Wooden pencil</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Metal strip</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

- The good conductors are all metals.

Home learning  Survey of home appliances

Page 51

- Never touch broken wires.
- Never touch sockets, plugs or electrical appliances with wet hands.
- Never put electrical appliances near water.
- Never put anything into a mains socket.

Choose your conductor

Class activity  Investigate the conductivity of metals

Page 53

- Metals listed in order of conductivity (1 = best conductor; 6 = worst conductor):
  - gold (1) – very bright bulb;
  - copper (2) – very bright bulb;
  - silver (3) – bright bulb;
  - iron (4) – bright bulb;
  - aluminium (5) – bright bulb;
  - graphite (6) – bulb not very bright.

Home learning  Research project: Ampère

Page 54

- 1 André-Marie Ampère.
- 2 Lyon, France.
- 3 22 January 1775.
- 4 Ampere, the unit for measuring electric current.
- 5 Students’ drawings should be of an ammeter.
- 6 Amperes or amps.
- 7 The amount of current in a circuit.
- 8 a

Using metals and plastics

Home learning  Wiring a plug

Page 55

<table>
<thead>
<tr>
<th>Conductors</th>
<th>Insulators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal objects, e.g. spoons, paperclips</td>
<td>Paper</td>
</tr>
<tr>
<td></td>
<td>Card</td>
</tr>
<tr>
<td></td>
<td>Wooden objects</td>
</tr>
<tr>
<td></td>
<td>Plastic objects</td>
</tr>
</tbody>
</table>
Part of the plug | What it does
---|---
Fuse | Prevents too much electricity reaching the appliance
Plastic casing | Insulates electricity

### Making and breaking circuits

#### Class activity Changing the components in a circuit

**Page 56**

Changes and, therefore, students' answers and predictions will vary. Here are some examples for changes and their results:

<table>
<thead>
<tr>
<th>Change made</th>
<th>What happened?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add one bulb</td>
<td>None of the bulbs lit up</td>
</tr>
<tr>
<td>Add one battery</td>
<td>The bulbs were brighter</td>
</tr>
<tr>
<td>Add two bulbs</td>
<td>The bulbs were less bright</td>
</tr>
<tr>
<td>Add four bulbs</td>
<td>None of the bulbs lit up</td>
</tr>
<tr>
<td>Increase the length</td>
<td>The bulbs lit up</td>
</tr>
</tbody>
</table>

Students' own answers.

### Using circuit diagrams

#### Home learning Using circuit diagrams

**Page 57**

A 1 No, 2 Close the switch, 3 The bulbs will light dimly.

B 1 Yes, 2 No change, 3 The bulb will light brightly.

C 1 No, 2 Add a battery or remove a bulb, 3 The bulbs will light dimly.

D 1 No, 2 Close the switch, 3 The bulb will light brightly.

### Class activity Build circuits from diagrams and test them

**Page 58**

- **A** This circuit will light the bulb.
- **B** This circuit will light the bulb brightly so another bulb can be added.
- **C** This circuit will light the bulbs if the switch is closed.
- **D** The bulb might blow so remove a battery or two.
- **E** The bulbs will light but another battery can be added.
- **F** This circuit will light the bulb if the switch is closed.

### Home learning Draw circuit diagrams from written instructions

**Page 59**

1. Circuit diagram with one bulb and two batteries:

2. Circuit diagram with two bulbs, an open switch and two batteries:

3. Circuit diagram with one bulb, a closed switch, an ammeter and three batteries:

© Oxford University Press 2018
Module 5 Caring for the Environment

Looking after our world

Class activity  Protecting our environment

Page 64

There are many animals and plants that are endangered. We will lose these species forever unless we protect them and their natural habitats. They will become extinct. (A species is a type of living thing.)

A habitat is where an animal or plant lives. Many animals and plants are lost due to human activities. Hunting and cutting down forest can destroy natural habitats and the animals and plants that live there.

There are many plants that we have not discovered yet. They may help us with medicines or other useful things.

Some animals are endangered because of human impact – such as cutting down forest or damaging coral reefs. They can also be endangered due to pollution and hunting.

Reducing hunting and pollution can protect endangered species. Preventing the damage to habitats caused by cutting down forests, removing coral, mining and quarrying can also protect them.

