PRACTICE MAKES PERMANENT

600+ questions

AQA GCSE Combined Science Trilogy

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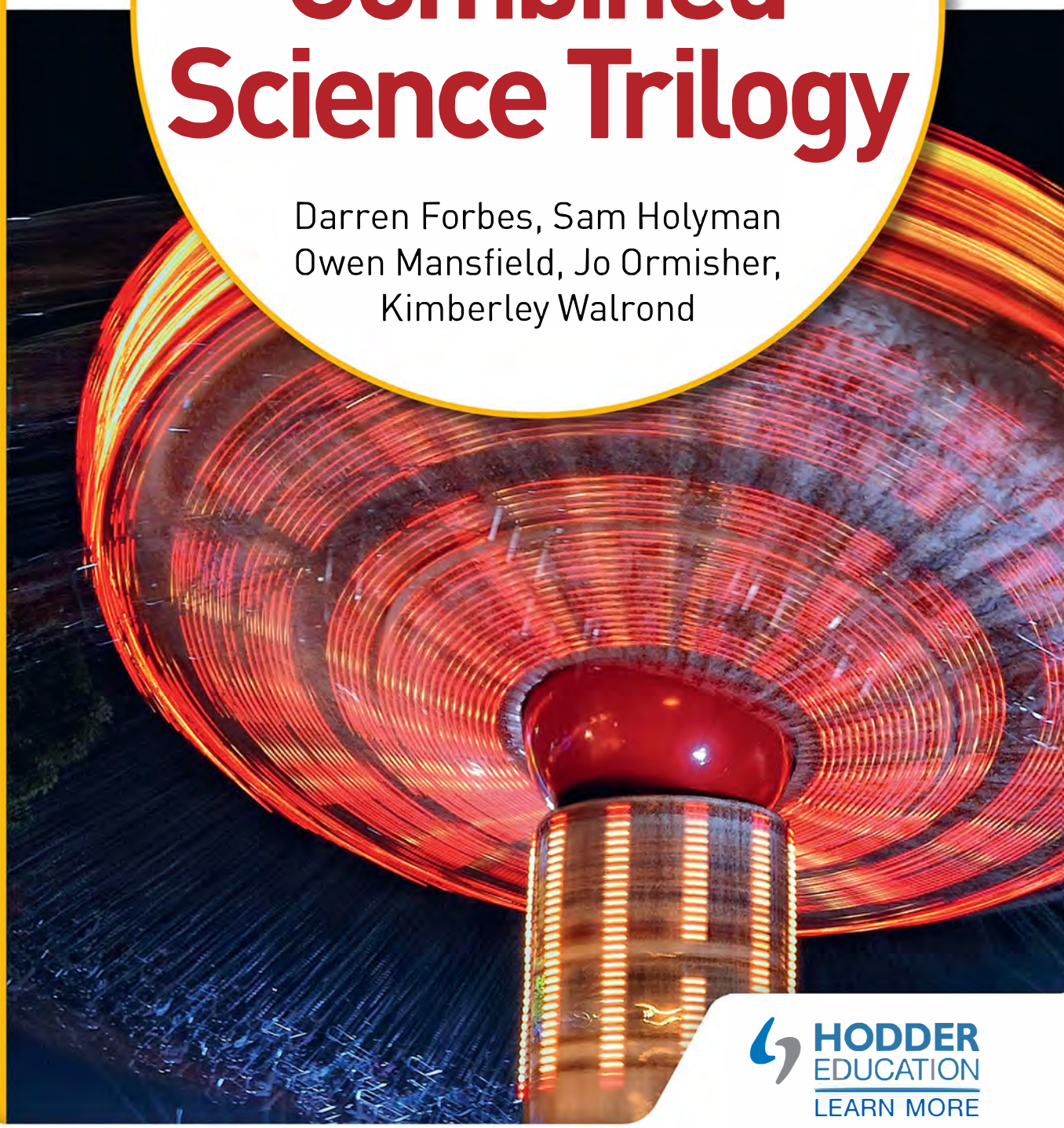

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Contents

Chemistry

1 Cell biology

Cell structure

Quick questions

p2 4.1.1.1
1 What is a 'eukaryotic cell'?

p2–3 4.1.1.1
2 What is a 'prokaryotic cell'?

p6 4.1.1.2
3 Plant and algal cells have cell walls. What is their cell wall made of?

p10 4.1.1.4
4 Cells **differentiate** as an organism develops. What does differentiate mean?

p12 4.1.1.5
5 What is meant by the resolution (or resolving power) of a microscope?

p12 4.1.1.5
6 Why can ribosomes not be seen using a light microscope?

p15 4.1.1.5
7 Give the formula for calculating the magnification of an object.

p11 4.1.1.5
8 Rearrange the equation for magnification to find:

- the real size of an object
- the image size.

RP2 MS5c
9 Give the equation used to calculate the area of a circle.

MS1b H
10 Convert these numbers into standard form:

- 456 000
- 0.00032

Exam-style questions

11 **Figure 1** shows two cells labelled A and B. One is a prokaryotic cell and one is a eukaryotic cell.

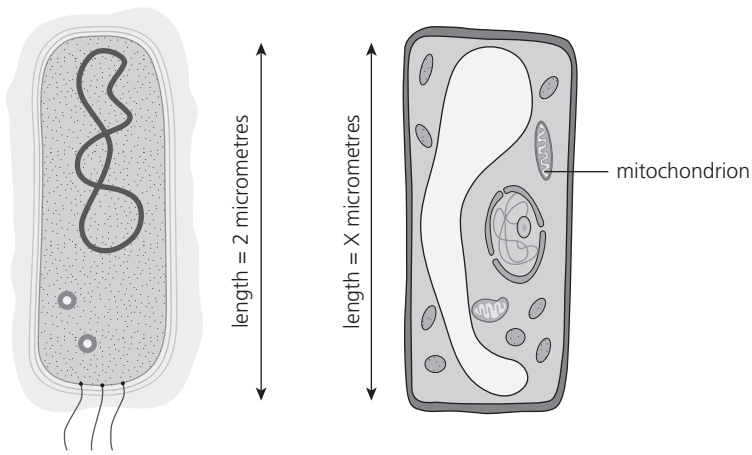

Figure 1

p3 4.1.1.1

11–1 Give the letter of the prokaryotic cell. *[1]*

p2–4 4.1.1.1

11–2 Describe **two** ways that cell **A** is different from cell **B**. *[2]*

p16 4.1.1.1 WS4.5 MS2h

11–3 Cell **A** is 2 micrometres (µm) long. Give its length in millimetres (mm) and in nanometres (nm). *[2]*

p15 4.1.1.5 MS2h,3b WS4.5

11–4 **Figure 1** shows cell **A** and cell **B** the same length, but the magnification of each cell is different.

