

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE

A152/01

TWENTY FIRST CENTURY SCIENCE
ADDITIONAL SCIENCE A

Modules B5 C5 P5 (Foundation Tier)

TUESDAY 22 JANUARY 2013: Morning

DURATION: 1 hour
plus your additional time allowance

MODIFIED ENLARGED 18pt

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR SUPPLIED MATERIALS:

Periodic Table (inserted)
Data Booklet (inserted)

OTHER MATERIALS REQUIRED:


Pencil
Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer ALL the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil ()
- The number of marks is given in brackets [] at the end of each question or part question.
- A list of physics equations is printed in the Data Booklet.
- A list of qualitative tests for ions is printed in the Data Booklet.
- An enlarged copy of the Periodic Table is inserted.
- The total number of marks for this paper is 60.

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Answer ALL the questions.

- 1 In 2010 a volcano erupted in Iceland.
Gases from the volcano pushed clouds of ash into the air.**

- (a) The gases inside the volcano were mainly carbon dioxide and steam.**

Complete the table to show the formulas of these two gases.

carbon dioxide	
steam	

[2]

- (b) Molten lava also came out of the volcano.
The lava contains a lot of silicon dioxide.
Suggest why the lava contains silicon dioxide.
Put a tick (✓) in the box next to the correct answer.**

Silicon dioxide is present in large quantities in the Earth's crust.

☐

Silicon dioxide has a high melting point.

☐

All minerals are made of silicon dioxide.

☐

Silicon dioxide is only found in Iceland.

☐

[1]

- (c) The clouds of ash spread thousands of miles.
Many flights across Europe were cancelled.**

**Information found on the internet says that:
scientists think that the volcano gave off an
estimated 150 000 tonnes of carbon dioxide each
day**

**about 17 000 flights were cancelled each day
because of the volcano**

**on average, a modern plane produces about 20
tonnes of carbon dioxide per flight.**

- (i) Some people say that the volcanic eruption
meant that less carbon dioxide was put into
the atmosphere each day.**

**Use the information above to explain if this is
true. You should include a calculation in your
answer.**

[3]

- (ii) Look at the information on the previous page from the internet.
Some of the numbers may not be accurate.
Explain why some of the numbers may not be accurate.



**The quality of written communication
will be assessed in your answer.**

[6]

(d) Jet fuel is made of hydrogen and carbon.

The equation shows what happens when jet fuel burns.

jet fuel + oxygen \rightarrow carbon dioxide + water

The mass of the products is more than the mass of the fuel.

Explain why.

[2]

(e) Jet engines are hot enough to melt the silicon dioxide in the ash cloud from the volcano.

This damages the engines.

Silicon dioxide has a very high melting point.

Use your understanding of bonding and structure to suggest why silicon dioxide has a high melting point.

[2]

[TOTAL: 16]

2 There are several aluminium refineries in Iceland.

The refineries use an electric current to break down melted aluminium oxide.

(a) What do we call this process?

Put a **ring** around the correct answer.

