

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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10	
11	
12	
13	
TOTAL	



General Certificate of Secondary Education
Foundation Tier
June 2013

Additional Science 2

AS2FP

Unit 6

F

Thursday 23 May 2013 9.00 am to 10.30 am

For this paper you must have:

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

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. 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 11(c) 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.

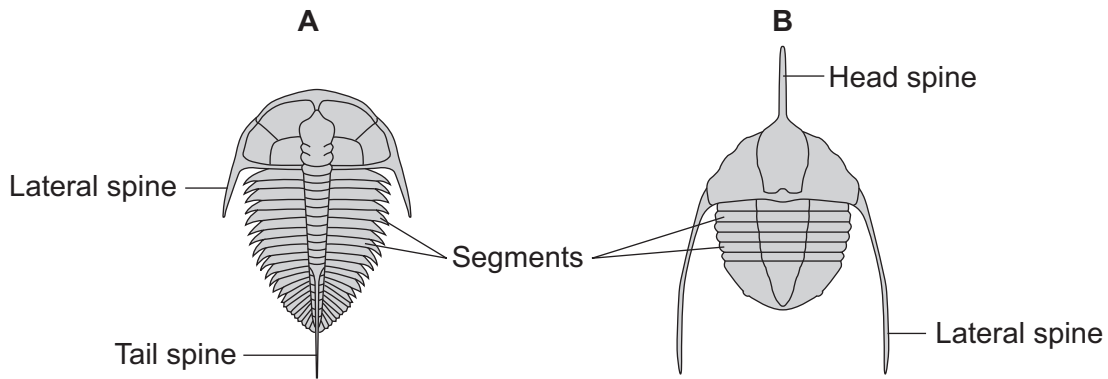


J U N 1 3 A S 2 F P O 1

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

Biology Questions

- 1** Trilobites were animals that lived in the sea more than 250 million years ago. The diagrams show two species of trilobite, **A** and **B**.



- 1 (a)** Which **two** statements about species **A** and species **B** are correct?

Tick (✓) **two** boxes.

	Tick (✓)
B has a head spine	
A has lateral spines longer than its body	
B has fewer segments than A	
B has segments with pointed ends	

(2 marks)

- 1 (b)** Trilobites became *extinct* about 250 million years ago.

- 1 (b) (i)** What does *extinct* mean?

.....

.....

(1 mark)



1 (b) (ii) How do scientists know what trilobites looked like?

.....

.....

(1 mark)

1 (b) (iii) 250 million years ago there were many different types of trilobite on Earth. Scientists think that trilobites became extinct over a very short time period.

What is the most likely reason why trilobites became extinct?

Tick (✓) **one** box.

	Tick (✓)
New predators where they lived	
New competitors in their environment	
A sudden massive change to the environment	

(1 mark)

5

Turn over for the next question

Turn over ►



2 Many cells in the body can divide to form new cells.

2 (a) Draw a ring around the correct answer in each box to complete each sentence.

2 (a) (i) Body cells have

one
two
four

 set(s) of chromosomes.

(1 mark)

2 (a) (ii) Body cells divide by a process called

fertilisation.
inheritance.
mitosis.

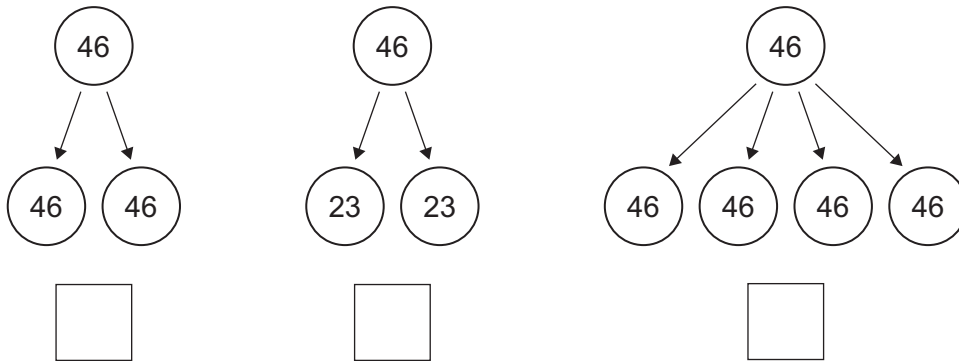
(1 mark)

2 (b) Human body cells have 46 chromosomes.

