

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	



General Certificate of Secondary Education  
Foundation Tier  
January 2010

# Applied Science (Double Award)

**APSC/2F**

**F**

**Unit 2 Science for the Needs of Society**

**Thursday 14 January 2010 9.00 am to 10.30 am**

**For this paper you must have:**

- a ruler.

You may use a calculator.

**Time allowed**

- 1 hour 30 minutes

**Instructions**

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 90.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

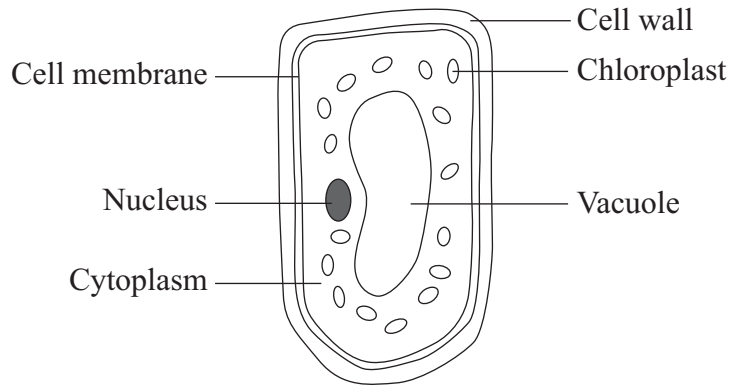


J A N 1 0 A P S C 2 F 0 1

Answer **all** questions in the spaces provided.

1 Living organisms are made up of cells that can all do different jobs.

1 (a) This is a diagram of a leaf cell from a plant.



Some of the cell components in a plant cell are:

- A Nucleus
- B Cell membrane
- C Cell wall
- D Vacuole
- E Chloroplast
- F Cytoplasm

Use the letters **A, B, C, D, E** or **F** to answer the questions.

Write your answer in the box.

1 (a) (i) Give **one** cell component that is found in **both** plant **and** animal cells.  (1 mark)

1 (a) (ii) Give **one** cell component that is found **only** in plant cells.  (1 mark)



1 (b) Plants make food by photosynthesis.

1 (b) (i) Name the part of the cell where photosynthesis occurs.

.....  
(1 mark)

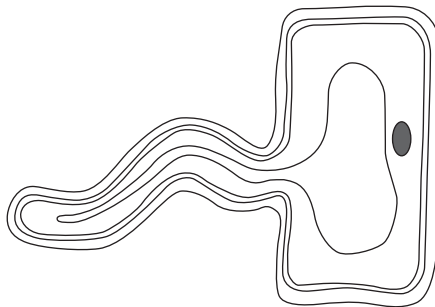
1 (b) (ii) Choose the correct words from the box to complete the word equation for photosynthesis.

<b>air</b>	<b>glucose</b>	<b>oxygen</b>	<b>water</b>
------------	----------------	---------------	--------------

Carbon dioxide + ..... → ..... + .....  
(2 marks)

1 (c) Specialised plant cells do special (particular) jobs.

This diagram shows a root hair cell.



Give **two** differences between a leaf cell and a root hair cell.

1 .....

.....

2 .....

.....

(2 marks)

**Question 1 continues on the next page**

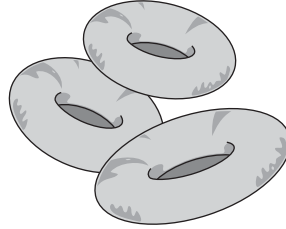
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1 (d) Diagrams 1 and 2 show specialised human cells.

Look at the diagrams and answer the questions below.

**Diagram 1**



1 (d) (i) Draw a ring around the name of the cells in **Diagram 1**.

**White blood cells**

**Red blood cells**

**Platelets**

*(1 mark)*

1 (d) (ii) What is the special feature of the cells in **Diagram 1**?

Draw a ring around the correct answer.

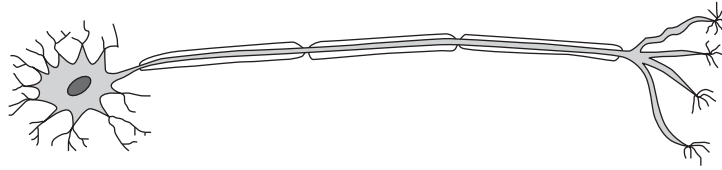
**No nucleus**

**No cell membrane**

**Extended shape**

*(1 mark)*



**Diagram 2**

1 (d) (iii) Draw a ring around the name of the cell in **Diagram 2**.