Students may consider many examples of human activities that destroy natural habitats such as: deforestation, overfishing, hunting, pollution, litter, building roads and buildings, damming rivers to form reservoirs and removing coral and sand from coastal areas.

Home learning  Conservation project

Page 65

Students could suggest that conservation projects are needed to protect the environment and the living things in it.

Students should produce an information leaflet that includes the criteria listed in the checklist. They should explain the main aims of the conservation project and the living things that it protects. The risks to the living things should be outlined and how the protection takes place needs to be explained. Important factors such as the date the project started and how it started
should be discussed and the length of time needed for completion of the project must be mentioned. For example, is it a long-term project over many years or a short project of a few weeks or months? Funding from the project should also be researched and what is to happen after the conclusion of the project will need to be added. Finally, students should think about how funds are raised and whether local people could be involved.

Pictures of the protected living things must be included in the leaflet.

**Home learning  Local animals and plants**

**Page 66**

Example answers:

<table>
<thead>
<tr>
<th>Clues to look for</th>
<th>Webs, trails, chewed leaves, eggs</th>
<th>birdsong, feathers, eggs, eggshells, nests</th>
<th>digging, footprints, fur, hair, damage to trees and leaves, scratching</th>
<th>skin, signs of movement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of animal</strong></td>
<td>Insects and spiders</td>
<td>birds</td>
<td>mammals such as deer, squirrels and voles</td>
<td>reptiles such as lizards and snakes</td>
</tr>
</tbody>
</table>

Students will find clues to a wide variety of living things in their area, but should try to include some that indicate insects, small birds, mammals and reptiles.

**Class activity  Design a habitat**

**Page 67**

Students can design a wide array of habitats and include many possible plants and animals. It is important that they ensure all of the living things have water, food, space and, in the case of plants, sunlight. Any animals will also need some form of shelter.

**Home learning  Investigate the greenhouse effect**

**Page 68**

Students should predict that the temperature would be higher inside the greenhouse than outside.

Students should note that as the temperature outside the greenhouse increases the temperature inside does also. Therefore, students should circle Yes.

The temperature inside the greenhouse will be higher than outside.

This should tell students that this is similar to the greenhouse effect on Earth. If heat is prevented from leaving the atmosphere, then the atmosphere will keep warming up.

The greenhouse effect is increasing the temperature on Earth.

**Home learning  Waste disposal in the local area**

**Page 69**

Waste is anything that is not needed and is discarded.

Students should follow the checklist on the Workbook page to ensure their report includes the relevant information. They must describe how waste is collected in their area and where it is taken. They must also research and report on how much, if any, of the waste is recycled.

The sign students design must include the recycle, reuse and reduce logo and information to persuade people to recycle, reuse or reduce materials to reduce waste.

**Caring for the environment**

**Home learning  Saving energy at home**

**Page 70**

The devices in the picture that use energy are: mixer, cooker (hob and oven), washing machine, microwave, kettle, toaster and extractor fan.

The functions of the devices are:

- **Mixer** – used for mixing foods for cooking.
- **Cooker (hob and oven)** – used for heating foods in cooking.
- **Washing machine** – used for washing and sometimes drying clothes.
- **Microwave** – used for heating drinks and foods.
- **Kettle** – used for boiling water.
- **Toaster** – used for heating bread to make toast.
- **Extractor fan** – used to remove cooking smells.

The devices students have at home will vary.
Students can select a number of possible devices, but they should select one they use a great deal. They should then survey how often it is used and for how long, and then calculate the energy consumption by researching the energy consumption per hour and multiplying this by the number of hours the device is used for. Some typical energy consumption figures per hour are given below:

- Mixer – 0.7 kilowatts per hour.
- Cooker (hob and oven) – 2.0 kilowatts per hour.
- Washing machine – 1.0 kilowatts per hour.
- Microwave – 1.4 kilowatts per hour.
- Kettle – 1.5 kilowatts per hour.
- Toaster – 1.0 kilowatts per hour.
- Extractor fan – 0.1 kilowatts per hour.

Note that different models vary in energy consumption. For example, there are two-slice and four-slice toasters. The example given is for a two-slice toaster. Modern cookers and washing machines can be twice as efficient as older models.

**Class activity Make a useful object from waste materials**

*Page 71*

Students should produce clear drawings of their design and a list of materials needed.

