

Specimen Paper

Centre Number						Candidate Number					
Surname											
Other Names											
Candidate Signature											



General Certificate of Secondary Education
Foundation Tier

Additional Science 2 Unit 6

F

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

For this paper you must have:

- a ruler
 - the Chemistry Data Sheet (enclosed)
 - the Physics Equation Sheet (enclosed).
- You may use a calculator.

Time allowed

- 90 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 space 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 9 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.

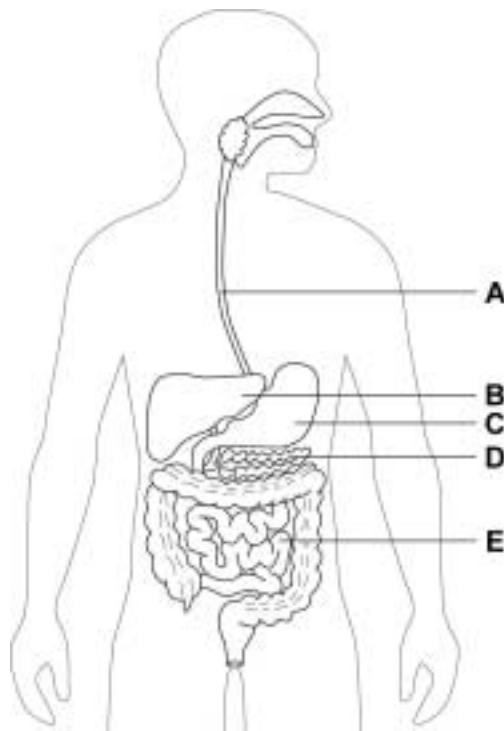
There are no questions printed on this page

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

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

Biology questions

- 1 The diagram shows the digestive system.



For each question write the correct letter in the box.

Which structure, **A**, **B**, **C**, **D** or **E**, is:

- 1 (a) the stomach

(1 mark)

- 1 (b) the small intestine

(1 mark)

- 1 (c) the liver?

(1 mark)

Turn over ►

2 Babies find it difficult to digest proteins in their food.



Baby food manufacturers use enzymes to 'pre-digest' the protein in baby food.

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

amino acids	amylases	fatty acids
proteases	glucose	lipases

Proteins are 'pre-digested' using enzymes called

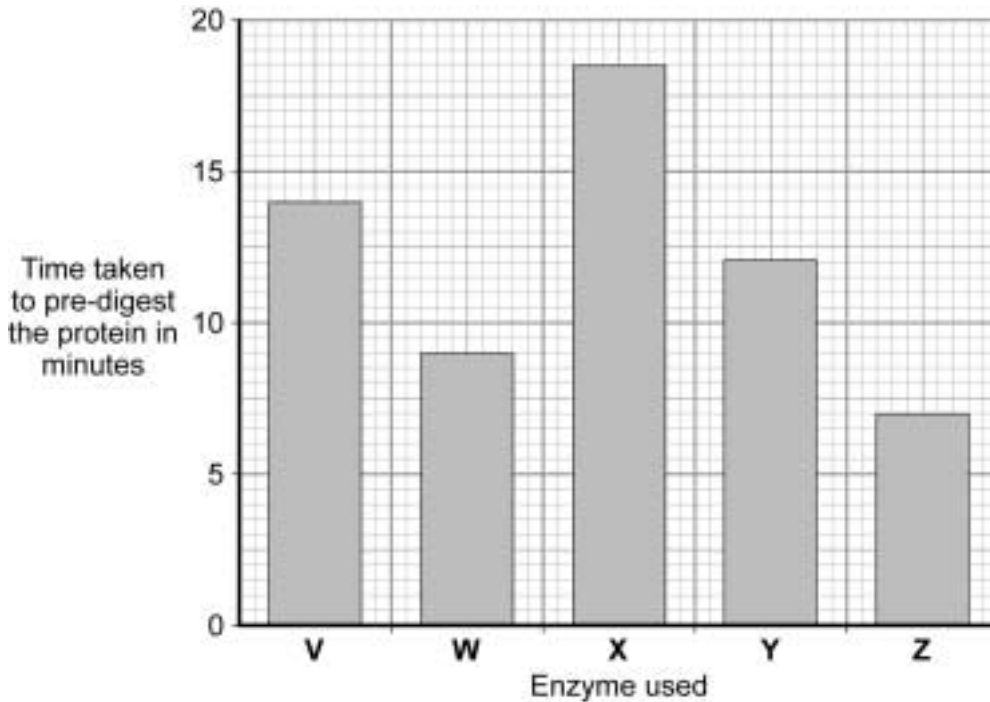
The pre-digestion of protein produces
(2 marks)

2 (b) A baby food manufacturer uses enzyme **V** to pre-digest protein.

He tries four new enzymes, **W**, **X**, **Y** and **Z**, to see if he can reduce the time taken to pre-digest the protein.

The graph shows the time taken for the enzymes to completely pre-digest the protein.