**Skin cell**

**Hair cell**

**Nerve cell**

(1 mark)

1 (d) (iv) What is the special feature of the cell in **Diagram 2**?

Draw a ring around the correct answer.

**No nucleus**

**No cell membrane**

**Extended shape**

(1 mark)

11
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**Turn over for the next question**

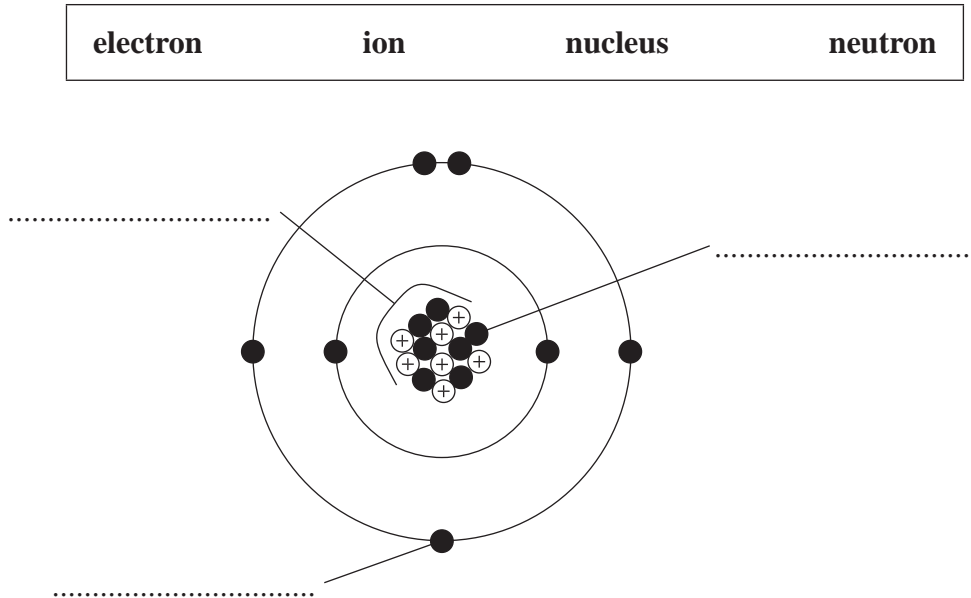
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2 Chemists have discovered that the building blocks of materials are atoms and molecules.

2 (a) The diagram shows an atom of nitrogen.

2 (a) (i) Use words from the box to label the diagram of the atom.



(3 marks)

2 (a) (ii) Draw a ring around the correct atomic number of nitrogen.

5                      7                      14                      21

(1 mark)

2 (b) The table shows the names and formulae of some molecules.

Name	Formula
Nitrogen	$N_2$
Carbon dioxide	
	$H_2O$
Hydrogen	$H_2$
Ethanol	$C_2H_5OH$
Methane	

2 (b) (i) Complete the table by writing in **one** missing name and **two** missing formulae.

(3 marks)



2 (b) (ii) Nitrogen molecules are formed from nitrogen atoms.

How many nitrogen atoms combine together to form one nitrogen molecule?

.....  
(1 mark)

2 (b) (iii) Nitrogen is an element.

Name **one** other element in the table.

.....  
(1 mark)

2 (b) (iv) Give **one** use for methane.

.....  
.....  
(1 mark)

<b>10</b>

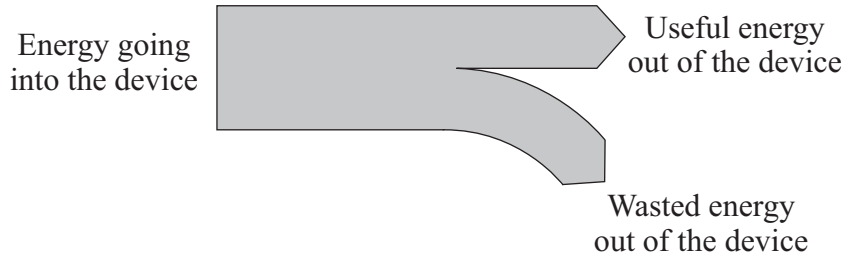
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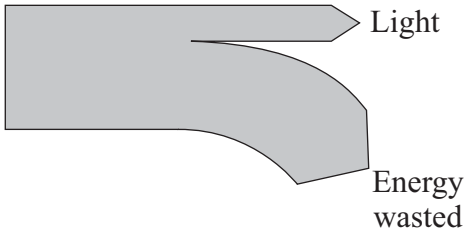
3 A Sankey diagram shows the energy transfer that occurs in a device.

