

Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

Forename(s)

Candidate signature

GCSE SCIENCE A 1

F

Foundation Tier Unit 5

Tuesday 16 May 2017

Afternoon

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a ruler
- a calculator
- the Chemistry Data Sheet and Physics Equations Sheet booklet (enclosed).

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. Do not write outside the box around each page or on blank pages.
- 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.
- Question 12(b) should be answered in continuous prose. In this question you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
TOTAL	



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



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

Biology Questions

1 It is important that the amount of water in the body is controlled.

1 (a) Excess water is lost in urine.

Which organ produces urine?

[1 mark]

Tick (✓) **one** box.

Lung

Kidney

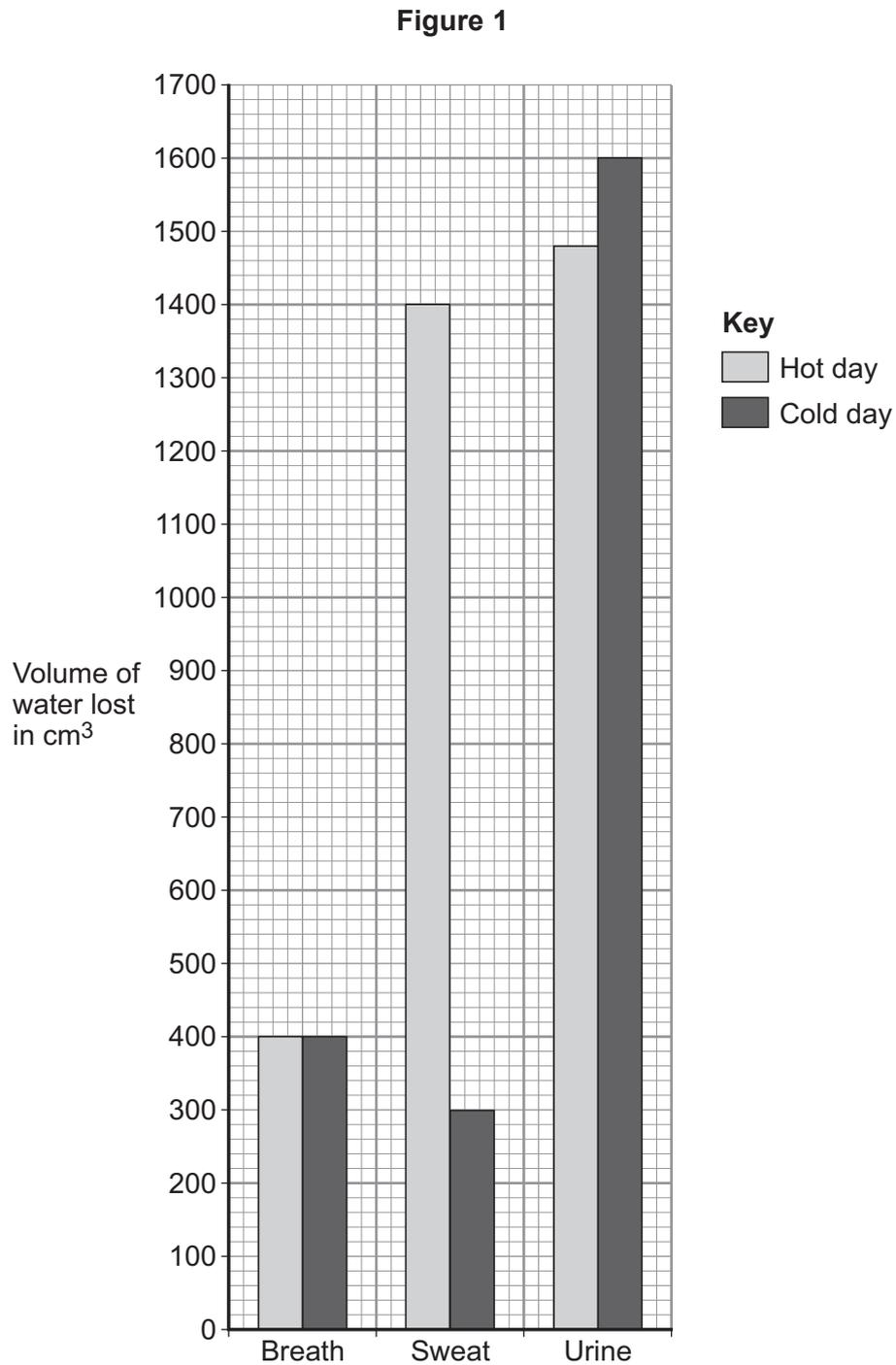
Skin

Question 1 continues on the next page

Turn over ►



- 1 (b) **Figure 1** shows the volume of water lost from a boy's body on a hot day and on a cold day.