The manufacturer uses the same concentration of enzyme and the same mass of protein in each experiment.



2 (b) (i) How long did it take enzyme **V** to pre-digest the protein? minutes
(1 mark)

2 (b) (ii) Which enzyme, **V**, **W**, **X**, **Y** or **Z**, would you advise the baby food manufacturer to use?

Write your answer in the box.

Enzyme

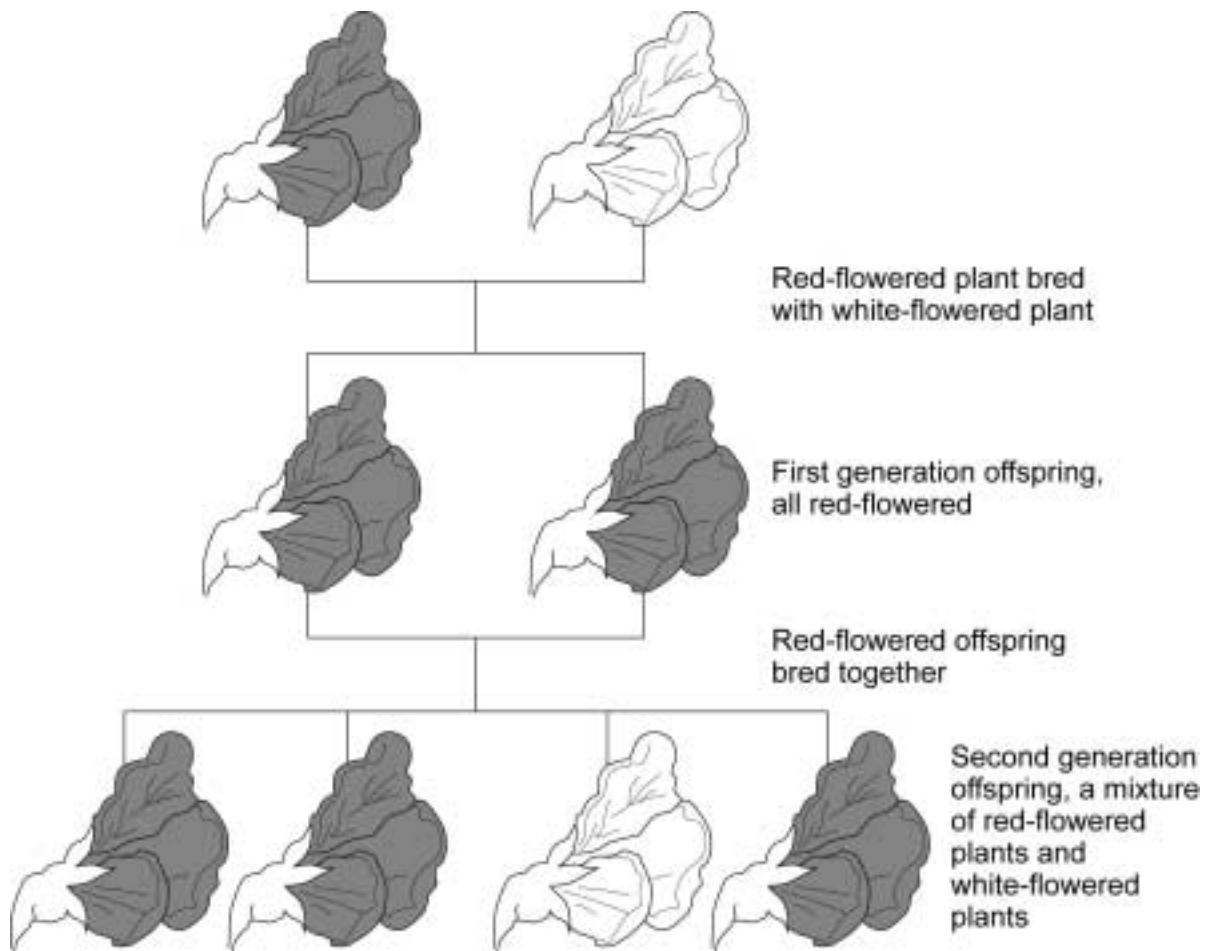
(1 mark)

4

Turn over for the next question

Turn over ▶

- 3** The diagrams show one of Mendel's experiments.
He bred pea plants.



Mendel suggested that flower colour was controlled by inherited factors.

- 3 (a)** Draw a ring around the correct answer to complete each sentence.

- 3 (a) (i)** The first generation plants show that the red factor is

dominant.
environmental.
recessive.

(1 mark)

3 (a) (ii) The second generation plants show that the white factor is

dominant.
environmental.
recessive.

(1 mark)

3 (b) (i) What do we call inherited factors?

.....
(1 mark)

3 (b) (ii) How are inherited factors passed from generation to generation?