Cell **A** is 2 µm long. Cell **B** is X µm long.

Calculate the length of cell **B**. *[2]*

p4–5 4.1.1.2

11–5 Mitochondrion, ribosome and nucleus are structures found in eukaryotic cells.

Write the structures in order of size from smallest to largest. *[1]*

p3–5 4.1.1.1

11–6 Suggest **one** reason why prokaryotic cells do not have mitochondria.

Use information from **Figure 1**. *[1]*

Total: 9

12 Cells are the basic unit of all living things.

Cells are either eukaryotic or prokaryotic.

Eukaryotic and prokaryotic cells have different structures.

p3–6 4.1.1.1

12–1 Eukaryotic cells and prokaryotic cells both contain genetic material.

Describe **two** ways that the genetic material is arranged differently in prokaryotic and eukaryotic cells. *[2]*

p4–6 4.1.1.2

12–2 Plant cells contain chloroplasts, but animal cells do not.

Give **two** other differences between plant cells and animal cells. *[2]*

p12 4.1.1.5

12–3 Some of the sub-cellular structures in cells can only be seen using an electron microscope.

Give **two** reasons why electron microscopes are used to study cells in finer detail than light microscopes. *[2]*

p10–11 4.1.1.4

12–4 Cells may differentiate to become specialised cells.

Explain what happens when a cell differentiates. *[2]*

p10–11 4.1.1.4

12–5 Describe the main difference between differentiation in animal cells and plant cells. *[2]*

p8–10 &69 4.1.1.3 QWC

12–6 Describe at least **three** of the structures and functions of specialised plant and animals cells. *[6]*

Total: 16

p4–8&11 4.1.1.2

13 **Figure 2** shows a light microscope.

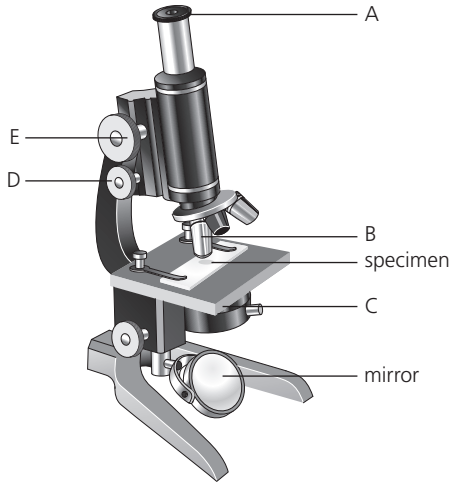

Figure 2

13–1 Name the parts of the microscope labelled A–E. Choose your answers from the options below. *[5]*

eyepiece lens	objective lenses	coarse focus	fine focus	stage

RP1 AT7

13–2 Describe a method used to prepare cheek cells for viewing with a light microscope. *[3]*

QWC RP1 AT7

13–3 Describe how a light microscope can be used to view a prepared slide of cells at **high** power. *[6]*

WS1.2, 3.1 AT7

13–4 **Figure 3** shows a cheek cell seen with a light microscope.

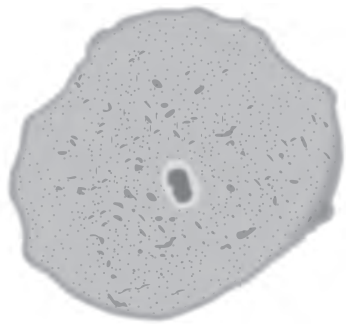

Figure 3

Draw the cell shown in the photo. Label the cell membrane, cytoplasm and nucleus. *[2]*

13–5 Describe the functions of these three parts of a cell: cell membrane, cytoplasm and nucleus. *[3]*

RP1 AT7

13–6 A student looks at cheek cells using the light microscope, but cannot see individual cells.

Suggest what the student needs to do to the microscope to see individual cells. *[2]*

Total: 21

Cell division

Quick questions

p19 4.1.2.1

1 Name the part of the cell that contains chromosomes.

p19–20 4.1.2.1

2 What are chromosomes made of?

p19–20 4.1.2.1

3 What are carried on chromosomes?

Exam-style questions

p19–23 4.1.2.1

4 New cells are produced by cell division.

Figure 4 shows an animal cell with some of its structures magnified to show more detail.

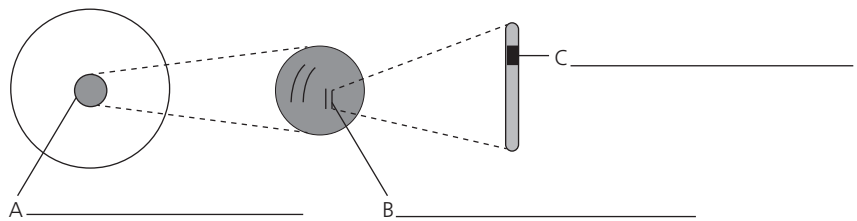

Figure 4

4–1 Name parts A–C. Choose your answers from the options below. *[3]*

chromosome	gene	nucleus

4–2 Multicellular organisms, such as plants, use cell division during their development.

Give **one** other use of cell division by mitosis in multicellular organisms. *[1]*

4–3 Plants contain meristem tissue. What is the function of meristem tissue? *[1]*

4–4 Stem cells from meristem tissue in plants can be used to produce clones.