**Sankey diagram**

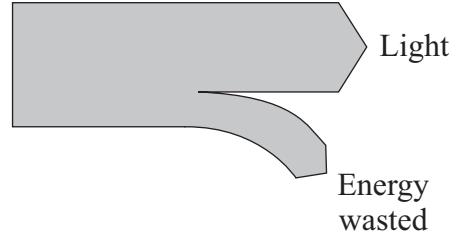


3 (a) The Sankey diagrams for a normal light bulb and a low energy light bulb are shown below.

**Normal light bulb**



**Low energy light bulb**



Why is a low energy light bulb described as more efficient than a normal light bulb?

.....

.....

.....

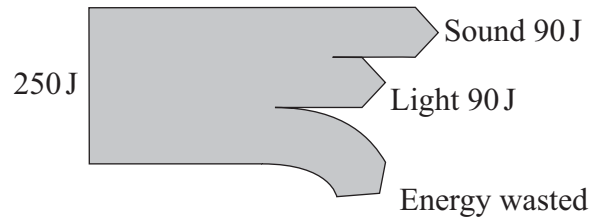
.....

(2 marks)





- 3 (b) The Sankey diagram for a TV looks like this.



- 3 (b) (i) What type of energy goes into the TV to make it work?

.....  
(1 mark)

- 3 (b) (ii) Calculate how much energy is wasted.

.....  
The amount of energy wasted is ..... J  
(1 mark)

**Question 3 continues on the next page**

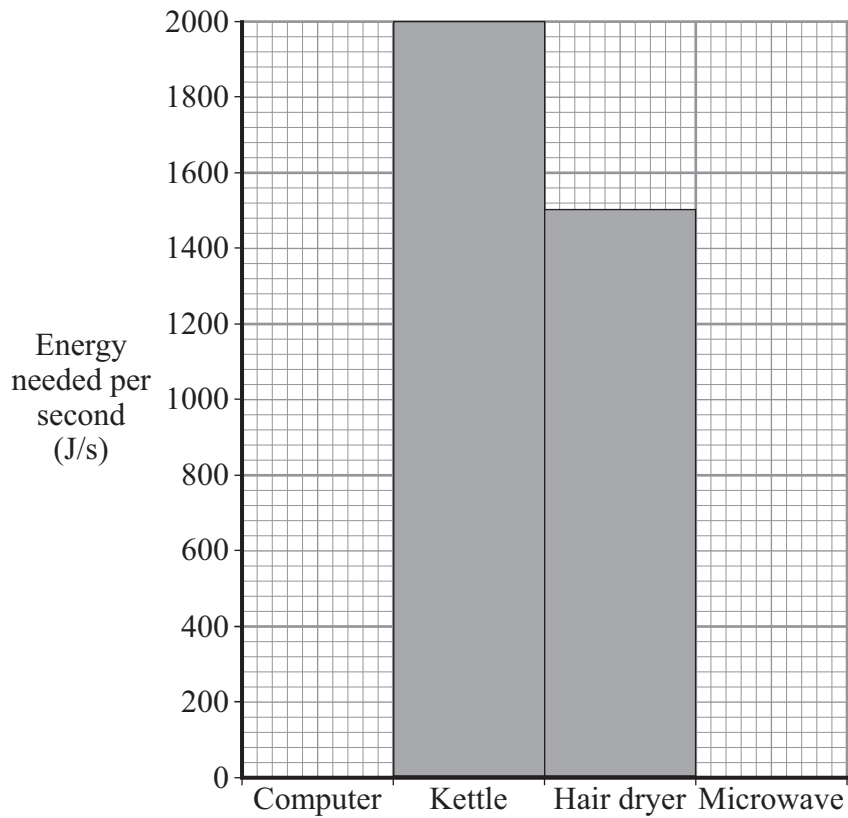
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- 3 (c) The table shows the amount of energy that some devices need to work.