- 1 (b) (i) Calculate the total volume of water lost on a cold day.

[1 mark]

Total volume lost = _____ cm³



- 1 (b) (ii) Compare the volume of water lost on a hot day with that lost on a cold day in breath, in sweat and in urine.

[3 marks]

Breath _____

Sweat _____

Urine _____

- 1 (b) (iii) Give **one** reason for the difference in the volume of water lost in sweat on a hot day compared to that lost on a cold day.

[1 mark]

6

Turn over for the next question

Turn over ►



2 Receptors are cells in the nervous system that detect changes in the environment.

2 (a) (i) What is a change in the environment called?

[1 mark]

Draw a ring around the correct answer.

a reaction

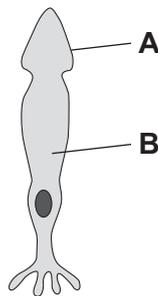
a reflex

a response

a stimulus

2 (a) (ii) Figure 2 shows a light receptor cell.

Figure 2



Name parts **A** and **B**.

Use the correct answers from the box.

[2 marks]

cell membrane

cell wall

cytoplasm

nucleus

A _____

B _____



2 (a) (iii) There are other structures in the nervous system.

Draw **one** line from each structure to its description.

[3 marks]

Structure	Description
Brain	An electrical impulse
Effector	A muscle or a gland
Synapse	A coordinator
	A gap between two neurones

Question 2 continues on the next page

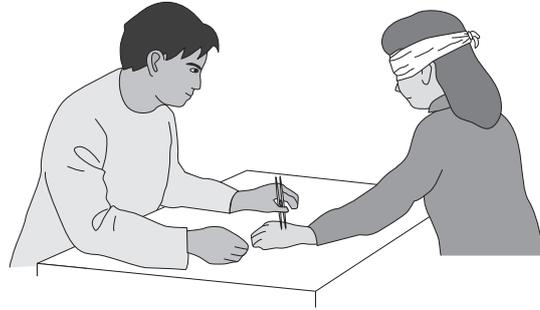
Turn over ►



2 (b) A group of 30 students investigated the sensitivity of different parts of the body to touch.

The students worked in pairs, as shown in **Figure 3**.

Figure 3



One student was blind-folded.

The second student:

- had two small pointed sticks with the points exactly 0.5 cm apart
- gently touched both points, at the same time, onto different parts of the blind-folded student's body.

The blind-folded student said if she felt one or two points.

The students then swapped over and repeated the investigation.

The results for all 30 students are shown in **Table 1**.