Give **two** advantages of producing clones using stem cells from meristem tissue. *[2]*

4–5 Plant cloning can be used to protect rare species from extinction. Describe **one** other use of plant cloning. *[2]*

Total: 9

p20–1 4.1.2.2

5 Cells divide in a series of stages called the cell cycle.

Figure 5 shows some onion cells at different stages of the cell cycle.

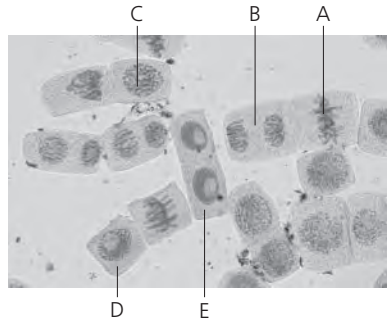

Figure 5

5–1 Give the letter of the cell that is **not** dividing by mitosis. *[1]*

5–2 What is happening to the chromosomes in cell B? *[1]*

5–3 Describe what is happening in cell E. *[2]*

Total: 4

p22–4 4.1.2.3

6 Stem cells have an important function in living organisms.

6–1 What is a stem cell? *[2]*

6–2 Therapeutic cloning produces an embryo with the same genes as the patient.

Give **one** advantage of treatment with cells that have the same genes as the patient. *[1]*

6–3 Name **two** conditions that could be treated with stem cells. *[2]*

WS3 **6–4** Describe **two** reasons why people may be against the use of stem cells. *[2]*

WS1.3 QWC **6–5** Leukaemia is a disease that affects the blood. A patient with leukaemia can be treated using stem cells. The stem cells can be obtained from the patient's own bone marrow. Stem cells can also be obtained from human embryos.

Evaluate the use of stem cells from the patient and from human embryos. *[6]*

Total: 13

Transport in cells

Quick questions

p29 4.1.3.1 **1** What do substances move across to get into and out of cells?

p30 4.1.3.1 **2** Name **two** substances that move **into** cells and **two** substances that move **out of** cells.

p33–4 4.1.3.2 **3** Define the term 'osmosis'.

p35 4.1.3.2 **4** Write out the equation for calculating percentage change in mass.

p36 4.1.3.3 **5** Plants require mineral ions for healthy growth. Where do plants get mineral ions from?

p36–7 4.1.3.3 **6** Which molecules are absorbed into the blood by active transport and used for cell respiration?

Exam-style questions

p31–3 4.1.3.1

7 An organism's surface area to volume ratio affects its ability to transport sufficient molecules into and out of its cells.

Figure 6 shows cubes with different side lengths.

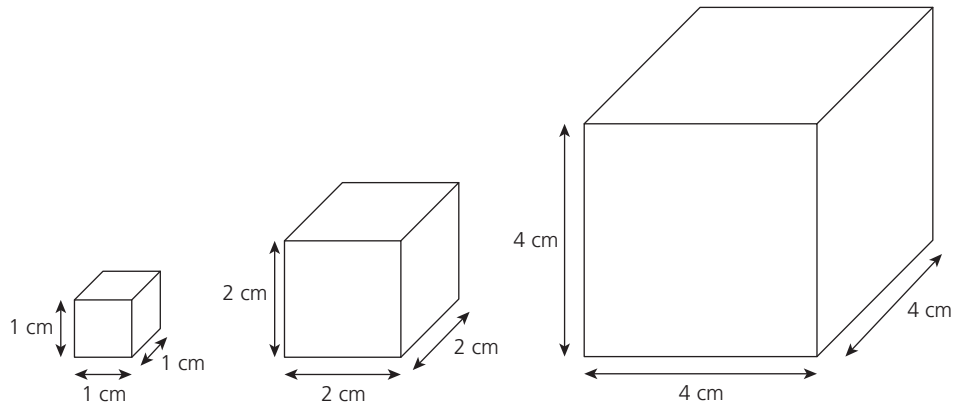

Figure 6

Surface area to volume ratio can be calculated using the equation:

$$\text{surface area to volume ratio} = \frac{\text{surface area}}{\text{volume}}$$

MS1c,5c **7–1** Explain how surface area to volume ratio changes as the length of the sides double.

Use calculations to support your answer. *[3]*

WS3.5 **7–2** Compare the surface area to volume ratio of a single-celled organism with the surface area to volume ratio of a large multicellular organism. *[1]*

7–3 Explain how single-celled organisms obtain the oxygen they need for aerobic respiration. *[2]*

7–4 Insects do not have lungs or blood. Suggest how insects obtain the oxygen they need for aerobic respiration. *[2]*

7–5 Explain how large multicellular organisms, such as mammals, obtain the oxygen they need to carry out aerobic respiration. *[2]*

Total: 10

p35–6 4.1.3.2 RP3

8 A student investigates osmosis by measuring the effect of different concentrations of salt solution on the mass of carrot cylinders.

This is the method the student uses:

1 Label six boiling tubes 0.0 M, 0.2 M, 0.4 M, 0.6 M, 0.8 M and 1.0 M.

2 Add 10 cm^3 of each concentration of salt solution to the boiling tubes.

3 Use a cork borer to cut six carrot cylinders, then trim the cylinders to the same length.

4 Gently dry the carrot cylinders with a paper towel.

5 Measure the mass of each carrot cylinder.

6 Put one carrot cylinder into each boiling tube for one hour.

7 Remove the carrot cylinders from the test tubes and gently dry them with a paper towel.

8 Measure the mass of each carrot cylinder.

WS2.2 **8–1** What is the independent variable for this investigation? *[1]*

WS2.2 **8–2** What is the dependent variable for this investigation? *[1]*

WS2.2 **8–3** Give **two** variables that the student controlled in this investigation. *[2]*

WS2.3 **8–4** Give the reason why the student dries the carrot cylinders. *[1]*

WS3.1 MS4a,4c **8–5** Describe how the student could use a graph to find the concentration of salt inside the carrot cells. *[3]*

Total: 8

9 Substances move into and out of cells by active transport, diffusion or osmosis.

p29–37 4.1.3.1, 4.1.3.2 **9–1** Describe **two** similarities between diffusion and osmosis. *[2]*

p29–37 4.1.3.3 **9–2** Describe **two** differences between active transport and osmosis. *[2]*

p9 4.1.1.3, 4.1.3.1 **9–3** Root hair cells absorb water and mineral ions from the soil.