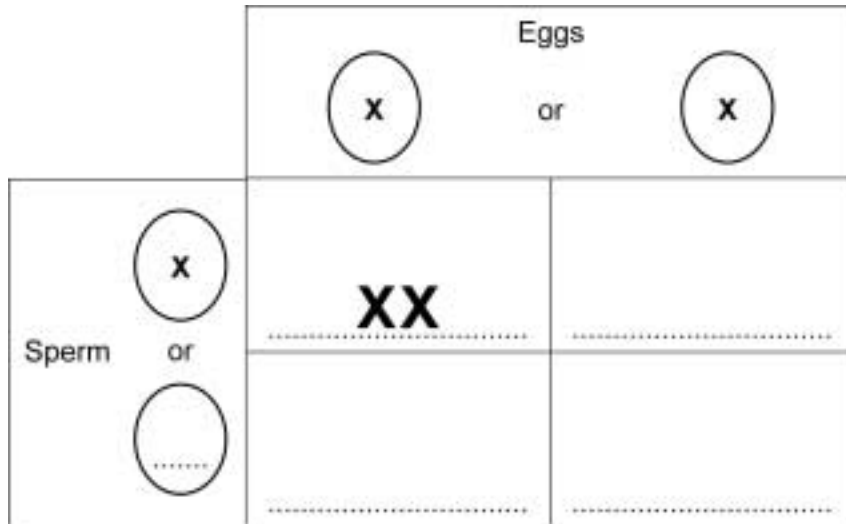
.....
(1 mark)

4

Turn over for the next question

Turn over ►

- 4 In humans, sex chromosomes control whether a person is male or female.
- 4 (a) Use letters **X** and **Y** to complete the Punnett square for sex inheritance.



(3 marks)

- 4 (b) A couple already have three boys.

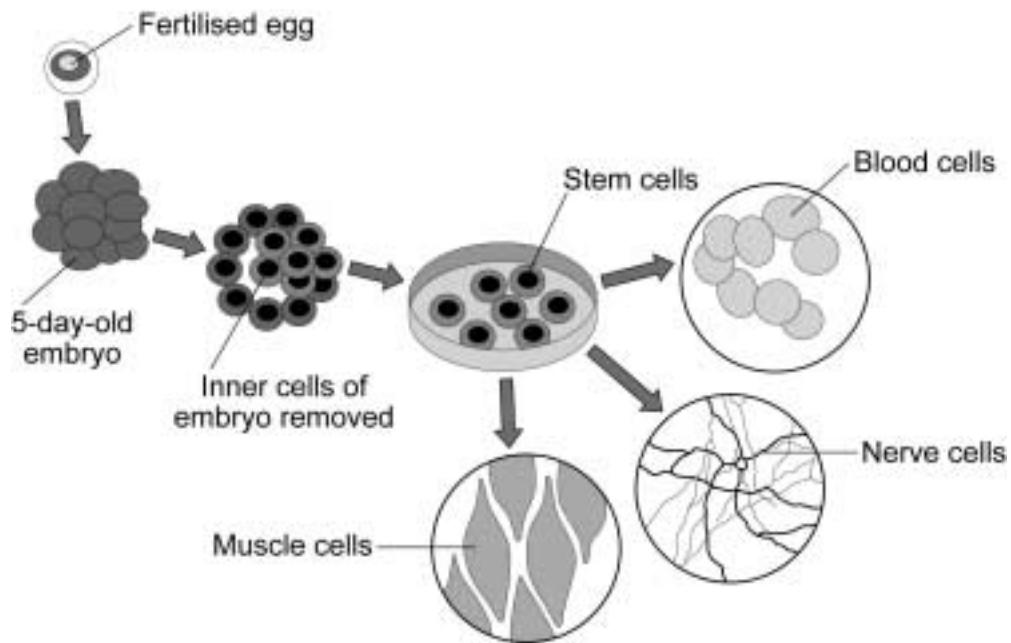
What is the probability that their next child will be a girl?

.....

.....

(1 mark)

- 5 The diagram shows how cells from human embryos can be used to grow 'replacement body parts' for humans.



- 5 (a) Complete the sentence.

The fertilised egg divides to form the 5-day-old embryo by a process called.....

(1 mark)

Question 5 continues on the next page

Turn over ►

5 (b) Some statements about stem cells are given below.

Tick (✓) **two** advantages and **two** disadvantages of using stem cells to grow 'replacement body parts' for humans.

	Advantage Tick (✓)	Disadvantage Tick (✓)
Stem cells can grow into many different kinds of body cells.		
Stem cells may grow out of control.		
Large numbers of stem cells can be grown in the laboratory.		
Stem cells may be used to treat some human diseases.		
Collecting and growing stem cells is expensive.		
Patients treated with stem cells may need to take drugs for the rest of their life to prevent rejection.		

(4 marks)

5

Chemistry Questions

6 Ammonia has the formula NH_3 . It is made from nitrogen and hydrogen. Ammonia dissolves in water to form a solution with a pH of 10.

6 (a) What does this pH value tell you about ammonia solution?

.....
.....

(1 mark)

6 (b) In industry a large amount of ammonia is neutralised by an acid to make ammonium nitrate.

6 (b) (i) What type of substance is ammonium nitrate?