Device	Energy needed per second (J/s)
Computer	360
Kettle	2000
Hair dryer	1500
Microwave	1200

Complete the bar chart by plotting the energy needed by the computer and by the microwave.



(2 marks)



3 (d) Lots of different energy sources are used to power all the devices we use in our everyday lives.

3 (d) (i) Draw **one** line from each device to the appropriate energy source.

Device	Energy source
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Camping stove</div>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Mains electricity</div>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Mobile telephone</div>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Gas</div>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Microwave</div>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Battery</div>
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Oil</div>

(3 marks)

3 (d) (ii) Why is it more convenient for mp3 players to run off batteries?

.....

.....

(1 mark)

3 (d) (iii) Why are batteries **not** used to power kettles?

.....

.....

(1 mark)

**Turn over for the next question**

**Turn over ▶**



4 (a) Alcohol and tobacco are two legal drugs used for recreational purposes.

4 (a) (i) Name **one** organ in the human body that is damaged by long-term alcohol use.

.....  
(1 mark)

4 (a) (ii) Draw a ring around the word that best describes alcohol.

**stimulant**

**depressant**

**painkiller**

**hallucinogen**

(1 mark)

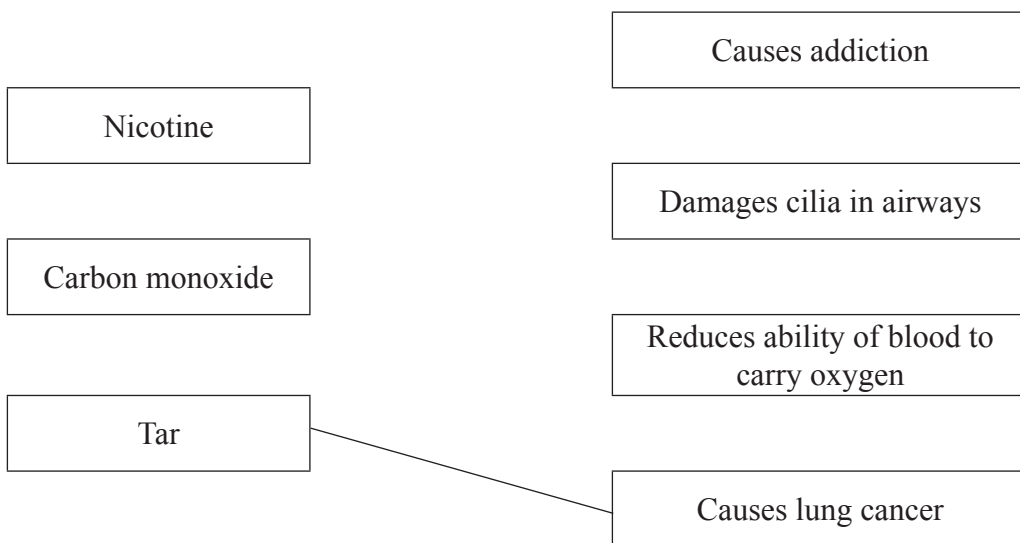
4 (a) (iii) Smoke from tobacco contains harmful chemicals.

Draw **one** line from each chemical to its effect.

One has been done for you.

**Chemical**

**Effect**



(2 marks)



- 4 (b) A UK medical journal published an article comparing the effects of some legal and illegal drugs.

This table shows data on some of the drugs.

Drug	Number of UK users	Number of related UK deaths per year
Heroin	300 000	700
Cocaine	780 000	214
Alcohol	40 000 000	4 000
Amphetamines	430 000	35
Tobacco	10 000 000	114 000

Some scientists say that alcohol and tobacco cause more harm than some illegal drugs. Use data from the table to suggest why they say this.

.....  
 .....  
 (1 mark)

- 4 (c) Some examples of medical drugs are:

- A** Aspirin  
**B** Penicillin  
**C** Paracetamol

Use the letters, **A**, **B** or **C**, to answer the questions.  
 Write your answer in the box.

- 4 (c) (i) Which drug is an antibiotic?

(1 mark)

- 4 (c) (ii) Which drug can be used as both a painkiller and an anti-inflammatory?

(1 mark)

- 4 (c) (iii) A cold is caused by a virus.

Why will doctors not normally prescribe antibiotics to treat a cold?

.....  
 .....  
 (1 mark)

Turn over ►



4 (d) Some patients want to be allowed to take cannabis as a medical drug. Read the opinion of a patient.