Table 1

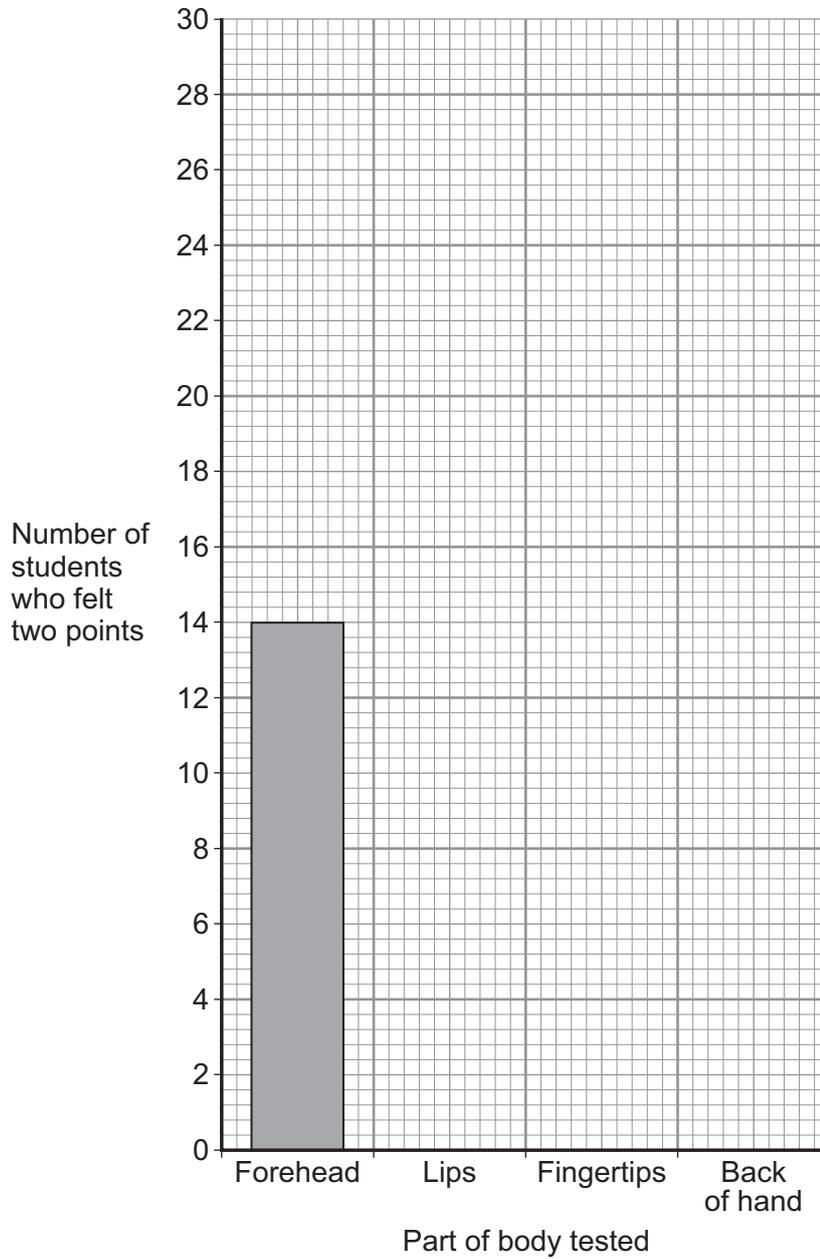
Part of body tested	Number of students who felt two points
Forehead	14
Lips	26
Fingertips	29
Back of hand	12



2 (b) (i) Plot the results on the bar chart.

The result for the forehead is already plotted.

[2 marks]



2 (b) (ii) Which part of the body shown in **Table 1** is the most sensitive to touch?

Suggest **one** reason why this part of the body needs to be the most sensitive.

[2 marks]

Part of body _____

Reason _____

10

Turn over ►



3 Plant growth is controlled by hormones.

3 (a) (i) The shoots of plants grow towards the light.

What is this plant response called?

[1 mark]

Draw a ring around the correct answer.

gravitropism

horticulture

photosynthesis

phototropism

3 (a) (ii) The roots of plants grow downwards.

What is this plant response called?

[1 mark]

Draw a ring around the correct answer.

gravitropism

horticulture

photosynthesis

phototropism

3 (b) Plant hormones are used in some weed killers.

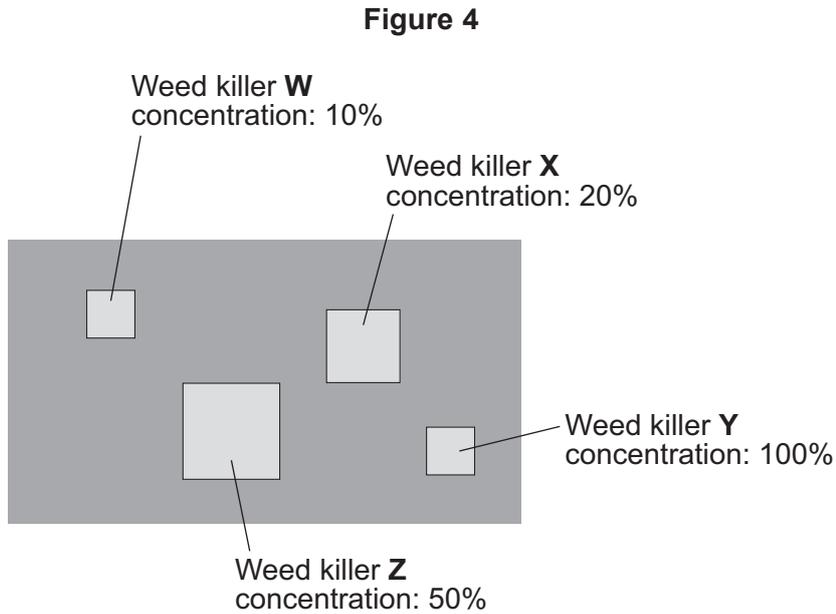
A student wanted to find the best weed killer to kill dandelion weeds.

The student:

- marked out squares on a lawn where dandelions were growing
- used four **different** weed killers, **W**, **X**, **Y** and **Z**
- used each weed killer at a **different** concentration
- poured some of the weed killer solution onto the marked square being tested
- counted the number of dandelion plants still alive after 2 weeks.