2 (b) (i) Which diagram shows cell division in a human body cell?

The numbers in each circle show how many chromosomes are in each cell.

Tick (✓) **one** box.



(1 mark)

2 (b) (ii) When body cells divide more cells are made.

Give **two** reasons why the body might need more cells.

1

2

(2 marks)



2 (c) Cells from human embryos can be made to develop into any kind of human cell. These new cells may be collected for medical use.

2 (c) (i) What scientific name is given to cells that can develop into any kind of human cell?

Draw a ring around the correct answer.

body cells

nerve cells

stem cells

(1 mark)

2 (c) (ii) Give **one** way cells collected from embryos could be used to help repair damage to the body.

.....

(1 mark)

2 (d) *Sexual* reproduction may produce twins.

2 (d) (i) What is *sexual* reproduction?

.....

(2 marks)

2 (d) (ii) Some twins are identical.

What is it that makes these twins identical?

Tick (✓) **one** box.

Some twins are identical because they . . .	Tick (✓)
are born on the same day.	
have DNA the same as each other.	
have the same parents.	

(1 mark)

10

Turn over ►



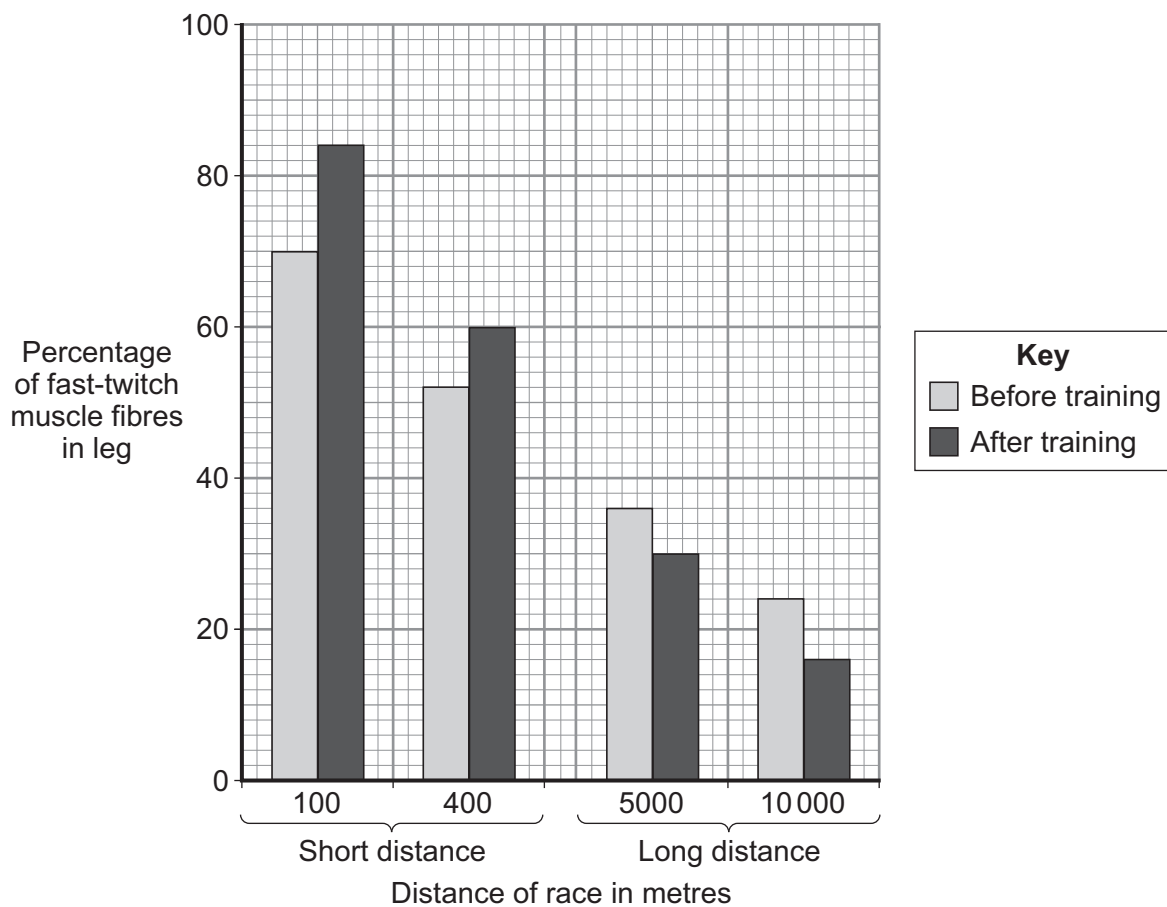
- 3 Athletes have training sessions every day.
Some athletes are training for short distance races.
Some athletes are training for long distance races.