ELECTROLYSIS

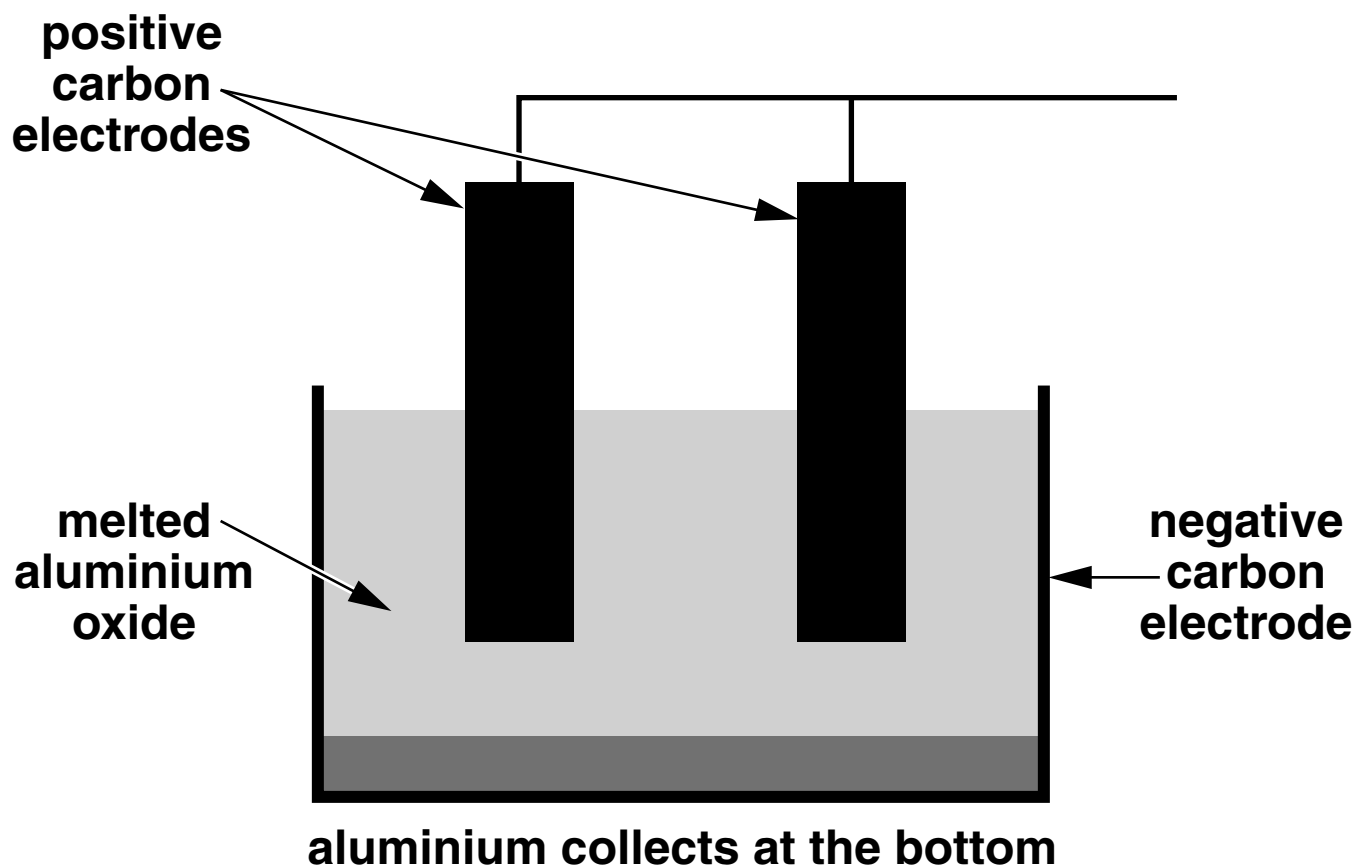
ELECTROMAGNETISM

PRECIPITATION

SOLUBILITY

[1]

(b) The diagram shows a cell used in this process.



Put ticks (✓) in the correct boxes to complete these sentences.

Melted aluminium oxide
conducts electricity

better than	
the same as	
worse than	

solid aluminium oxide.

When the electric current is turned
on, aluminium is formed at

the negative electrode.	
the positive electrode.	
both electrodes.	

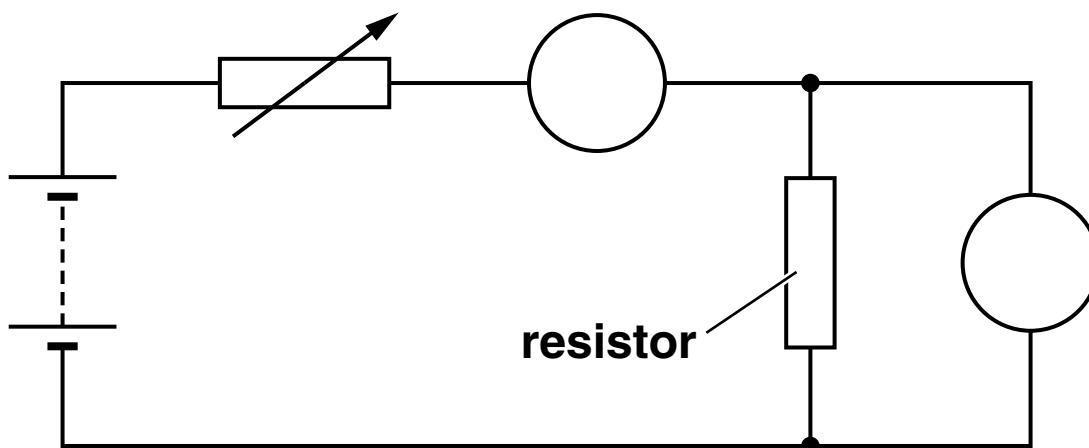
At the positive electrode

aluminium gas is formed.	
hydrogen gas is formed.	
oxygen gas is formed.	
the aluminium in the electrode dissolves.	