Figure 4 shows how she set up the investigation.



This investigation would **not** give valid results.

How could the student improve the investigation to find the best weed killer to kill the dandelion weeds?

Suggest **three** improvements.

[3 marks]

Improvement 1 _____

Improvement 2 _____

Improvement 3 _____

5

Turn over ►



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



Chemistry Questions

4 This question is about limestone.

4 (a) **Figure 5** shows a limestone quarry.

Figure 5



Limestone is quarried using explosives.

Suggest **two** disadvantages of quarrying.

[2 marks]

1 _____

2 _____

4 (b) Limestone is mainly calcium carbonate. The formula of calcium carbonate is CaCO_3

How many different elements are in calcium carbonate?

[1 mark]



5 This question is about copper.

5 (a) A building is covered in 3000 kg of copper metal.

1950 kg of the copper used is recycled copper.

5 (a) (i) How could the percentage of recycled copper used in the building be calculated?

[1 mark]

Tick (✓) **one** box.

$$\frac{1050}{3000} \times 100 \quad \square$$

$$\frac{1950}{3000} \times 100 \quad \square$$

$$\frac{3000}{1950} \times 100 \quad \square$$

5 (a) (ii) Copper is a useful building material.

Give **two** reasons why.

[2 marks]

Tick (✓) **two** boxes.

Copper can be hammered into shape.

Copper does not conduct electricity.

Copper does not react with water.

Copper is an alkali metal.

Copper is brittle.



5 (b) Give **one** advantage of using recycled copper rather than extracting copper from its ore.

[1 mark]

Tick (✓) **one** box.

Recycled copper is more reactive.

Recycling uses less energy.

Recycling uses up more copper ore.

4

Turn over for the next question

Turn over ►



6 This question is about titanium.

6 (a) Give **one** reason why titanium is used in the manufacture of aeroplanes.

[1 mark]

Tick (✓) **one** box.

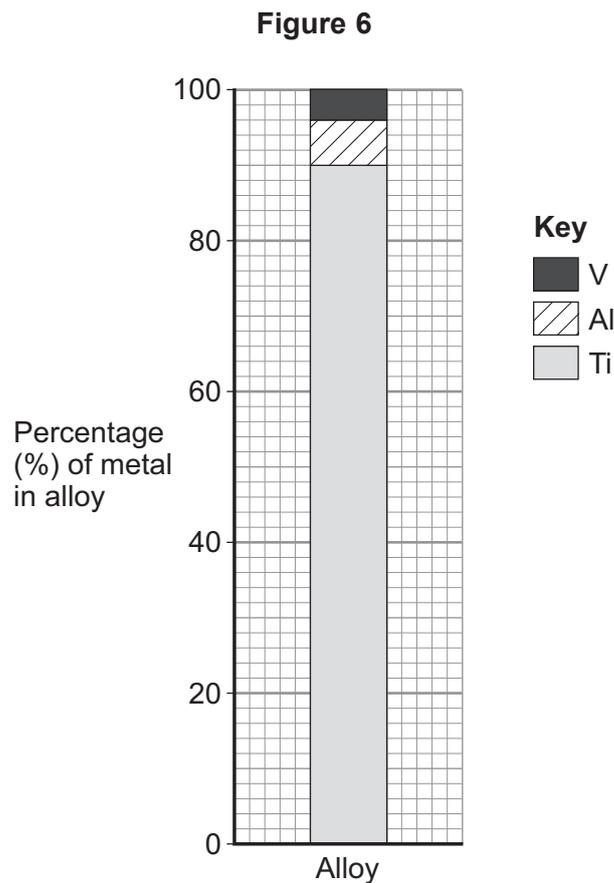
Titanium is corrosion resistant.

Titanium does not conduct heat.

Titanium is cheap to extract.

6 (b) Some alloys are used in the manufacture of aeroplanes.

Figure 6 shows the composition of one alloy.



Complete **Table 2**.

Use the Chemistry Data Sheet to help you answer this question.

[2 marks]

Table 2

Symbol	Name of element	Percentage (%) of metal in alloy
V	Vanadium	4
Al		
Ti		

6 (c) Why are alloys used rather than pure metals?

[1 mark]

4

Turn over for the next question

Turn over ►



7 Magnesium is used in the production of titanium.

7 (a) Magnesium is extracted from magnesium ore.

Magnesium ore is mainly magnesium carbonate.