Following the making of the object, students should be able to list some changes following an evaluation of their model. These could cover design, method of construction, material selected or a combination of these.

**Home learning Interpreting recycling data**

*Page 72*

Brazil recycled the highest percentage of cans in 2012.

The USA recycled the lowest percentage of cans in 2012.

Japan recycled the highest percentage of cans in 2000.

Argentina has improved its recycling record the most since 2000.

In the USA, the recycling rate fell from 62.1% in 2000 to approximately 50%, but then rose to 67% in 2012.

In Europe, there has been a steady increase from 43% in 2000 to 66.7% in 2012.

Possible ways that students can increase the number of cans that are recycled in their country is to have special bins to collect the cans and recycling depots in places around the area. Cans should be clearly marked and people should be taught about the need to recycle – including information signs near bins.

**Class activity Litter survey**

*Page 73*

Students must predict the type of litter they believe they will find prior to the survey. It is likely that predictions will include plastic bottles, paper or cardboard packaging or food waste.

Students should produce a clear table of the number of items found and use the data to decide which is the most common type of litter and give reasons. A likely response is that modern packaging, such as plastic bottles and fast-food cartons, are very common and people do not take them to the correct litter bins. It may also be that students live in a windy area and litter collects in certain places or they may live near to shops that create a lot of packaging material.

**Home learning Air pollution**

*Page 74*

Students should produce an information leaflet or poster that clearly explains which fuels are used in the area to generate electricity and also contains information about the nature of the pollution that this electricity generation creates. Students should also discuss the impact on the environment of this pollution.

Students make an air filter and attach it to an open window. They should find that if the air is polluted by dust and other solid particles, their filter will collect some of this.

Students should realise that most of the air we breathe is polluted in some way, but in some areas the pollution is very high – such as from traffic, factories, power stations and building work.
What we have learned about caring for the environment

Home activity  What I have learned...
Page 75
1  a feathers, b skin, c oxygen, d planting trees, e dustbins.
2  Litter can produce harmful chemicals that wash into streams, rivers and the sea and poison living things. Litter can also choke or strangle living things.
3  Recycling helps the environment because fewer raw materials have to be used and it takes less energy to recycle an object than it takes to make it from scratch. This reduces the energy needs and, therefore, the pollution caused by producing the energy is also reduced.

Module 6 Mass and Weight

Things that go up always come down

Class activity  Investigate how objects fall
Page 78
Objects should all travel at the same speed.
Bigger objects make a bigger crater as there is more force.
Students may suggest measuring the size of the objects using scales.

Home learning  Do people understand weight and mass?
Page 79
Most packaging will use grams (g) or kilograms (kg) as their units of measurement.
Probably no packaging will use Newtons.

Investigating mass and weight

Class activity  Drawing and using graphs
Page 80

Object on Earth will weigh more than on another planet.

Home learning  Find the mass and weight of people at home
Page 81
Students' tables of results will vary depending on what they find.
1 kg has a weight of 10 N, so 100 g = 0.98 or 1 N.
Students' answers will vary, but weight on:
• Jupiter = weight × 25
• the Moon = weight × 1.66
People will weigh the most on Jupiter.
People will weigh the least on the Moon.
Students' bar charts should have the names of the people on the x-axis and their weight on the y-axis.

© Oxford University Press 2018
Home learning  A home-made forcemeter  
Page 82

3 100 g = 0.98 or 1 N.

Students should try to make them the same as 1 N.

4 Students’ results will vary.

6 100 g = 1 N, so 1 kg = 10 N

8 Students’ forcemeters will not be very accurate.

Class activity  Measuring the force of magnetism  
Page 83

4 The display on the top balance will change.

5 Repels = negative display. Attracts = positive display.

6 When the North end of a magnet is close to the North end of the magnet the top balance display should be negative.

7 When the North end of a magnet is close to the South end of the magnet the top balance display should be positive.

8 When the magnets repel the negative display goes up.

When the magnets attract the positive display goes down.

Investigating forces

Home learning  Which objects float?  
Page 84

Examples of objects that sink: sponge, cutlery, stones.

Examples of objects that float: bottle top, plastic duck, plastic food container.

Students’ predictions will vary.

1 Empty plastic bottle with lid on: whole bottle will float.

2 Plastic bottle quarter full of water with lid on: the part of the bottle containing the water will sink and the rest of the bottle will float.