Figure 7 shows a root hair cell.

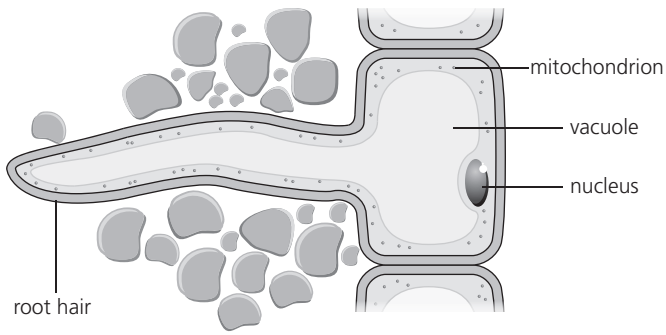

Figure 7

Describe how the shape of the root hair cell increases the rate of water uptake. *[2]*

p36 4.1.3.3 **9–4** Mineral ions are in a more dilute solution in the soil than inside the cell.

Name the process that transports mineral ions into the root hair cell. *[1]*

p5&36 4.1.3.3 **9–5** The root hair cell has large numbers of mitochondria.

Explain how this increases the uptake of mineral ions. *[3]*

p36 4.1.3.3 **9–6** Some soils are water-logged. This means that there is water filling the air spaces in the soil.

Explain why plants grown in water-logged soil are deficient in mineral ions. *[3]*

Total: 13

Cell biology topic review

p34–6 4.1.3.2

1 A student investigates the effect of a range of concentrations of salt solution on the mass of potato cylinders.

The student follows this method:

- Cut six potato cylinders to the same length and diameter.
- Carefully blot the cylinders dry with a paper towel.
- Weigh each cylinder.
- Put one cylinder into each boiling tube (**Figure 8**).
- Remove the cylinders from the tubes after one hour.
- Carefully dry each cylinder and reweigh them.

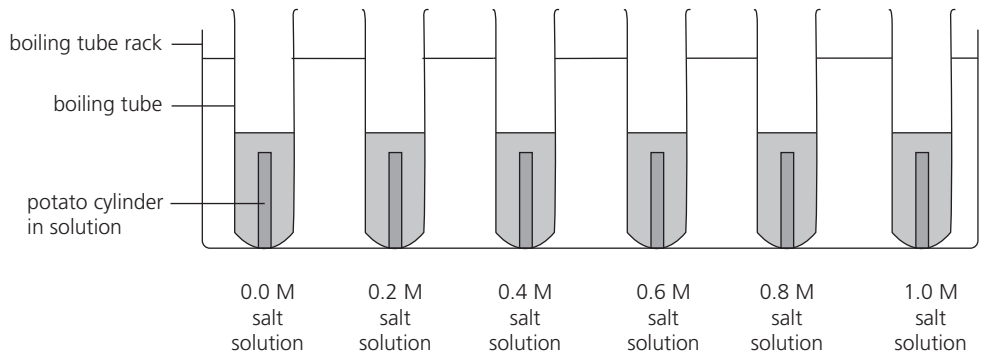

Figure 8

Table 1 shows the student's results.

Concentration of salt solution in M	Mass of potato at start in g	Mass of potato at end in g	Change in mass in g	Percentage change in mass in %
0.0	19.6	20.9	+1.3	+6.6
0.2	16.8	17.2	+0.4	+2.4
0.4	22.1	20.5	–0.6	–2.7
0.6	17.0	14.7	–2.3	
0.8	19.2	16.4	–2.8	–14.6
1.0	27.9	23.6	–4.3	–15.4

Table 1

WS1.2, 3.5 RP2 **1–1** Explain why there was an increase in mass for the salt concentrations 0.0 M and 0.2 M. *[2]*

MS1c **1–2** Calculate the percentage change in mass for the salt concentration 0.6 M. *[1]*

WS1.2 **1–3** Give **one** reason why the student calculated the percentage change in mass. *[1]*

MS4c **1–4** Plot a graph of the student's results. *[4]*

- Choose suitable scales.
- Label the axes.
- Plot the percentage change in mass for each concentration of salt solution.
- Draw a line of best fit.

MS4a **1–5** Use your graph to find the concentration of salt solution where there is no change in mass. *[1]*

WS1.2 **1–6** What is the significance of the concentration of salt solution that gives no change in mass? *[1]*

Total: 10

2 **Figure 9** shows a cell from the lining of the small intestine.

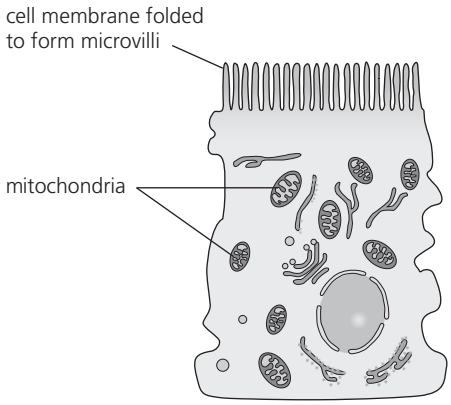

Figure 9

The cell is specialised to absorb digested food; for example, glucose (sugar).

p31 4.1.1.2, 4.1.1.3, 4.1.3.3 **2–1** Explain why the cell has lots of mitochondria. *[3]*

p31 4.1.3.1 **2–2** The cell membrane is folded to form microvilli. Explain why this would increase the rate of absorption. *[2]*

p20&22 4.1.1.4, 4.1.2.2, 4.1.2.3 **2–3** Explain how stem cells are able to produce all of the cells required in a growing foetus. *[3]*

Total: 8

3 **Figure 10** shows an axolotl.