7 (a) (i) In the first stage of the extraction process, magnesium carbonate is heated to produce magnesium oxide.

What type of reaction is this?

[1 mark]

Draw a ring around the correct answer.

combustion

decomposition

electrolysis

7 (a) (ii) The word equation for the reaction is:



Calculate the mass of carbon dioxide produced when 42 kg of magnesium carbonate is heated.

[1 mark]

Mass of carbon dioxide = _____ kg

7 (a) (iii) Describe how you would test for carbon dioxide.

[2 marks]

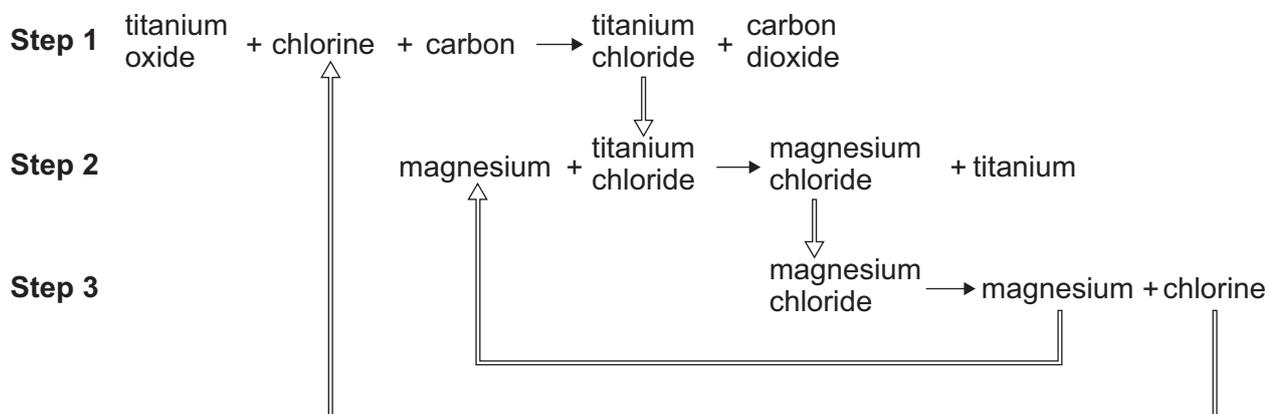
Solution used _____

Result _____



7 (b) **Figure 7** shows the steps in the industrial process to extract titanium from titanium oxide.

Figure 7



7 (b) (i) Which substance is a waste product of the process?

[1 mark]

Tick (✓) **one** box.

- carbon
- carbon dioxide
- titanium oxide

7 (b) (ii) Titanium is produced in **Step 2**.

Suggest **two** reasons why magnesium chloride is then converted into magnesium and chlorine in **Step 3**.

[2 marks]

7

Turn over ►



8 Potassium and argon are elements.

8 (a) Complete **Table 3** to show the number of protons, neutrons and electrons in an atom of potassium and in an atom of argon.

[2 marks]

Table 3

	Potassium	Argon
Mass number	39	40
Number of protons	19	18
Number of neutrons	20	
Number of electrons		18

8 (b) Use the correct answer from the box to complete the sentence.

[1 mark]

ions	molecules	neutrons	protons
------	-----------	----------	---------

Potassium and argon are different elements because their atoms have
different numbers of _____ .

3



Physics Questions

9 **Figure 8** shows the arrangement of particles in a solid, a liquid and a gas.

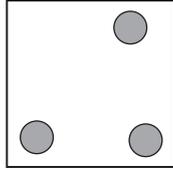
9 (a) Draw **one** line from each arrangement of particles to the correct state of matter.

[2 marks]

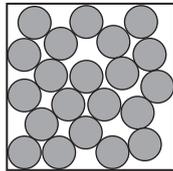
Figure 8

Arrangement of particles

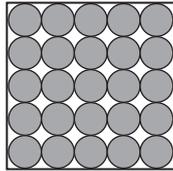
State of matter



Solid



Liquid



Gas

9 (b) Use the correct answers from the box to complete each sentence.

Each word can be used once, more than once or not at all.

[4 marks]

solid

liquid

gas

The particles vibrate around fixed positions in a _____.

The state of matter in which the particles have the most energy is a _____.

Evaporation is when a _____ becomes a _____.