Leg muscles of different people contain different amounts of fast-twitch fibres.

The bar chart shows the percentage of fast-twitch fibres in the leg muscles of athletes:

- before training starts
- after training for several years.

The results are shown for athletes training for short distance races and for long distance races.



3 (a) Read the information.

An athletics teacher says that:

- by finding the percentage of fast-twitch fibres in leg muscles you can choose the best distance for a person to run
- training for a particular length race will change the percentage of fast-twitch fibres in leg muscles.

Describe how the information in the bar chart supports what the teacher says.

.....

.....

.....

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.....

.....

(3 marks)

3 (b) A student wants to become an athlete.
 The leg muscles in the student are analysed.
 The analysis shows the student has 50% fast-twitch fibres before training.

Which distance of race would you suggest the student should train for?

.....

Give a reason for your answer.

.....

.....

(2 marks)

5

Turn over ►



Chemistry Questions

- 4 A swimming pool was closed after two chemicals leaked into the pool. Fire-fighters were asked to investigate the leak. They had to wear special suits.



The two chemicals that leaked were sodium hypochlorite and sulfuric acid. The chemicals reacted together to make chlorine gas.

- 4 (a) (i) Which ion makes sulfuric acid acidic?

Draw a ring around the correct answer.

hydrogen ion (H^+)

hydroxide ion (OH^-)

sulfate ion (SO_4^{2-})

(1 mark)

- 4 (a) (ii) Draw a ring around the correct answer in the box to complete the sentence.

A solution of sodium hypochlorite is alkaline.

The pH of sodium hypochlorite solution is

4

7

11

(1 mark)



4 (a) (iii) Draw a ring around the correct answer in the box to complete the sentence.

The reaction between an acid and an alkali is called

combustion.
decomposition.
neutralisation.

(1 mark)

4 (b) The fire-fighters wore special suits.

Suggest why.

.....

.....

(1 mark)

4 (c) Sodium chloride solution can be electrolysed.
Sodium hypochlorite can be made using **two** products of the electrolysis.

Tick (✓) **two** correct products of the electrolysis of sodium chloride solution.

Product	Tick (✓)
Chlorine	
Sodium	
Sodium sulfate	
Sodium hydroxide	

(2 marks)

6

Turn over for the next question

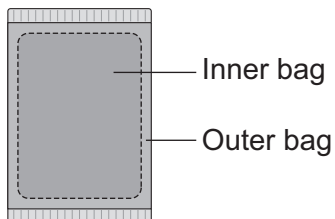
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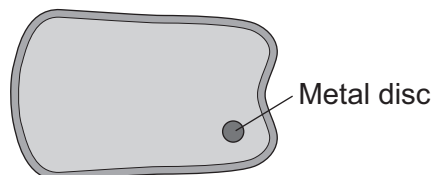
5 People sometimes use hand warmers to keep their hands warm in cold weather.

There are two types of hand warmer.

Disposable hand warmer



Reusable hand warmer



5 (a) Draw a ring around the correct answer in the box to complete the sentence.

The hand warmers give out energy because of

decomposition

endothermic

exothermic

reactions.

(1 mark)

5 (b) The table gives information about the two types of hand warmer.

	Disposable hand warmer	Reusable hand warmer
Cost in pence	50	40
Highest temperature in °C	45	54
How it is used	Will only work once	Can be used again after putting into boiling water, then cooling
Time the hand warmer stays warm in hours	10	0.5



5 (b) (i) Use **only** information from the table to answer this question.

Give **two** advantages and **two** disadvantages of the **reusable** hand warmer, compared with the **disposable** hand warmer.

Advantages

.....

.....

.....

Disadvantages

.....

.....

.....

(4 marks)

5 (b) (ii) The reaction in the disposable hand warmer is slow.

Using information from the table, how can you tell the reaction is slow?

.....

.....

(1 mark)

6

Turn over for the next question

Turn over ▶



6 Silver bromide is an insoluble salt.

Silver bromide can be made by mixing **two** solutions together.