I have a disease called rheumatoid arthritis, which is very painful. My doctor cannot prescribe cannabis because it is illegal.

Suggest **one** advantage and **one** disadvantage for the patient of taking cannabis.

Advantage .....

Disadvantage .....

(2 marks)

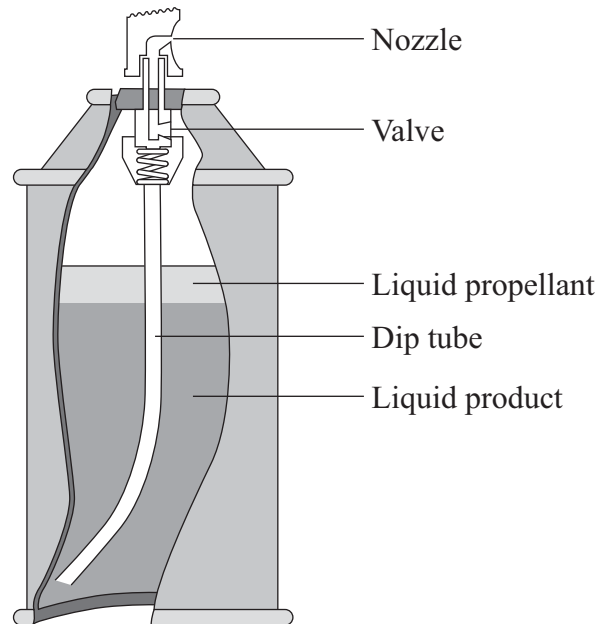
10
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5 Scientists are worried about the effects of some man-made chemicals on the environment.

Aerosols have many different uses in the home.

The diagram shows the design of an aerosol can.



Use words from the box to complete the sentences about how the aerosol can works.

gas	high	liquid	low	solid
-----	------	--------	-----	-------

5 (a) (i) The propellant has a ..... boiling point. (1 mark)

5 (a) (ii) When the valve is opened the propellant turns from a .....  
into a ..... and this pushes the product out of the can. (2 marks)

**Question 5 continues on the next page**

**Turn over ►**



- 5 (b) (i) Four types of mixture that are used at home are described in the table.

Which **one** is the description of an aerosol?

Tick (✓) **one** box.

Description of type of mixture	(✓)
A liquid mixture with small lumps of solid that are not dissolved in the liquid	
Bubbles of liquid filled with gas	
Very small liquid particles mixed with a gas	
A liquid trapped inside a solid structure	

(1 mark)

- 5 (b) (ii) Name **one** product that is sold as an aerosol.

.....

(1 mark)

- 5 (b) (iii) Name **one** other type of mixture used in the home.

.....

(1 mark)

- 5 (c) CFCs and other propellants released from aerosol cans are powerful greenhouse gases that may increase global warming.

Power stations also release a greenhouse gas.

- 5 (c) (i) Name the gas.

.....

(1 mark)

- 5 (c) (ii) How is this gas produced in the power station?

.....

.....

.....

.....

(2 marks)





5 (c) (iii) Suggest **two** ways of reducing this gas in the atmosphere in the future.

1 .....

.....

2 .....

.....

(2 marks)

<b>11</b>

**Turn over for the next question**

**Turn over ►**



6 People who make kettles need to understand how heat moves from one place to another.

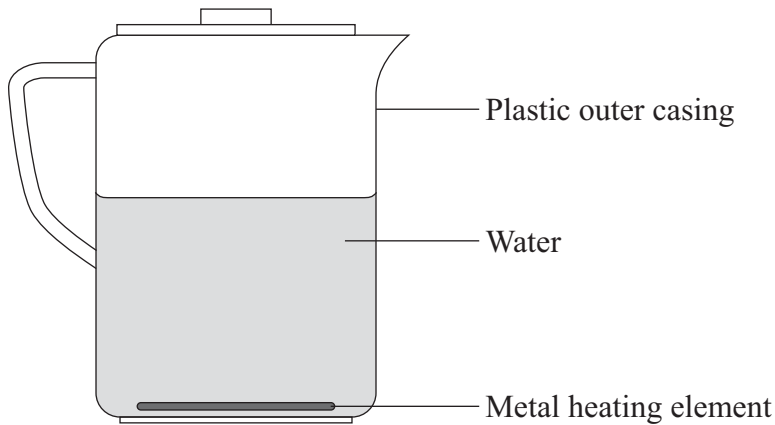
6 (a) Use words from the box to complete the sentences.