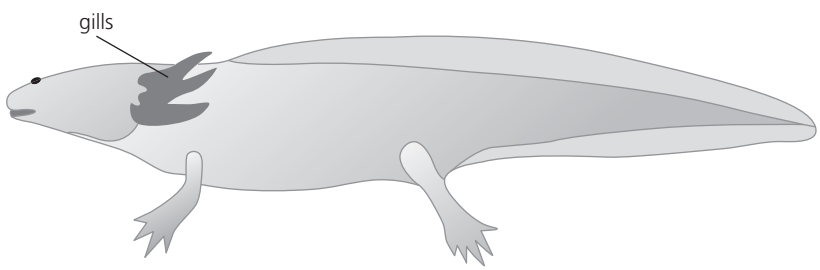

Figure 10

Axolotls are multicellular animals that live in water.

Axolotls have gills for gas exchange.

p32&33 4.1.3.1

3–1 Explain why axolotls use gills rather than conducting gas exchange through their epidermis. *[2]*

p32&33 4.1.3.1 WS3.5

3–2 Suggest **two** features of an axolotl's gills that make it an effective gas exchange surface. *[2]*

p22–3 4.1.1.4, 4.1.2.3

3–3 If an axolotl's leg is removed, it can regrow a new leg.

The specialised cells in the axolotl have to dedifferentiate to produce cells that can form new bone, muscle or skin cells.

Name the type of cells produced when specialised cells dedifferentiate. *[1]*

p20–1 4.1.2.2 WS4.2, 4.4

3–4 The new bone, muscle and skin cells divide by mitosis to grow a new leg. DNA replicates during mitosis.

The mass of DNA in an axolotl skin cell is 36 picograms (1 picogram = 10^{-12} grams).

- What is the mass of DNA in the skin cell after the DNA replicates? *[1]*
- What is the mass of DNA in one of the new skin cells? *[1]*

p23–4 4.1.2.3

3–5 Scientists use axolotls in research to find ways of regenerating human tissues and organs.

Name **one** condition that this research could find a treatment for. *[1]*

p24 4.1.2.3 WS1.3

3–6 Suggest **one** reason why some people may be against this type of research. *[1]*

Total: 9

2 Organisation

Principles of organisation

Quick questions

p43 4.2.1 **1** What are the basic building blocks of all living organisms?

p43 4.2.1 **2** What is a 'tissue'?

p43 4.2.1 **3** What is an 'organ'?

Exam-style questions

p43 4.2.1 **4–1** Arrange these structures in size order, from smallest to largest. *[2]*

cell	organ	organ system	organism	tissue

p43& 68–9 4.2.1 **4–2** Give **two** examples of tissues. *[2]*

p43& 70–1 4.2.1 **4–3** Give **two** examples of organs. *[2]*

p43&71 4.2.1 **4–4** Organs are organised to form organ systems. Give **two** examples of organ systems. *[2]*

Total: 8

Animal tissue, organs and organ systems

Quick questions

p42–3 4.2.2.1 **1** Describe the function of the digestive system.

p49 4.2.2.1 **2** What are 'enzymes' and how do they work?

p52 4.2.2.2 **3** Describe the function of the heart.

p51–2 4.2.2.2 **4** Explain what 'double circulation' means.

p56–7 4.2.2.2 **5** Where are coronary arteries found and what is their function?

p54–56 4.2.2.3 **6** Name the components of blood tissue and give their functions.

p57 4.2.2.4 **7** Explain how stents are used to treat coronary heart disease (CHD).

p58–9 4.2.2.5 **8** Explain what is meant by the term 'health' and list ways of improving health.

p61–2 4.2.2.6 **9** Explain what is meant by the term 'risk factor', and give examples of risk factors and their associated diseases.

p60 4.2.2.7 **10** Describe how cell division can result in cancer.

Exam-style questions

11 The digestive system digests and absorbs food.

Figure 1 shows the human digestive system.

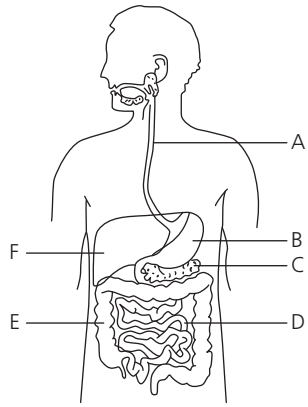

Figure 1

p44 4.2.2.1

11–1 Name the parts of the digestive system labelled A–F. *[6]*

p48 4.2.2.1 AT8 QWC WS2.2, 2.3

11–2 The digestive system digests carbohydrates, lipids and proteins.

Describe how a student could test a sample of food to find out whether it contains carbohydrates, lipids and proteins. *[6]*

p50 4.2.2.1

11–3 Digestion is completed by digestive enzymes.

What is the main function of all digestive enzymes? *[1]*

p47 4.2.2.1

11–4 The liver produces bile that is stored in the gall bladder. Describe the functions of bile. *[4]*

Total: 17

p49–50 4.2.2.1

12 **Figure 2** shows the 'lock and key' model of enzyme action.

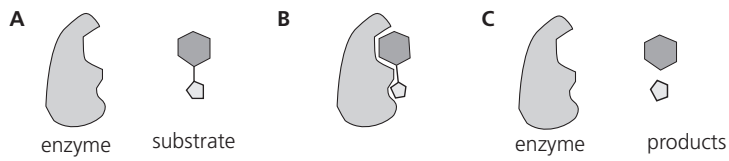

Figure 2

WS1.2

12–1 Describe what is happening in parts **A** to **C** in **Figure 2**. *[4]*

QWC

12–2 Enzyme activity can be affected by factors including temperature and pH.

Figure 3 shows the effect of temperature on enzyme activity.

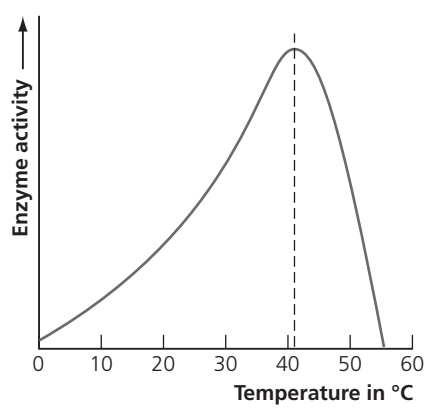

Figure 3

Describe and explain how increasing the temperature affects the rate of reaction. *[6]*

RP5 WS2.2 AT1,2,5,8

12–3 A student investigates the effect of pH on the rate of reaction of the enzyme amylase.