Draw a ring around the correct answer in each box to complete each sentence.

6 (a) (i) The type of reaction used to make insoluble silver bromide is called

electrolysis.
neutralisation.
precipitation.

(1 mark)

6 (a) (ii) The method used to separate solid silver bromide from the solution is

distillation.
evaporation.
filtration.

(1 mark)

6 (b) The table shows some soluble and some insoluble salts.

Soluble salts	Insoluble salts
lead nitrate	lead bromide
silver nitrate	silver bromide
sodium bromide	
sodium chloride	

Which **two** salts from the table could you use to make silver bromide?

.....

.....

(2 marks)

4



7 Sodium was discovered in 1807 by Humphrey Davy. Davy electrolysed sodium hydroxide using a battery. The first battery was made in 1800.

Davy collected sodium from the electrolysis of sodium hydroxide.

7 (a) Sodium is produced at the negative electrode.

Why are sodium ions attracted to the negative electrode?

.....
.....

(1 mark)

7 (b) Draw a ring around the correct answer in each box to complete each sentence.

7 (b) (i) Today sodium can be extracted from molten sodium chloride by electrolysis.

The electrolyte used in this process is

chlorine.
sodium.
sodium chloride.

(1 mark)

7 (b) (ii) Molten sodium chloride can be represented as

NaCl(g).
NaCl(l).
NaCl(s).

(1 mark)

7 (c) Scientists could not produce sodium before 1800.

Suggest **one** reason why.

.....
.....

(1 mark)

4

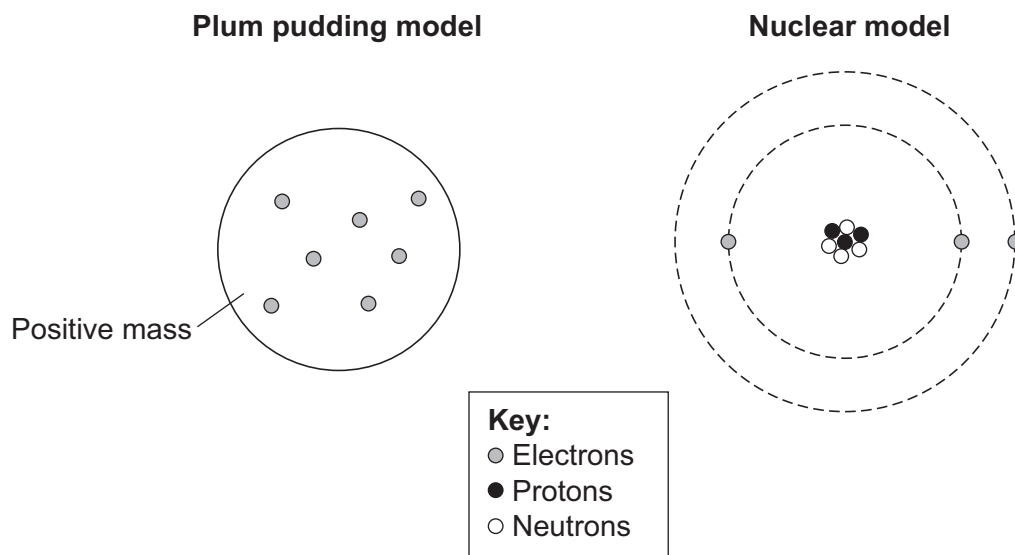
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Physics Questions

- 8 Before 1909 scientists believed that the atom could be modelled like a 'plum pudding'. In 1909 a new model called the nuclear model was suggested.

The diagram shows the two different models.



- 8 (a) Which are the **three** correct features of the nuclear model?

Tick (✓) the **three** correct features in the table.

Feature of the nuclear model	Tick (✓)
An atom has a negatively charged nucleus surrounded by empty space.	
An atom has electrons surrounded by a positively charged mass.	
Most of the atom is empty space.	
There is a nucleus made up of only protons and neutrons.	
There is a nucleus made up of protons, neutrons and electrons.	
There are electrons orbiting the nucleus.	

(3 marks)



8 (b) (i) An atom of carbon has 6 protons. The mass number of this carbon atom is 12.

How many neutrons does this carbon atom contain?

.....
(1 mark)

8 (b) (ii) Carbon-14 is an isotope of carbon and has a mass number of 14.

Draw a ring around the correct answer in the box to complete the sentence.