6

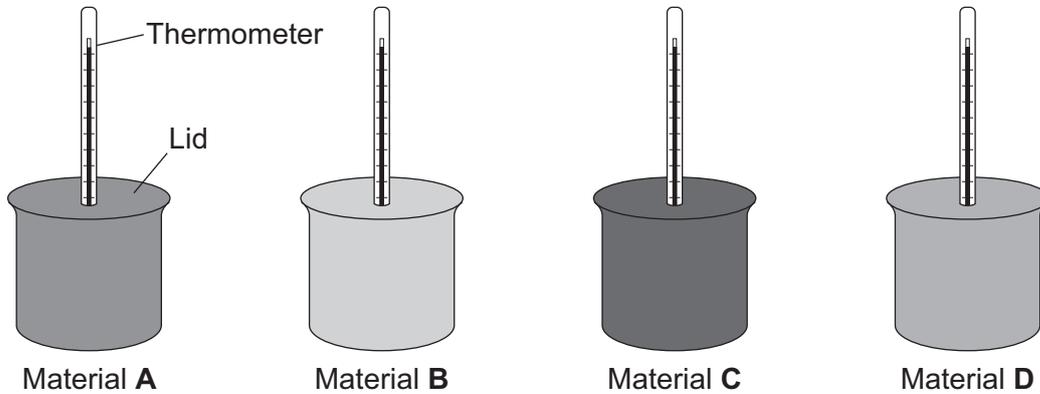
Turn over ►



10 A student investigated four insulating materials, **A**, **B**, **C** and **D**.

Figure 9 shows four identical beakers, each wrapped in one of the materials.

Figure 9



The student:

- poured the same volume of water at 90 °C into each beaker
- placed a lid on each beaker
- measured the temperature of the water in each beaker after 10 minutes
- calculated the temperature change.

10 (a) What was the dependent variable in the investigation?

[1 mark]

Tick (✓) **one** box.

change in temperature of the water

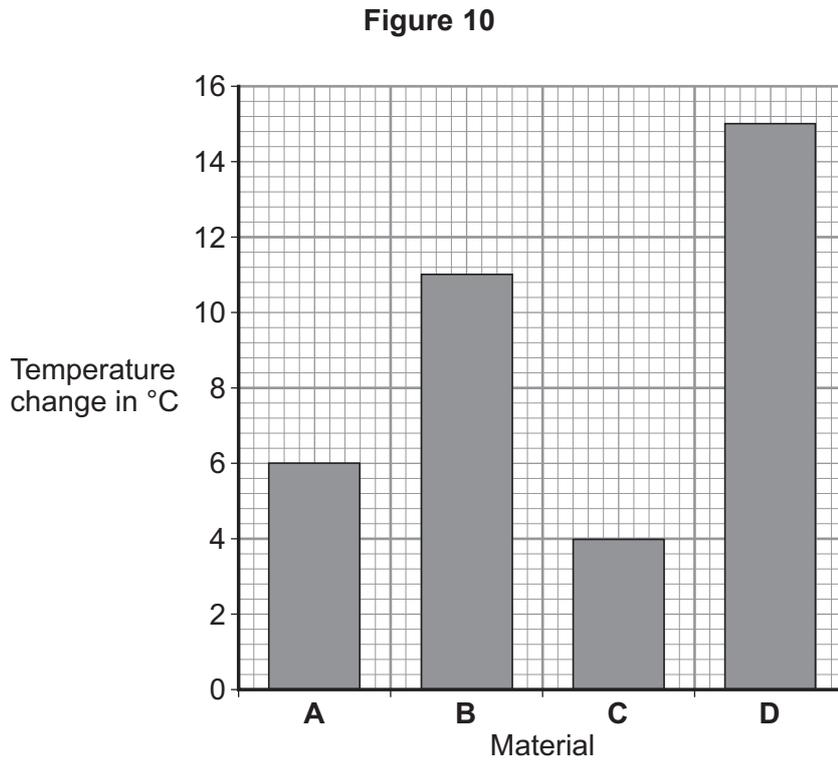
starting temperature of the water

thickness of material

volume of water



10 (b) Figure 10 shows the student's results.



10 (b) (i) Use the correct answer from the box to complete the sentence.

[1 mark]

categoric	continuous	control
-----------	------------	---------

The student drew a bar chart because the type of material is a _____ variable.

10 (b) (ii) Which material, A, B, C or D, is the best insulator?

Tick (✓) **one** box.

A	<input type="checkbox"/>	B	<input type="checkbox"/>	C	<input type="checkbox"/>	D	<input type="checkbox"/>
---	--------------------------	---	--------------------------	---	--------------------------	---	--------------------------

Give a reason for your answer.