.....

(1 mark)

6 (b) (ii) Which acid is added to ammonia to make ammonium nitrate?

.....

(1 mark)

6 (b) (iii) Draw a ring around the main use of ammonium nitrate.

fertiliser

lubricating oil

medicine

plastic

(1 mark)

Question 6 continues on the next page

Turn over ►

- 6 (c) Instant cold packs are used to treat sports injuries.



One type of cold pack has a plastic bag containing water. Inside the bag is a smaller bag containing ammonium nitrate.

The outer bag is squeezed so that the inner bag bursts. The ammonium nitrate dissolves in the water. This process is endothermic.

Explain why the bag becomes cold.

.....

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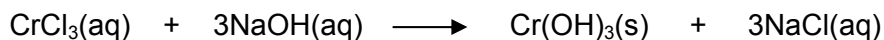
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(2 marks)

7 Waste water from some industrial processes contains metal ions, such as chromium ions. These ions must be removed from the water before the water is returned to a river.

The equation shows a method of removing chromium ions from water.



7 (a) This type of reaction is called a precipitation reaction.

What happens in a precipitation reaction?

.....
(1 mark)

7 (b) (i) Complete the name of the substance with the formula NaOH.

Sodium
(1 mark)

7 (b) (ii) How many atoms are in the formula for NaOH?

.....
(1 mark)

7 (c) It is important to remove chromium ions from water before it is returned to a river.

Suggest why.

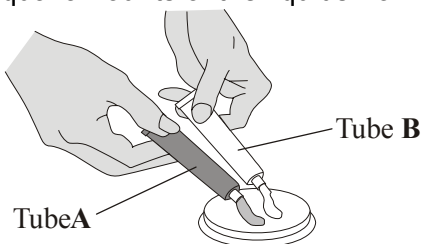
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.....
(1 mark)

4

Turn over ▶

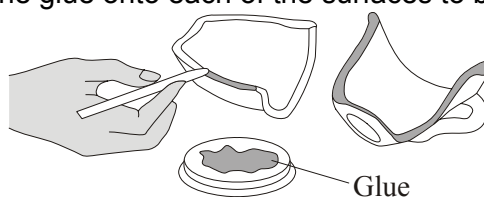
8 The following steps show how to use a type of glue.

Step 1 Measure out equal amounts of the liquids from tubes **A** and **B**.

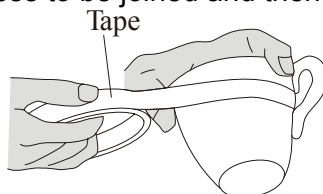


Step 2 Mix the liquids to make the glue.

Put a thin layer of the glue onto each of the surfaces to be joined.



Step 3 Assemble the pieces to be joined and then hold them together with tape.



Step 4 Leave the glue to set.

When liquids **A** and **B** are mixed a chemical reaction takes place.
This reaction is exothermic.

8 (a) Complete the sentence.

During the reaction the temperature of the mixture will (1 mark)

8 (b) The time taken for the glue to set at different temperatures is given in the table below.

Temperature in °C	Time taken for the glue to set
20	3 days
60	6 hours
90	1 hour

8 (b) (i) Complete the sentences below using words or phrases from the box.

decreases increases stays the same

When the temperature is increased the time taken for the glue to set

When the temperature is increased the rate of the setting reaction

(2 marks)

8 (b) (ii) Put a tick (✓) next to the **two** reasons why an increase in temperature affects the rate of reaction.

Reason	(✓)
It gives the particles more energy.	
It increases the concentration of the particles.	
It increases the surface area of the particles.	
It makes the particles move faster.	

(2 marks)

5

Turn over for the next question

Turn over ▶

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

Copper sulfate crystals can be made from copper oxide and dilute sulfuric acid.



Describe a method to make copper sulfate crystals from copper oxide and dilute sulfuric acid.

For the method you should include:

- the names of the pieces of apparatus used
- a risk assessment.

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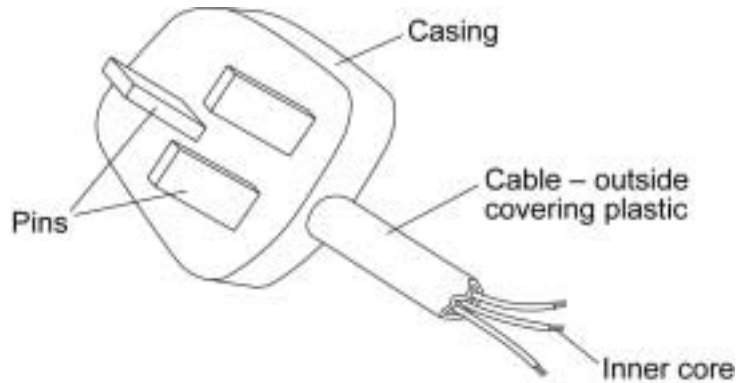
.....

(6 marks)

6

Physics Questions

10 (a) The diagram shows a three-pin plug and electrical cable.