The number of protons in an atom of carbon-14 is

6

8

14

(1 mark)

5

Turn over for the next question

Turn over ►



9 This question is about stars.

9 (a) Stars are made when enough dust and gas from space has been pulled together.

What is the name of the force that pulls the dust and gas together?

.....

(1 mark)

9 (b) The energy in stars is released when nuclei fuse together.

What is the name of this process?

Draw a ring around the correct answer.

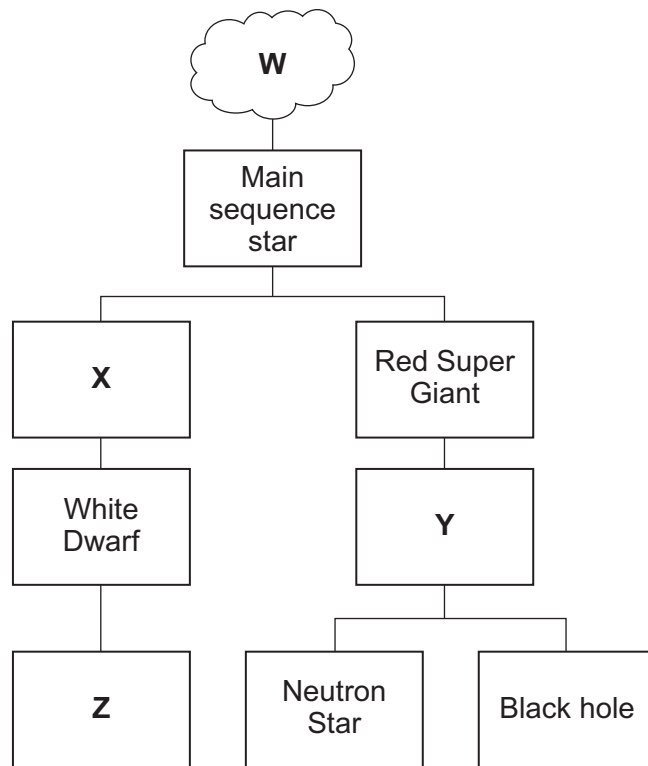
fission

fusion

decay

(1 mark)

9 (c) (i) The diagram shows the life cycle of stars.
W, X, Y and Z are four stages in the life cycle of stars.



Use the words from the box to name the stages **W**, **X**, **Y** and **Z**.

Black Dwarf	Protostar	Red Giant	Supernova
-------------	-----------	-----------	-----------

W

X

Y

Z

(3 marks)

9 (c) (ii) Draw a ring around the correct answer in each box to complete each sentence.

After the main sequence, a star's life cycle is determined by its

age.
brightness.
size.

During the main sequence period of its life cycle, a star is stable because the forces

within the star are

balanced.
increasing.
unbalanced.

(2 marks)

7

Turn over for the next question

Turn over ►



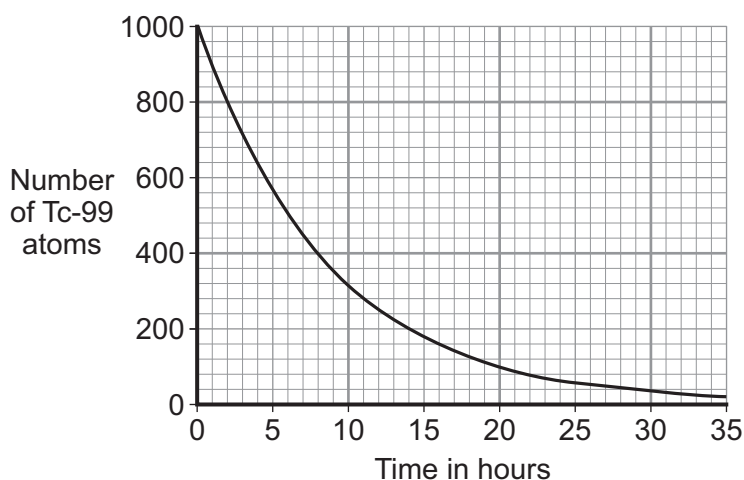
- 10** Medical tracers are used to check the function of organs in the body. Technetium-99 (Tc-99) can be used as a medical tracer.

Tc-99 is injected into a patient. A detector outside the body is used to detect the nuclear radiation from the Tc-99.