[2 marks]

4

Turn over ►



11 (a) Table 4 gives some information about two oil-filled heaters, **Heater A** and **Heater B**.

Table 4

	Heater A	Heater B
Power rating in kW	2.5	1.5
Automatic timer	Yes	No
Number of temperature settings	1	3
Design feature	Has a carry handle	Protection against overheating

11 (a) (i) Give **one** advantage and **one** disadvantage of **Heater A** compared to **Heater B**.
[2 marks]

Advantage of **Heater A** _____

Disadvantage of **Heater A** _____

11 (a) (ii) **Heater A** is used for 6 hours.

Calculate how much energy, in kWh, is transferred by **Heater A**.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

Energy transferred = _____ kWh



11 (b) **Heater A** heats the air in a room by the process of convection.

11 (b) (i) Complete the sentences to describe how the air in the room is heated.

[4 marks]

Air particles near to the heater gain _____ and move apart.

This makes the air near to the heater _____ dense.

The warmer air _____ and cooler air falls to replace it.

This movement of air is called a convection _____ .

11 (b) (ii) The mass of the air in the room is 50 kg.

Heater A raises the temperature of the air by 6 °C.

The specific heat capacity of air is 1000 J/kg °C.

Calculate the energy that the heater transfers to the room.

Use the correct equation from the Physics Equations Sheet.

Tick (✓) the correct unit.

[3 marks]

Energy transferred = _____

Unit	Tick (✓)
joules	
seconds	
watts	



Biology Questions

12 In 2015 scientists announced that they might have discovered a new type of antibiotic produced by soil bacteria.

This would be the first new antibiotic to be discovered in over 25 years.

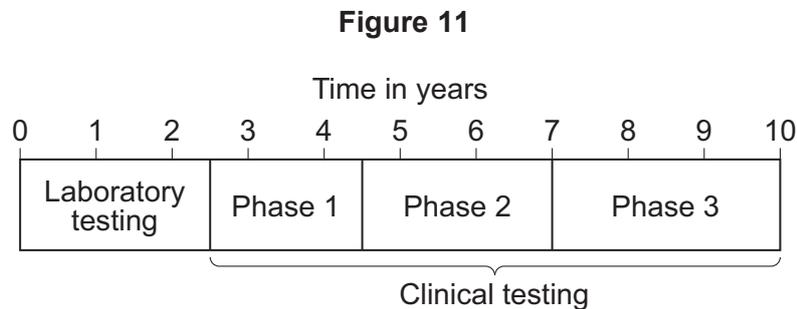
12 (a) Suggest why the development of a new type of antibiotic is very important.

[2 marks]

12 (b) In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

A new drug must be tested before it can be sold.

Figure 11 shows a timeline for the stages of testing one new drug.



Describe what happens at each stage of drug testing.

Give the reasons for each stage.

You should include how the tests are designed to obtain valid results.

[6 marks]



There are no questions printed on this page

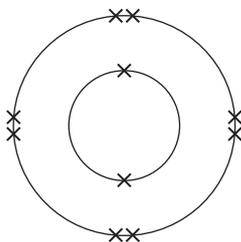
**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



Chemistry Questions

- 13 **Figure 12** shows the electronic arrangement of an atom.

Figure 12



- 13 (a) What is the name of the element represented in **Figure 12**?

Use the Chemistry Data Sheet to help you answer this question.

[1 mark]

- 13 (b) Explain what the electronic arrangement tells you about the reactivity of this element.

[2 marks]

3

Turn over for the next question

Turn over ►



14 Fuels have many different uses.

14 (a) (i) Some power stations use coal as the fuel.

The elements in coal include carbon, hydrogen, nitrogen, oxygen and sulfur.

When coal burns, several pollutant gases are produced.

Name **two** of the pollutant gases produced.

For each pollutant gas, describe the effect the gas has on the environment.

[4 marks]

Gas _____

Effect _____

Gas _____

Effect _____

14 (a) (ii) Some power stations use biofuels.

Suggest **one** advantage of using a biofuel rather than coal.

[1 mark]



14 (b) Petrol is often used as the fuel in cars.

Which element is removed from petrol, before petrol is burnt in cars?