Name a suitable material to make the:

plug casing

inner core of the cable

Give the reason for your choice of each material.

plug casing

.....

inner core of the cable

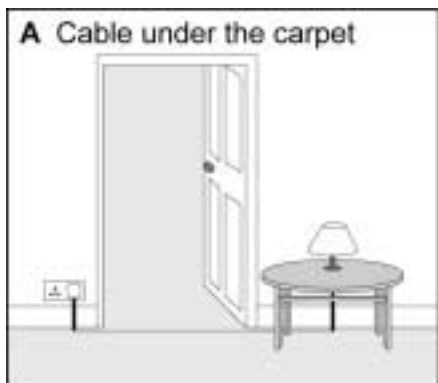
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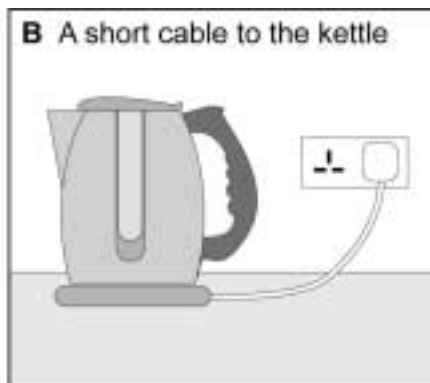
(4 marks)

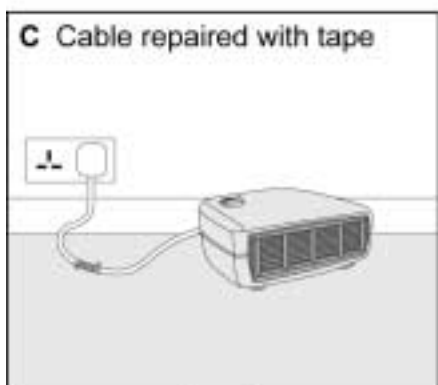
Question 10 continues on the next page

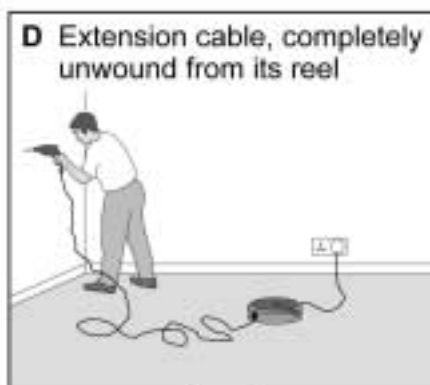
Turn over ►

- 10 (b) The pictures show mains electricity being used to operate various devices. Some of the pictures show the electricity being used in a dangerous way.









In the box underneath each picture put:

a tick (✓) if the electricity is being used safely


a cross (✗) if the electricity is being used dangerously.

(2 marks)

11 (a) Look at the electrical safety information poster.

**Get it right!
Choose the right fuse.**

Most fuses are 3A or 13A.
To choose the right fuse you must know the power of the appliance.



230 V 4A
920 W

Power is marked on the information plate.

<p>Power over 700 W use a 13A fuse.</p> <ul style="list-style-type: none"> • Fan heaters • Dishwashers • Washing machines 	<p>Power under 700 W use a 3A fuse.</p> <ul style="list-style-type: none"> • Radios • Portable TVs • Electric blankets
--	---

11 (a) (i) Complete the table to show which size fuse, 3 A or 13 A, should be fitted to each of the appliances.

Appliance	Power	Fuse
Kettle	2200 W	
Hair straighteners	75 W	
Coffee maker	1260 W	

(2 marks)

11 (a) (ii) The plug of a washing machine has been wrongly fitted with a 3 A fuse.

Explain why the washing machine stops working shortly after it is switched on.

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.....

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(2 marks)

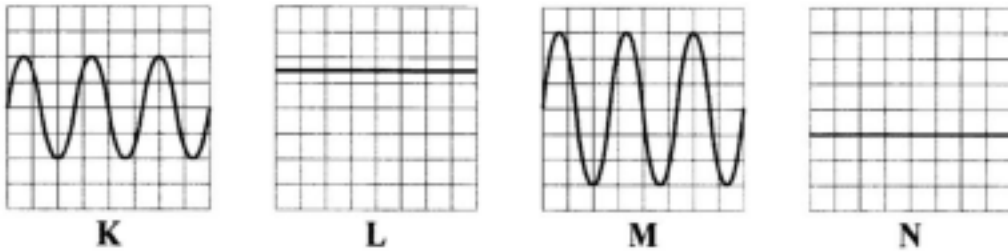
Turn over ▶

11 (b) Complete these two sentences.

In the UK, the mains electricity supply is volts.

The frequency of the UK mains electricity supply is hertz.
(2 marks)

11 (c) The diagram shows the oscilloscope traces produced by four different electricity supplies. The settings on the oscilloscope remained the same for each supply.



11 (c) (i) Which **two** supplies give a direct current (d.c)?