<b>conduction</b>	<b>convection</b>	<b>radiation</b>
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6 (a) (i) Heat travels through the metal heating element by ..... (1 mark)

6 (a) (ii) Heat travels through the water by ..... (1 mark)

6 (b) The diagram shows a cross-section of a kettle.



6 (b) (i) Complete the sentence to explain what happens when water is heated in the kettle.

The water expands and becomes ..... dense, so it ..... (2 marks)

6 (b) (ii) Why is the heating element made out of metal?

.....  
..... (1 mark)

6 (b) (iii) Why is the outer casing made out of plastic?

.....  
..... (1 mark)



6 (c) These sentences are about conduction.

Draw a ring around the correct word or phrase to complete each sentence.

6 (c) (i) Conduction occurs best through

- gases
- liquids
- solids

(1 mark)

6 (c) (ii) This is because the particles are

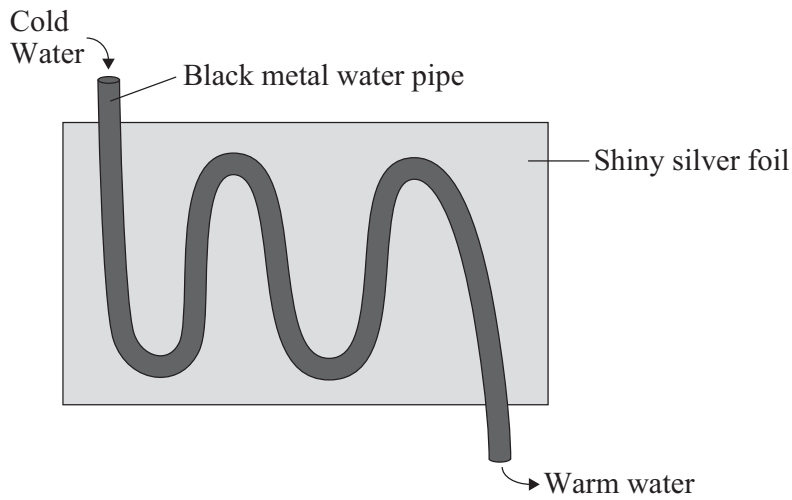
- close together
- far apart
- moving fast

and can pass on their

energy easily.

(1 mark)

6 (d) Another way of heating water is to use heat energy from the Sun. The diagram shows a solar water heater.



6 (d) (i) Why is the metal water pipe painted black?

.....

.....

(1 mark)

6 (d) (ii) What is the purpose of the shiny silver foil behind the pipe?

.....

(1 mark)

Turn over ▶



7 (a) The food we eat affects our health.

Certain foods are considered to be healthy and an excess of others is considered to be unhealthy.

7 (a) (i) Draw a ring around **one** unhealthy snack.

**apple                  crisps                  chocolate                  carrots                  sweets**  
(1 mark)

7 (a) (ii) Name **one** ingredient in the snack that you have chosen which makes it unhealthy.

.....  
(1 mark)

7 (b) To stay healthy, our body needs to control our blood glucose levels.

Draw a ring around the correct word or phrase to complete each sentence.

7 (b) (i) After a meal, the level of glucose in the blood

decreases
increases
stays the same

(1 mark)

7 (b) (ii) This makes the

liver
pancreas
stomach

produce insulin.

(1 mark)

7 (b) (iii) The insulin causes the glucose to be converted to

in the

liver
pancreas
stomach

glucagon
glycogen
sugar

(2 marks)



7 (c) Insulin belongs to a group of chemical substances known as hormones.

Hormones control many processes in our bodies.