- 10 (a)** What type of nuclear radiation is emitted from Tc-99?

.....
(1 mark)

- 10 (b)** The graph shows how the number of Tc-99 atoms in a sample changes with time.



- 10 (b) (i)** Use information from the graph to complete the sentences.

The number of Tc-99 atoms in the sample at the start was

The graph shows that as time increases, the number of Tc-99 atoms in the sample

.....

(2 marks)



10 (b) (ii) Use the graph to find the time taken for the number of Tc-99 atoms in the sample to fall from 800 to 400.

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

Time taken hours
(2 marks)

10 (c) Nuclear radiation can be dangerous to human health.

10 (c) (i) State **one** danger of nuclear radiation.

.....
.....

(1 mark)

10 (c) (ii) The syringes used by a nurse to inject the Tc-99 into the patient are covered in lead.

Suggest why.

.....
.....

(1 mark)

10 (c) (iii) The nurse is at a higher risk from nuclear radiation than the patient.

Explain why.

.....
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(2 marks)

9

Turn over for the next question

Turn over ►



Biology Questions

11 This question is about enzymes.

11 (a) Students investigated the effect of pH on two enzymes, **A** and **B**, from the human digestive system.

Enzymes **A** and **B** digest protein.

Egg white is made from protein.

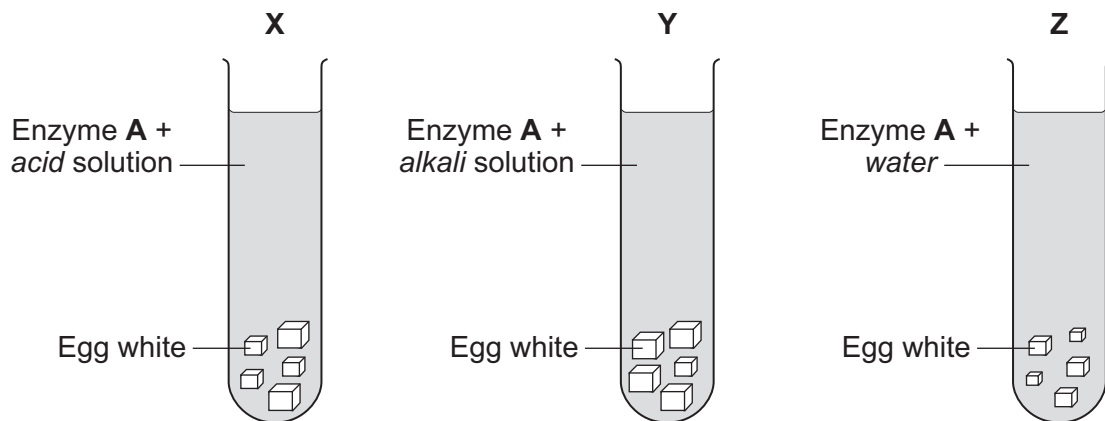
The students:

- put 5 cm³ of a solution of enzyme **A** into test tube **X**
- added 10 cm³ of an acid solution
- put five cubes of hard-boiled egg white into the test tube
- recorded how long it took for all the egg white to be digested.

The students repeated the experiment in test tube **Y**, using alkali solution instead of acid solution.

The students repeated the experiment in test tube **Z**, using water instead of acid solution.

The diagram shows how the investigation was set up.



Give **one** way the students could improve their investigation.

.....

.....

(1 mark)



- 11 (b)** The students recorded how long it took for all the egg white in each tube to be digested. The students repeated their investigation using enzyme **B**, instead of enzyme **A**. The table shows the results.

Enzyme	Time for all the egg white to be digested in minutes		
	Acid	Alkali	Neutral (water)
A	60	300	180
B	300	50	60

- 11 (b) (i)** Enzymes **A** and **B** were made in different parts of the human digestive system.

Where, in the human digestive system, was each enzyme made?

Enzyme **A**

Enzyme **B** (2 marks)

- 11 (b) (ii)** Give a reason for your answer for enzyme **A** in part (b)(i).

.....

..... (1 mark)

Question 11 continues on the next page

Turn over ►



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

Microorganisms make enzymes. Some of these enzymes can be used in the home and in industry.

How are enzymes used in the home and in industry?

In your answer you should:

- write about different types of enzymes
- describe the reactions the enzymes are used for
- describe how the products of the reactions are used in the home and in industry.