.....
(1 mark)

11 (c) (ii) Supply **K** provides a peak potential difference of 6 V.

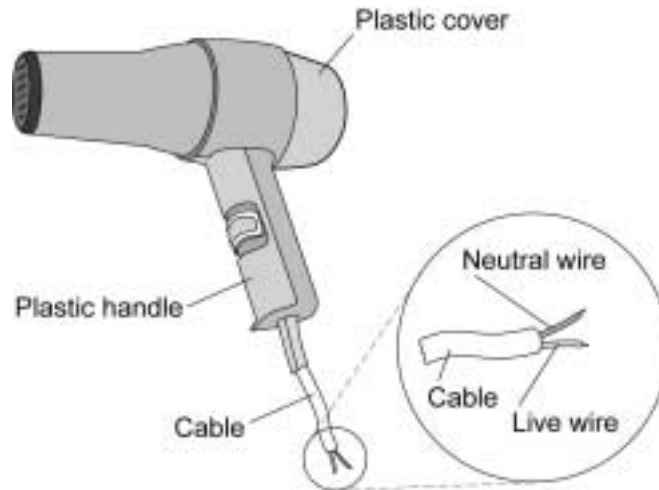
What is the peak potential difference provided by supply **M**?

.....
(1 mark)

11 (c) (iii) Which supply provides the largest potential difference?

.....
(1 mark)

- 11 (d) The diagram shows a hairdryer. The cable connecting the hairdryer to the plug does not have an earth wire.



- 11 (d) (i) Why does the hairdryer **not** need a cable with an earth wire?

.....

.....

.....

(1 mark)

- 11 (d) (ii) The hairdryer takes a current of 5 A from the 230 V mains electricity supply.

Calculate the power of the hairdryer.

Write down the equation you use, and then show clearly how you work out your answer.

.....

.....

.....

Power = W

(2 marks)

Turn over for the next question

Turn over ▶

12

Four different processes are described in **List A**. The names of these processes are given in **List B**.

Draw a line to link each description in **List A** to its correct name in **List B**.
Draw only **four** lines.

List A

the nucleus of an
atom splitting into
several pieces

the nuclei of two
atoms joining
together

an atom losing an
electron

an electric charge
moving through a
metal

List B

ionisation

gamma emission

nuclear fission

nuclear fusion

electric current

(4 marks)

4

Biology questions

13 Energy is obtained from both aerobic and anaerobic respiration during exercise.

13 (a) Give **three** differences between aerobic and anaerobic respiration.

1

2

3

(3 marks)

Question 13 continues on the next page

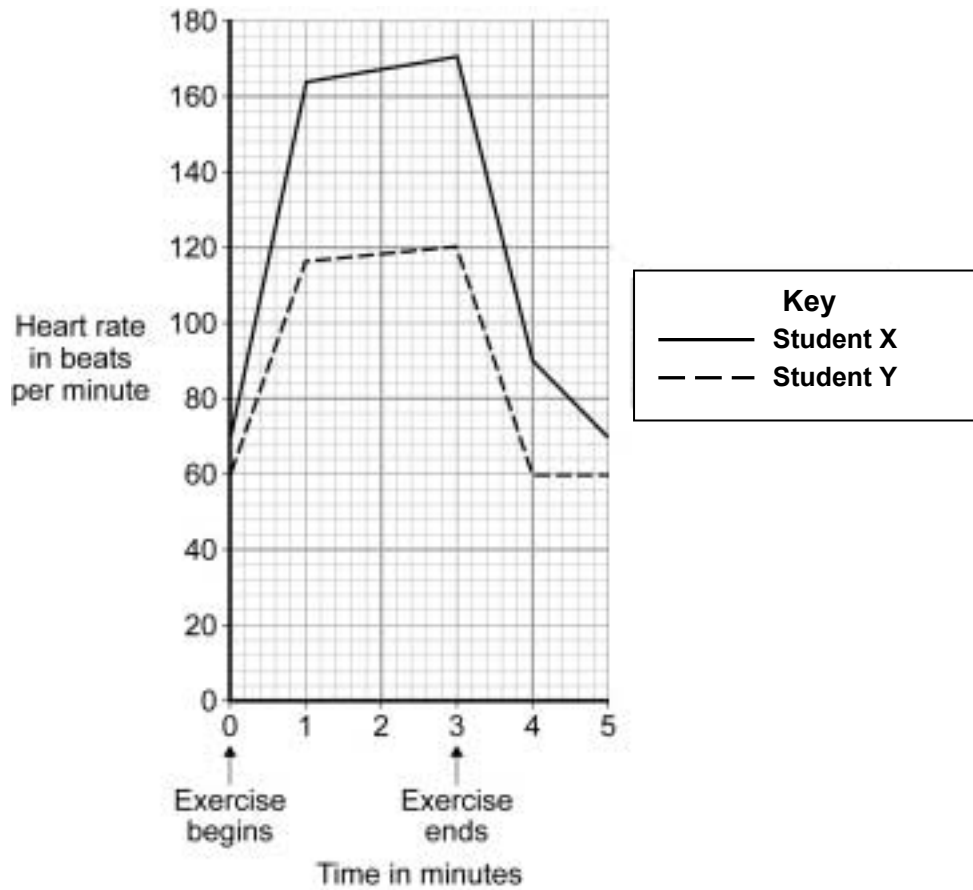
Turn over ►

13 (b) Two students did the same step-up exercise for 3 minutes.