This is the method the student uses:

- Add 2 cm^3 of pH 4 buffer solution and 4 cm^3 of starch solution to a test tube and put it in a water bath at 35 °C for 2 minutes.
- Add 2 cm^3 of amylase solution to another test tube and put it in the water bath for 2 minutes.
- Put one drop of iodine solution into each well on a spotting tile.
- Pour the amylase solution into the test tube with starch and buffer solutions. Start a stopwatch and stir the mixture with a glass rod.
- Remove one drop of the mixture with a glass rod every 30 seconds, and put it in a well of the spotting tile with the iodine solution.
- Keep sampling every 30 seconds until the iodine solution does not change colour.
- Repeat the investigation with buffer solutions at pH 5–9.

What is the dependent variable for this investigation? *[1]*

RP5 WS2.2 AT1,2,5,8

12–4 The student controlled the temperature in this investigation.

Give **one** other variable that the student controlled. *[1]*

RP5 WS2.2 AT1,2,5,8

12–5 Explain how the student controlled the temperature in this investigation. Include why they needed to control the temperature. *[3]*

RP5 WS2.2 AT3

12–6 Suggest why measuring the concentration of starch every 30 seconds would be better than recording a colour change. *[1]*

RP5 WS2.2 AT1

12–7 Suggest **one** way the student could more accurately measure the time taken for all of the starch to break down. *[1]*

12–8 The student repeats the investigation using a pH 2 buffer solution, starch solution and amylase solution. After 15 minutes, the iodine solution still turns blue–black. Explain why. *[2]*

Total: 19

13 **Figure 4** shows the human breathing system.

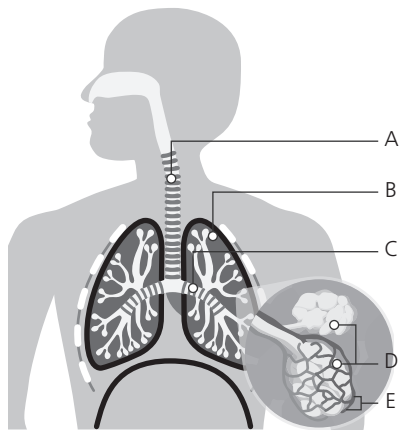

Figure 4

p30 4.2.2.2

13–1 Name the parts of the breathing system labelled A–E. Choose your answers from the options below. *[5]*

alveoli	bronchus	capillary network	lung	trachea

p61–2 4.2.2.6

13–2 Smoking tobacco is harmful.

Explain why smoking increases the risk of lung cancer. *[3]*

p62 4.2.2.6

13–3 Name **two** lung diseases other than cancer that smoking increases the risk of. *[2]*

p56 4.2.2.6

13–4 Smoking can affect the cardiovascular system. Give **two** ways that smoking can increase the risk of cardiovascular disease. *[2]*

Total: 12

14 **Figure 5** shows a cross-section through a human heart.

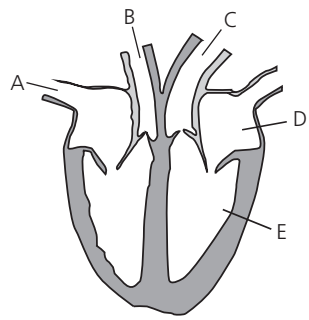

Figure 5

p51 4.2.2.2

14–1 Name the parts of the heart labelled A–E. Choose your answers from the options below. *[5]*

left atrium	left ventricle	right atrium	right ventricle
aorta	pulmonary artery	pulmonary vein	vena cava

p51 4.2.2.2

14–2 State the location and the function of the 'pacemaker' of the heart. *[2]*

p53 4.2.2.2

14–3 Give the functions of the left and right ventricles. *[2]*

p56&62 4.2.2.4

14–4 The coronary arteries can be affected by coronary heart disease (CHD).

Name **three** factors associated with an increased risk of CHD. *[3]*

p56 4.2.2.4

14–5 Explain what happens to the heart in CHD. *[3]*

Total: 15

p57 4.2.2.4

15 The heart contains valves to prevent the backflow of blood.

15–1 Give **one** heart valve fault that can develop in some people. *[1]*

15–2 Describe the effect a faulty valve would have on a person. *[2]*

15–3 How can faulty valves be treated? *[1]*

15–4 Heart failure can be treated using an artificial heart, or by organ transplant.

Give **one** other situation when an artificial heart might be used. *[1]*

WS1.3, 1.5

15–5 Describe **two** risks associated with heart or heart-and-lung transplants. *[2]*

Total: 7

p53–4 4.2.2.2

16 **Figure 6** shows the structure of three types of blood vessel: an artery, a capillary and a vein.

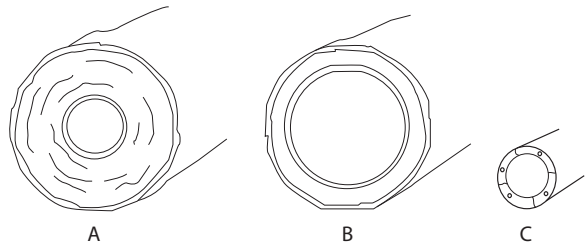

Figure 6

16–1 Identify the blood vessels labelled A–C. *[3]*

QWC **16–2** Describe the structures and functions of arteries, capillaries and veins. *[6]*

Total: 9

p54–6 4.2.2.3

17 Blood is a tissue.

17–1 Match each component of the blood, 1–4, to its function, A–D. *[4]*

Component of the blood
1 Red blood cells
2 White blood cells
3 Platelets
4 Plasma

Function
A Destroying pathogens
B Transporting substances around the body in solution
C Transporting oxygen around the body
D Helping blood to clot

17–2 The blood plasma transports carbon dioxide.

Name **two** other substances transported by the plasma. *[2]*

17–3 Red blood cells are adapted for their function.