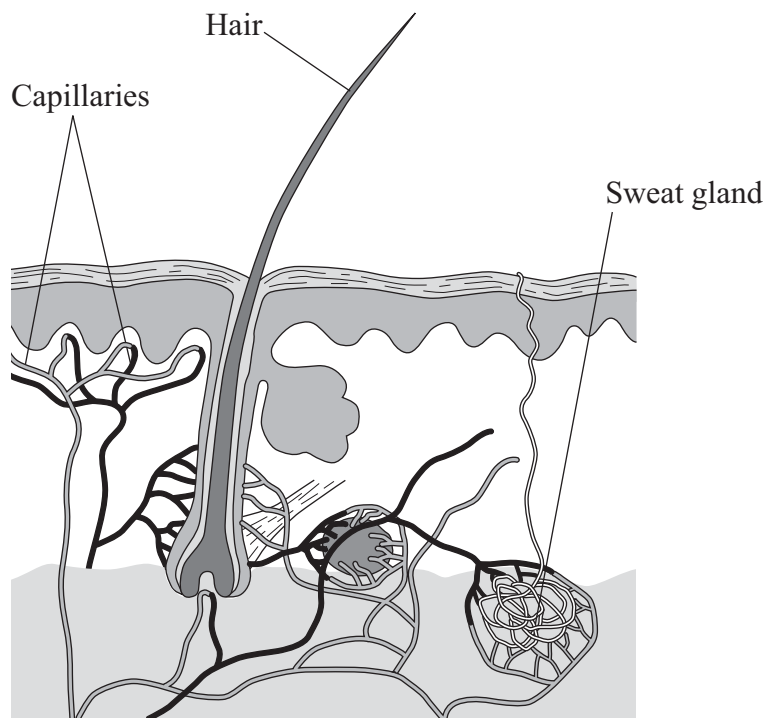
How are hormones transported to their target organs?

.....  
.....

(1 mark)

7 (d) Our body also controls our internal temperature.

Use the diagram to describe and explain **one** way in which our skin temperature can be lowered if we are feeling too warm.



.....  
.....  
.....  
.....

(2 marks)

9

Turn over ►



- 8 A wide range of materials is used in the building industry.

The physical properties of a material make it suitable for its use.

- 8 (a) Some uses for materials in the building industry are given in **Table 1**. Complete the table by writing the most common type of material next to the example given.

**Table 1**

Example of material and its use	Type of material
Polyethene gutters	Polymer
Steel-reinforced concrete for foundations	
Copper hot water cylinder	Metal
Bathroom tiles	
Wooden window frames	Natural

(2 marks)

- 8 (b) Some physical properties of two of the materials in **Table 1** are given in **Table 2**.

**Table 2**

Material	Melting temperature in °C	Density in g per cm <sup>3</sup>	Electrical conductivity	Heat conductivity
<b>A</b>	1083	8.92	Very good	Very good
<b>B</b>	110 to 140	0.95	Poor	Poor

For each material in **Table 2** name the type of material and give the property that makes it suitable for the use given in **Table 1**.

- 8 (b) (i) Material **A**

Type of material .....

Property .....

(2 marks)

- 8 (b) (ii) Material **B**

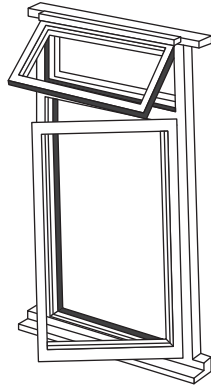
Type of material .....

Property .....

(2 marks)



8 (c) Wood is a traditional material used to make window frames, but other materials are often used instead of wood in modern houses.



8 (c) (i) Name a modern material used to make window frames.

.....  
(1 mark)

8 (c) (ii) Give **one** advantage of making a window frame from the modern material.

.....  
.....  
(1 mark)

8 (c) (iii) Give **one** advantage of making a window frame from wood.

.....  
.....  
(1 mark)

9

**Turn over for the next question**

**Turn over ▶**



9 Since 1956 Britain has been building nuclear power stations as an alternative to fossil fuel power stations.

9 (a) Name **one** fossil fuel.....  
(1 mark)

9 (b) Nuclear power stations transform nuclear radiation energy to heat energy.

9 (b) (i) Why is nuclear radiation dangerous to humans?  
.....  
.....  
(1 mark)

9 (b) (ii) What is the best material to stop gamma radiation?  
.....  
(1 mark)

9 (b) (iii) Give **two** uses of gamma radiation.  
1 .....  
2 .....  
(2 marks)

9 (c) There are other alternatives to fossil fuel power stations as energy resources.

9 (c) (i) Which type of energy resource uses the motion of the sea?  
.....  
(1 mark)

9 (c) (ii) Complete the table by writing a disadvantage of each of the energy resources.

Energy resource	Disadvantage
Solar	
Wind	
Hydroelectric	

(3 marks)

9
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**END OF QUESTIONS**