One of the students was fit. The other student was unfit.

The graph shows how the students' heart rate changed during the exercise and after the exercise.



13 (b) Suggest which student was the fitter.

Draw a ring around the correct answer. **Student X / Student Y**

Give **three** reasons for your answer.

1

2

3

(3 marks)

13 (c) Explain the advantage to the students of the change in heart rate during exercise.

.....
.....
.....
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(4 marks)

10

Turn over

Chemistry questions

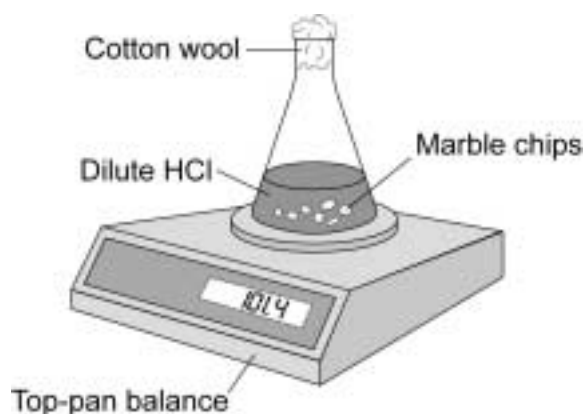
14 A student investigated the rate of reaction between marble and hydrochloric acid.

The student used an excess of marble.

The reaction can be represented by this equation:



The student used the apparatus shown in the diagram.



The student measured the mass of the flask and contents for ten minutes.

14 (a) The mass of the flask and contents decreased during the experiment.

Use the equation to help you explain why.

.....

.....

.....

.....

(2 marks)

14 (b) The balance used to measure the mass of the apparatus must be of high resolution for this experiment.

14 (b) (i) Which balance, **A**, **B**, or **C**, has the highest resolution?



Balance A



Balance B



Balance C

The balance with the highest resolution is balance .

(1 mark)

14 (b) (ii) Why should the balance used for this experiment have a high resolution?

Tick (✓) **one** box that gives the correct reason.

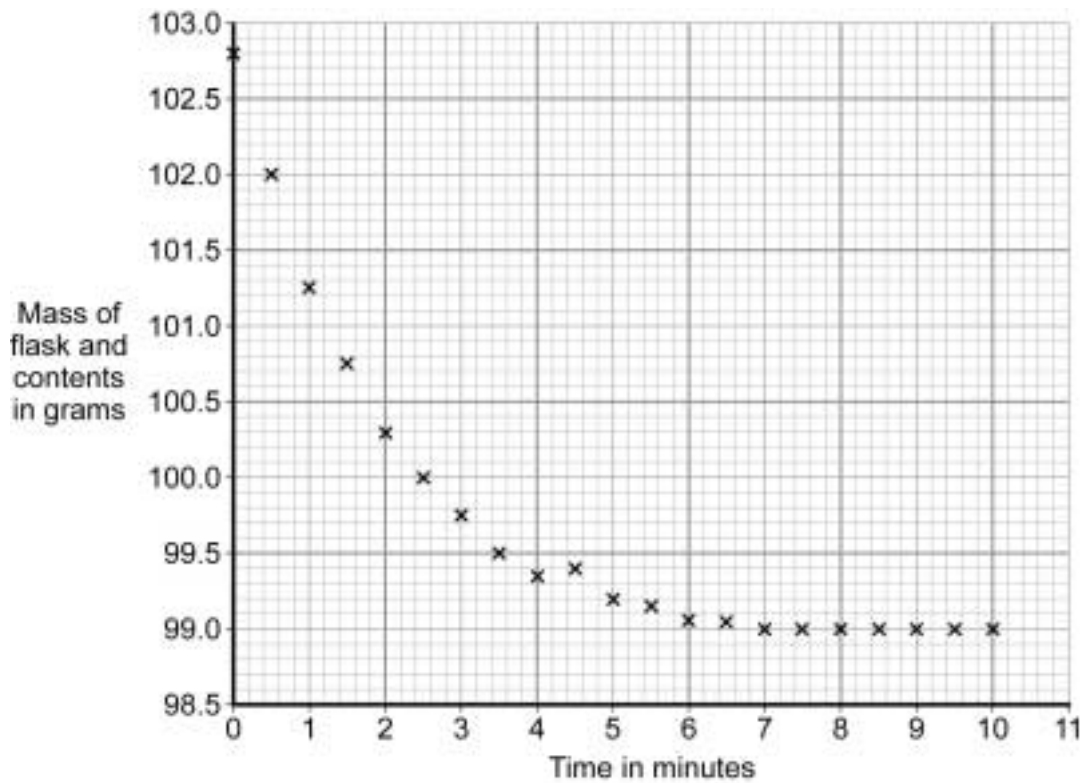
Reason	Tick (✓)
The balance is measuring a large mass.	
The balance is measuring a very small mass.	
The balance is measuring small changes in mass.	
The balance is the cheapest balance.	