Describe **one** adaptation of a red blood cell. *[2]*

Total: 8

18 Diseases can be communicable or non-communicable.

p59, 79 4.2.2.5

18–1 What is the difference between communicable and non-communicable diseases? *[1]*

p59 4.2.2.5

18–2 Communicable and non-communicable diseases are major causes of ill health.

Give **two** other factors that can affect both physical and mental health. *[2]*

p61 4.2.2.6

18–3 Risk factors are linked to an increased rate of a disease.

Explain the difference between **causation** and **correlation** with risk factors. *[2]*

p61–2 4.2.2.6

18–4 Obesity is a risk factor for type 2 diabetes.

People with type 2 diabetes produce enough insulin, but their cells are not sensitive to insulin.

Figure 7 shows the relationship between percentage abdominal fat and insulin sensitivity in a group of people.

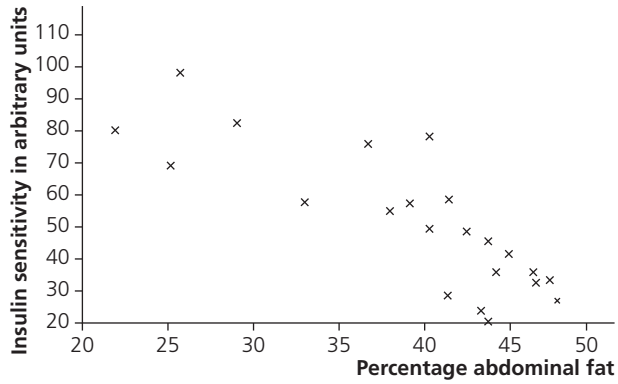

Figure 7

Name **two** other diseases that obesity is a risk factor for. *[2]*

p62&471 | 4.2.2.6 | MS2g, WS3.5

18–5 Identify the pattern shown in the graph in **Figure 7**. *[1]*

p62 | 4.2.2.6 | WS3.5, 3.6

18–6 A student uses the information from the graph in **Figure 7** to conclude that percentage abdominal fat can be used to find out if a person has type 2 diabetes. Give **two** reasons why this conclusion is not correct. *[2]*

Total: 10

p60–2 | 4.2.2.6

19 Carcinogens are chemicals or agents that can cause cancer by damaging DNA.

19–1 Give **two** examples of carcinogens. *[2]*

19–2 Cancer causes changes in cells that lead to tumours forming. Describe how tumours form. *[1]*

19–3 Tumours can be benign or malignant.

Give **one** difference between benign tumours and malignant tumours. *[1]*

19–4 Describe how tumours can spread to other parts of the body. *[1]*

19–5 Risk factors can increase the chance of a person getting cancer.

Risk factors can be caused by genetics or lifestyle factors.

List **three** lifestyle risk factors for cancers that scientists have identified. *[3]*

Total: 8

Plant tissue, organs and systems

Quick questions

p23& 69–71 | 4.1.2.3, 4.2.3.1

1 Where is meristem tissue found in plants and what is its function?

p72 | 4.2.3.2

2 Describe **two** functions of transpiration.

p68&71 | 4.2.3.2

3 Give the function of stomata and state where most stomata are found.

Exam-style questions

p68–9 4.2.3.1, 4.2.3.2

4 Leaves are the main sites of photosynthesis in plants.

4–1 **Figure 8** shows a cross-section through a leaf.

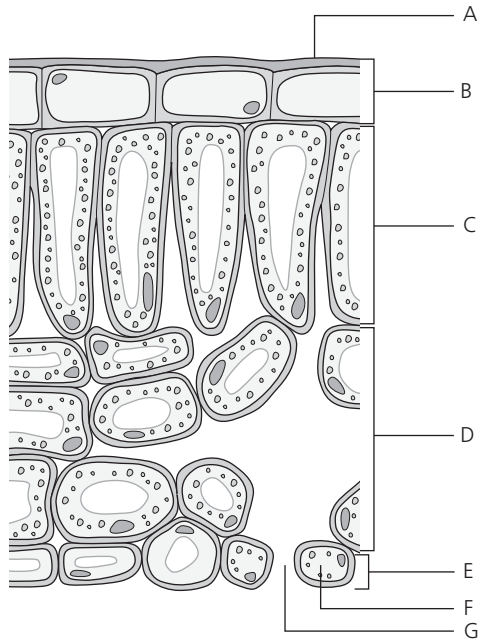

Figure 8

Name the parts of the leaf labelled A–G. Choose your answers from the options below. *[7]*

cuticle	guard cell	lower epidermis	stoma
spongy mesophyll tissue	palisade mesophyll tissue	upper epidermis	

QWC **4–2** Describe how the named plant tissues are adapted for their functions. *[6]*

Total: 13

p68–9&71 4.2.3.2

5 Stomata are found on the leaves of plants.

WS3.5 **5–1** **Figure 9** shows the appearance of open and closed stomata.

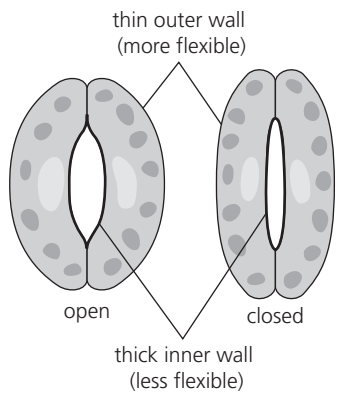

Figure 9

Stomata open when the light intensity is high.

When the light intensity is high, potassium ions (K^+) are transported into guard cells.

Suggest why a high concentration of K^+ inside guard cells causes stomata to open. *[4]*

AT7 MS5c

5–2 A student investigates the distribution of stomata on the upper and lower surfaces of a leaf.

The student uses a microscope to look at the lower epidermis, and counts the number of stomata in one field of view.

Figure 10 shows the field of view.

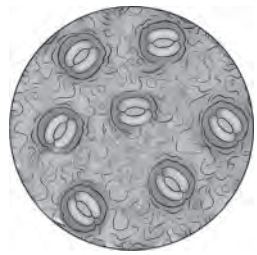

Figure 10

The diameter of the field of view is 0.4 mm.