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(6 marks)

10



Turn over for the next question

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

Turn over ►



Chemistry Questions

12 A student investigated the reaction of hydrochloric acid with calcium carbonate.

12 (a) The equation for the reaction is:



12 (a) (i) What is the name of the solution produced in the reaction?

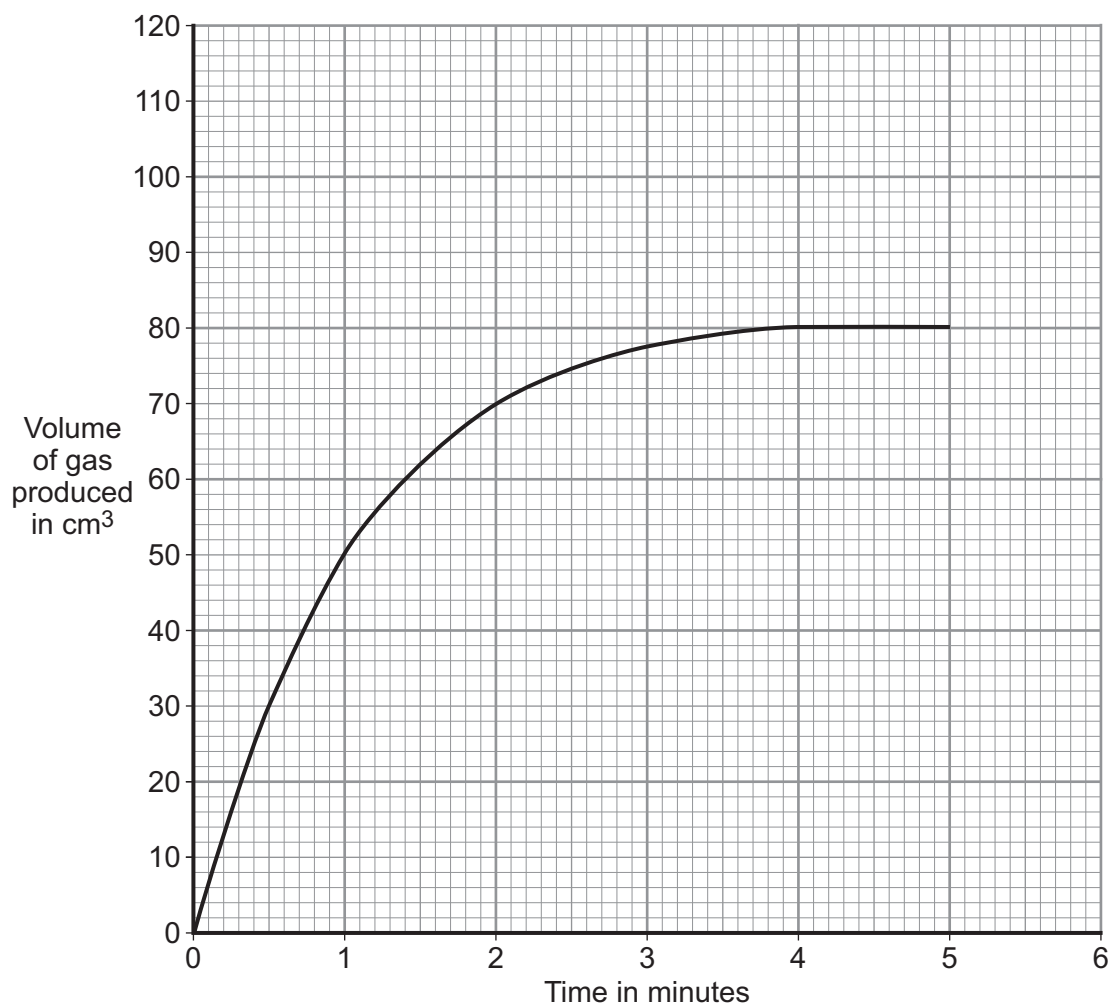
.....
(1 mark)

12 (a) (ii) What is the name of the gas produced in the reaction?

.....
(1 mark)

12 (b) The student measured the volume of gas produced in the reaction every half minute.

The graph shows the student's results.



12 (b) Use the graph to describe how the **rate** of this reaction changes with time.

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(3 marks)

12 (c) (i) The student repeated the investigation.

This time the temperature used was 10°C higher. All other variables were the same.

Sketch **on the graph** the results you would expect.