[1 mark]

Tick (✓) **one** box.

carbon

hydrogen

nitrogen

oxygen

sulfur

6

Turn over for the next question

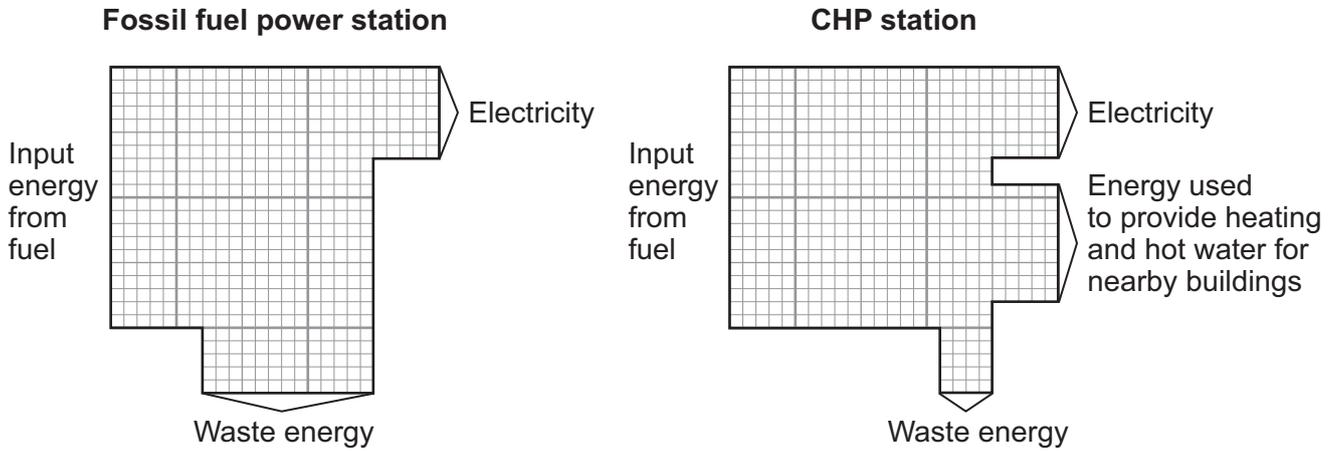
Turn over ►



Physics Questions

- 15** **Figure 13** shows Sankey diagrams for a fossil fuel power station and for a combined heat and power (CHP) station. A CHP station uses waste energy from the electricity it generates to provide heating and hot water for nearby buildings.

Figure 13



- 15 (a) (i)** Determine the efficiency of the fossil fuel power station.

Use the correct equation from the Physics Equations Sheet.

[2 marks]

Efficiency = _____

- 15 (a) (ii)** What happens to the waste energy from a fossil fuel power station?

[1 mark]

- 15 (a) (iii)** Which is more efficient, a fossil fuel power station or a CHP station?

Give a reason for your answer.

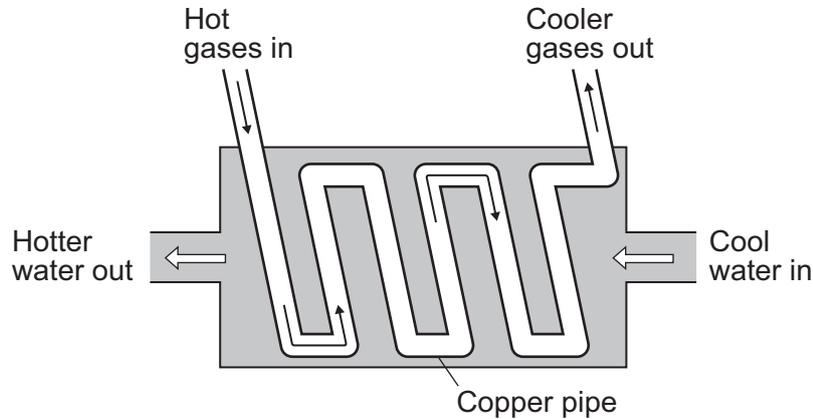
[1 mark]



- 15 (b)** A heat exchanger in a CHP station transfers energy from hot gases to cold water.

Figure 14 shows the heat exchanger.

Figure 14



- 15 (b) (i)** Why is the pipe made from copper rather than plastic?

[1 mark]

- 15 (b) (ii)** Suggest **two** improvements that could be made to this heat exchanger to increase the rate of energy transfer.

For each improvement give **one** reason why this would increase the rate of energy transfer.

[4 marks]

Improvement 1 _____

Reason _____

Improvement 2 _____

Reason _____

END OF QUESTIONS



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**



There are no questions printed on this page

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Copyright information

For confidentiality purposes, from the November 2015 examination series, acknowledgements of third party copyright material will be published in a separate booklet rather than including them on the examination paper or support materials. This booklet is published after each examination series and is available for free download from www.aqa.org.uk after the live examination series.

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2017 AQA and its licensors. All rights reserved.