3 Plastic bottle half full of water with lid on: half of the bottle containing the water will sink and the other half will float.

4 Plastic bottle filled with water with lid on: whole bottle will sink.

Home learning  Force diagrams  
Page 85

The arrow points in the direction of the force. For example, the upward arrow on the floating boat shows upthrust. The thicker the arrow the greater the force.

Balanced and unbalanced forces

Home learning  Friction  
Page 86

Rough materials will slow down the car. Smooth materials will speed up the car.

Students’ tables of results will vary.

Students may conclude that friction acts on the moving objects. This friction can slow them down or stop them completely.

Class activity  A toy car catapult  
Page 87

Students’ tables of results will vary.

Students could draw a line graph with ‘Distance pulled back (cm)’ plotted on the x-axis and ‘Distance travelled (cm)’ on the y-axis.

Students may conclude that the more the elastic is pulled back the further the car travels.
Friction can be useful

Home learning Streamlining
Page 88

People might think about Formula One cars and aeroplanes. When an object is streamlined, it reduces friction.

A shape with a pointed tip will be the most streamlined.

Students are likely to draw cone shapes.

Students may predict that the most pointed shape will be the most streamlined.

Students’ tables of results will vary, but the most streamlined will fall faster.

What we have learned about mass and weight

Home activity What I have learned...
Page 89

Quiz yourself

1 Human Organs and Systems
Page 90

1 a and b

1

2 Brain > This is the control centre of the body. It does millions of tasks without you thinking about them.

Heart > This pumps blood around the body in tubes called blood vessels.

Lungs > We breathe air into these.

Stomach and intestines > Food is digested and absorbed here.

Kidneys > We have two of these. They filter the blood and remove urea and ammonia, which are excreted in urine.

2 Reversible and Irreversible Reactions

3 a Oxygen, ignition and fuel.

b Oxygen – the air.

Ignition – a spark or matches.

Fuel – wood, methane or petrol.

c A fire extinguisher is used to put out a fire. It removes oxygen.

d Burning is an irreversible reaction.

Page 91

4 Left-hand label: Salt and water.

Right-hand label: Damp sand.

5 Labels from left to right: B, A C.
3 Food Chains
Page 93

6 a

b Students could select any three words to define. Example definitions:

Food chain – a series of living things with each being dependent on the next as a source of food.
Consumer – an animal that eats other animals or plants to obtain energy and nutrients.
Producer – a living thing (green plant) that can use energy from the Sun to help it make food.
Predator – an animal that captures and eats other animals.
Prey – an animal that is eaten by a predator.
Food web – a system of interlinked food chains.
Energy – what is transferred to something to allow it to do work.
Sunlight – light that originates in the Sun.

Colours are:
- All plants (producers) at the bottom should be green.
- The ant, rabbit, mouse, squirrel and butterfly (primary consumers) should be green.
- All other animals (secondary and tertiary consumers) should be red.

4 Electrical Conductors and Insulators
Page 94

8 a Labels from left to right: graphite, mercury, aluminium, gold, copper.

b Copper is used in homes to carry electric charge in wires.

c Aluminium is used for cables that carry electric charge from the power plant to homes.

d We don’t use the metal that is the best conductor for these purposes because it is too expensive and too heavy.

9 a and b

Circuit – a complete ring of conducting materials through which electricity can flow.

Insulator – a material that will not allow electricity to flow along it.

Conductor – a material that will allow electricity to flow along it.

Battery – a device that converts chemical energy into electrical energy.

5 Caring for the Environment
Page 95

10

© Oxford University Press 2018
11 Order from left to right: 4, 2, 6, 1, 5, 3

6 Mass and Weight

12 a

b  Mercury and Mars have the lowest force of gravity (not counting the Moon, which is a satellite).

c  Jupiter has the highest force of gravity.

d  The Earth’s force of gravity is 10.

Page 97

13 a  The unit for speed is metres per second (m/s).

b  The speed of the car is calculated by dividing the distance travelled by the time taken.

c  A 0.2 m/s
   B 0.5 m/s
   C 0.3 m/s
   D 0.25 m/s

14 Person A is travelling the fastest because he is sliding on snow and so will have less friction with the ground and he is moving downhill.