(1 mark)

Question 14 continues on the next page

Turn over ►

The results are shown on the graph. Use the graph to answer the questions.



14 (c) (i) Complete the graph by drawing a line of best fit.

(1 mark)

14 (c) (ii) After how many minutes had all the acid been used up?

..... minutes
(1 mark)

14 (c) (iii) Use the graph to find the mass of the flask and contents after 1.8 minutes.

.....grams
(1 mark)

14 (d) The student repeated the experiment using powdered marble instead of lumps of marble.

The rate of reaction between the marble and hydrochloric acid particles was much faster with the powder.

Explain why.

.....

.....

.....

.....

.....

.....

(2 marks)

9

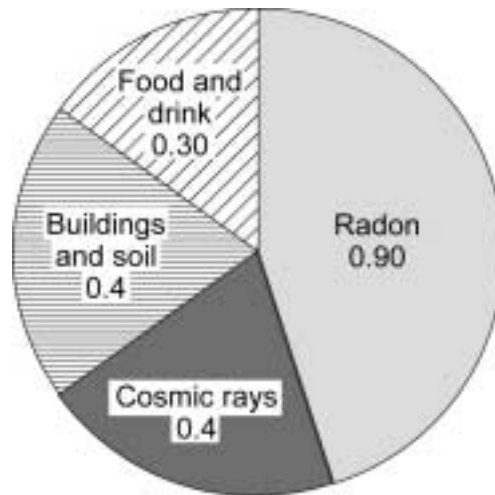
Turn over for the next question

Turn over ►

Physics questions

- 15** The pie chart shows the average radiation dose that a person in the UK receives each year from natural background radiation.

The doses are measured in millisieverts (mSv).



- 15 (a)** Some types of job increase the radiation dose a worker receives. People working as aircrew receive an increased radiation dose due to flying at high altitude.

- 15 (a) (i)** The radiation dose from which source of background radiation is increased by flying?

.....
(1 mark)

- 15 (a) (ii)** The following table gives the average additional radiation dose received by aircrew flying to various destinations from London.

Destination	Flight time in hours	Average additional radiation dose in mSv
Edinburgh	1	0.004
Istanbul	5	0.025
Toronto	8	0.050
Los Angeles	11	0.065
Tokyo	13	0.075

What is the relationship between flight time and average additional radiation dose?

.....
.....

(1 mark)

- 15 (a) (iii)** A flight from London to Jamaica takes 10 hours.

Estimate the likely value for the average additional radiation dose received by people on this flight.

Average additional radiation dose = mSv

Give a reason for your answer.

.....
.....

(2 marks)

Question 15 continues on the next page

Turn over ►

15 (b) The following table gives the effects of different radiation doses on the human body.

Radiation dose in mSv	Effects
10 000	Immediate illness; death within a few weeks
1 000	Radiation sickness; unlikely to cause death
100	Lowest dose with evidence of causing cancer

A businessman makes 10 return flights a year from London to Tokyo.

Explain whether the businessman should be concerned about the additional radiation dose received during the flights.

.....

.....

.....

.....

.....

(2 marks)

15 (c) In a study of 3900 aircrew it was found that 169 had developed leukaemia, a form of cancer. In a similar sized sample of non-aircrew the number of leukaemia cases was 156.

Suggest why it would be difficult to be certain that the leukaemia developed by the aircrew was caused by flying.

.....

.....

.....

.....

(2 marks)

END OF QUESTIONS

GCSE Physics Equations Sheet

Unit 6 F and H

$a = \frac{F}{m} \text{ or } F = m \times a$	<p>F resultant force m mass a acceleration</p>
$a = \frac{v - u}{t}$	<p>a acceleration v final velocity u initial velocity t time taken</p>
$W = m \times g$	<p>W weight m mass g gravitational field strength</p>
$F = k \times e$	<p>F force k spring constant e extension</p>
$W = F \times d$	<p>W work done F force applied d distance moved in the direction of the force</p>
$P = \frac{E}{t}$	<p>P power E energy transferred t time taken</p>
$E_p = m \times g \times h$	<p>E_p change in gravitational potential energy m mass g gravitational field strength h change in height</p>

$E_k = \frac{1}{2} \times m \times v^2$	E_k kinetic energy m mass v speed
$p = m \times v$	p momentum m mass v velocity
$I = \frac{Q}{t}$	I current Q charge t time
$V = \frac{W}{Q}$	V potential difference W work done Q charge
$V = I \times R$	V potential difference I current R resistance
$P = \frac{E}{t}$	P power E energy t time
$P = I \times V$	P power I current V potential difference
$E = V \times Q$	E energy V potential difference Q charge