Calculate the number of stomata in 1 mm^2 of the leaf.

Use $\pi = 3.14$

Give your answer to the nearest whole number. *[3]*

WS2.5, 2.7

5–3 The student counts the number of stomata in one field of view and uses this count to estimate the number of stomata in 1 mm^2 of the leaf.

Suggest how the student could improve their estimate. *[2]*

WS2.2

5–4 Suggest a method the student could use to estimate the area of a leaf. *[2]*

WS3.5

5–5 The student finds that there are more stomata on the lower surface than the upper surface.

Suggest why this is an advantage for a plant. *[2]*

Total: 13

Organisation topic review

1 The heart pumps blood around the body through the blood vessels.

p51 4.2.2.1

1–1 Copy and complete **Table 1** to show whether each structure is a tissue, organ or organ system.

Tick **one** box for each structure. *[3]*

Structure	Tissue	Organ	Organ system
Blood			
Blood, blood vessels and heart			
Heart			

Table 1

p55–6 | 4.2.2.3 | WS2.6, 3.5 | AT7

1–2 **Figure 11** shows some blood cells seen using a light microscope They are magnified ×2000.

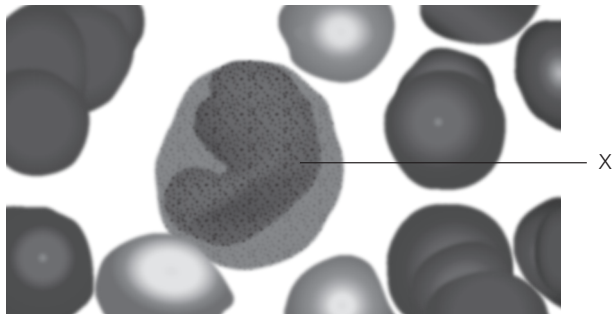

Figure 11

Draw a scientific drawing of cell **X** from **Figure 11**. Label **two** parts of the cell. *[3]*

p53–4 | 4.2.2.2

1–3 Arteries and veins are two types of blood vessel.

Compare the structure of an artery with the structure of a vein. *[3]*

4.2.2.2 | WS3.3, 4.2,4.4, 4.5 | MS1c,2h

1–4 **Table 2** shows the speed of blood flow through different blood vessels.

Blood vessel	Speed of blood flow in cm^3/s
Aorta	40
Capillary	0.03
Vena cava	15

Table 2

Calculate the volume of blood that flows through the aorta in 1 hour. Give your answer in dm^3. *[2]*

p51–3 | 4.2.2.2

1–5 What causes the high speed of blood flow in the aorta? *[1]*

4.2.2.2 | MS1c,2a | WS3.2, 3.3,4.6

1–6 Calculate the percentage decrease in the speed of blood flow from the aorta to the capillaries.

Give your answer to three significant figures. *[2]*

p51–3 | 4.2.2.2

1–7 Explain the benefit of the slow rate of blood flow in a capillary. *[2]*

Total: 16

2 Enzymes are produced by different organs in the digestive system.

p43–4, 46&49 | 4.2.2.1

2–1 Copy and complete the sentences. *[4]*

The digestive system has several organs that work together to digest and _____ food.

Digestive enzymes convert food into small _____ molecules that can enter the blood stream.

Enzymes catalyse specific reactions in living organisms due to the shape of their _____ _____.

Enzymes are _____ at high temperatures.

p44–5 4.2.2.1

2–2 Copy and complete **Table 3** to show where each enzyme is produced. Put a tick if the organ produces the enzyme. You can tick more than one enzyme for each organ. *[3]*

		Enzyme		
		Amylase	**Lipase**	**Protease**
Organ	**Salivary gland**			
	Stomach			
	Pancreas			

Table 3

p48 4.2.2.1 RP4

2–3 Amylase breaks down starch to sugars.

Describe how you would test a sample of food to show that it contains sugars. *[3]*

p47 4.2.2.1

2–4 Lipase is an enzyme that breaks down lipids (fats and oils).

Name the products of lipid digestion. *[1]*

p47 4.2.2.1

2–5 A person who has had their gall bladder removed may have a slower rate of lipid digestion. Explain why. *[3]*

4.2.2.6 WS3.2 MS4a

2–6 Lifestyle factors are linked to an increased rate of obesity.

The graph in **Figure 12** shows how the percentage of obese adults in the UK changed between 1994 and 2006.

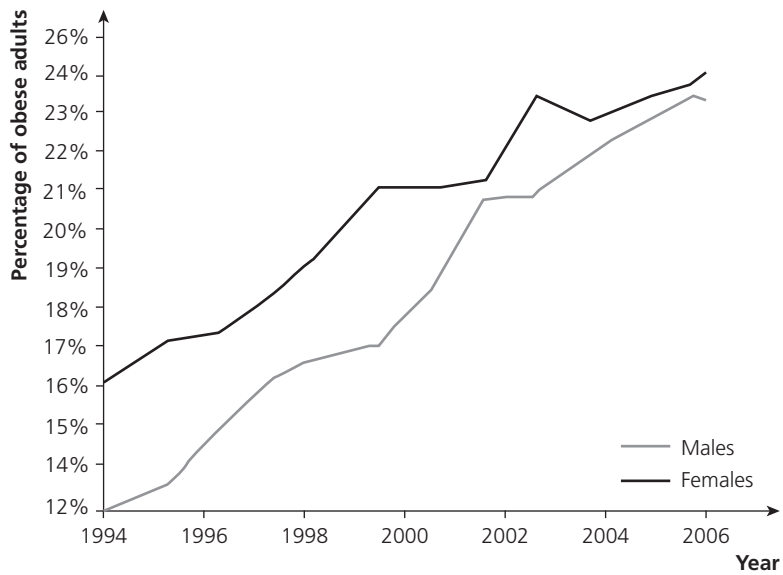

Figure 12

Describe the patterns shown in the graph in **Figure 12**. *[3]*

p58–9 4.2.2.6 WS3.5

2–7 Suggest **two** possible reasons for the change in the percentage of obese adults. *[2]*

Total: 19

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