(2 marks)

12 (c) (ii) Explain, in terms of particles, why the change in temperature affects the rate of reaction.

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(3 marks)

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Turn over for the next question

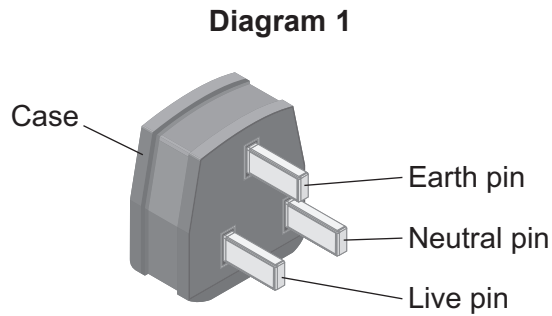
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Physics Questions

13 Most electrical appliances are connected to the mains using a cable and a three-pin plug.

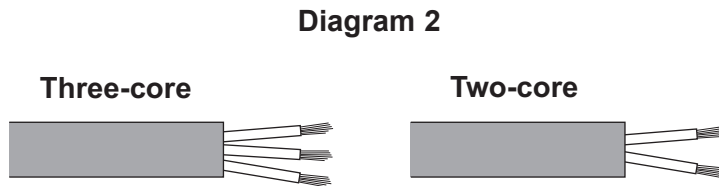
13 (a) **Diagram 1** shows a three-pin plug.



13 (a) (i) Why is the case of the plug made from plastic?

.....
(1 mark)

13 (a) (ii) **Diagram 2** shows a three-core cable and a two-core cable.



Name the **two** wires which are in both types of cable.

Wire 1

Wire 2

(2 marks)



13 (b) An engineer is designing an electric lawnmower. The lawnmower will be double insulated.

The electric motor of the lawnmower will need a current of 12A. The electric motor will be connected to the 230V mains electricity supply.

The engineer is choosing the cable that will connect the motor to a three-pin plug.

Information about five cables is shown in the table.

	Cable 1	Cable 2	Cable 3	Cable 4	Cable 5
Structure	Three-core	Two-core	Two-core	Two-core	Two-core
Maximum power rating in watts	3000	3000	3000	2500	2500
Type of plastic used for cable covering	Flexible	Rigid	Flexible	Flexible	Rigid

13 (b) (i) Use the information in the table to decide which cable is the most suitable to use for the lawnmower.

Justify your answer.

To gain full marks for this question your answer must include a calculation.

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(4 marks)

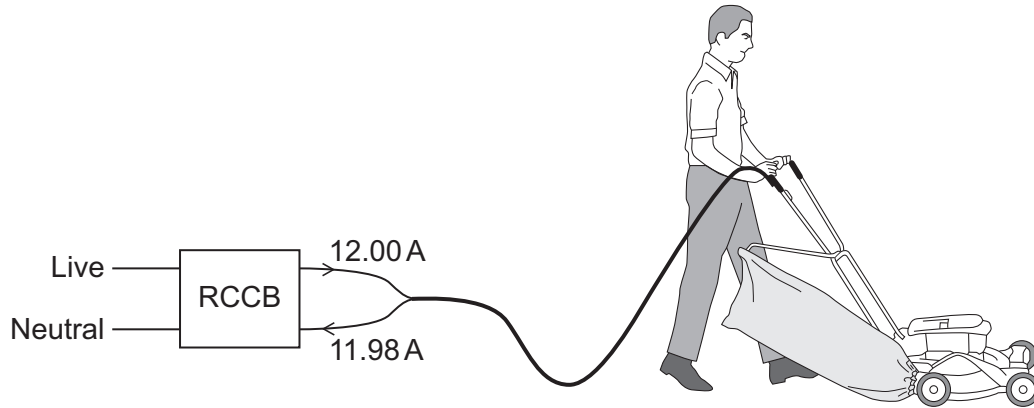
Question 13 continues on the next page

Turn over ►



13 (b) (ii) Electric lawnmower manufacturers recommend using a Residual Current Circuit Breaker (RCCB) when connecting a lawnmower to the mains electricity supply.

The diagram shows the current in the live and neutral wires when there is a problem with the lawnmower.



The RCCB would stop someone getting an electric shock from a faulty circuit in the lawnmower.

Explain how.

.....

.....

.....

.....

(2 marks)

9

END OF QUESTIONS

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