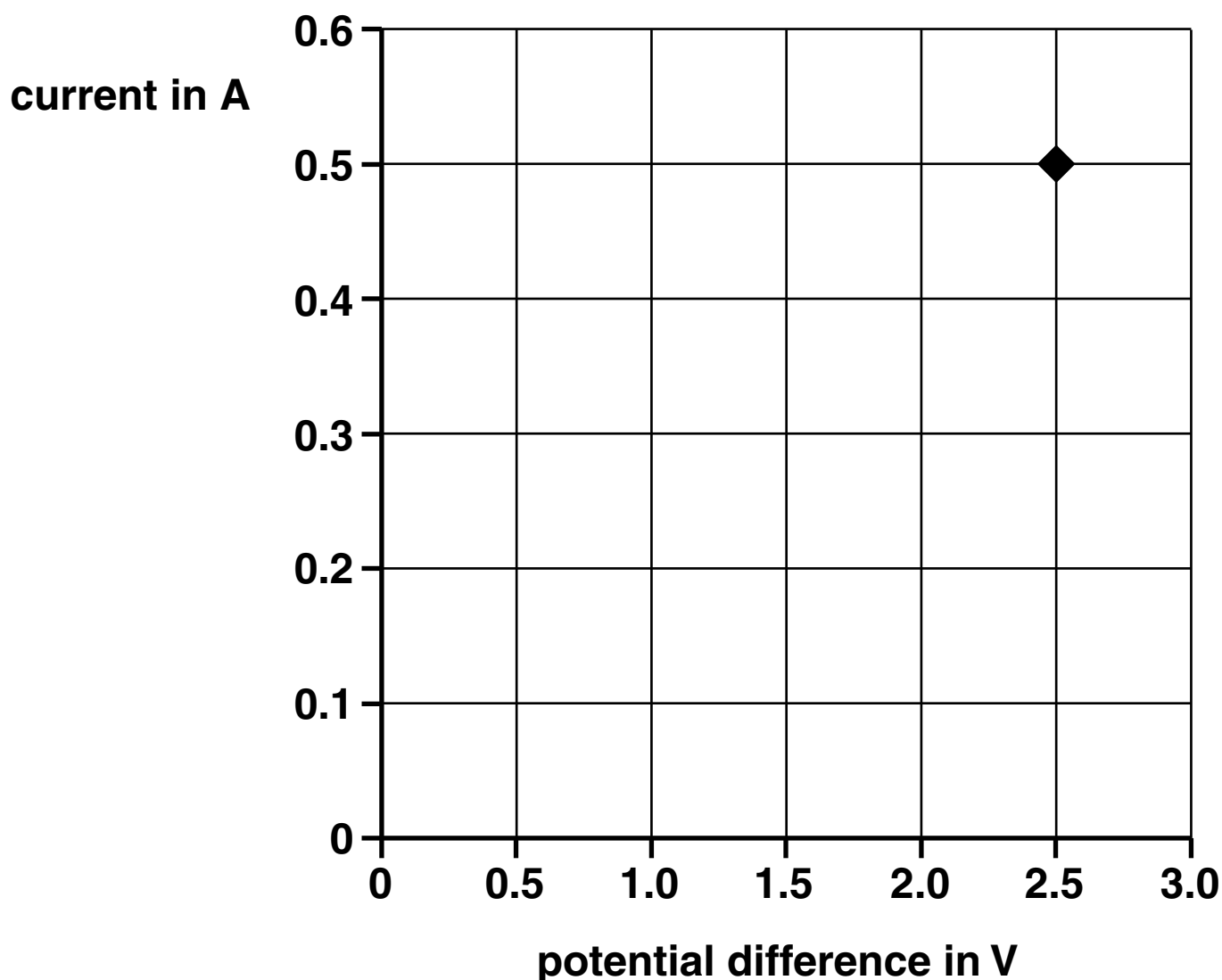
[3]

[TOTAL: 4]

3 Jill uses this circuit to investigate a resistor.



- (a) Both of the meter symbols are incomplete.
Complete the symbols for the two meters in the
circuit. [2]**
- (b) Jill sets the current in the resistor to 0.50 A.
The potential difference across the resistor is 2.5V.
Jill plots this first point on a current-voltage graph
(opposite).**



- (i) Jill makes some more measurements with different values of current.

Draw the line on the graph that the remaining points should lie on.

[1]

- (ii) Jill notices the writing 4R7 on the resistor. She thinks this means that its resistance is $4.7\ \Omega$.

Does this agree with her measurement?
Justify your answer.

[2]

**(c) Jack is another student.
He repeats Jill's experiment immediately with the
same resistor.
Jack's results give the resistance as $4.5\ \Omega$.**

**(i) Suggest why this is NOT the same as Jill's
value.**

_____ **[1]**

**(ii) What further evidence is needed to find the
correct value of the resistance?**

_____ **[2]**

[TOTAL: 8]

4 This question is about how an electric motor works.

Draw straight lines to link the START of each sentence about a simple electric motor to its correct END.

START

END

The coil spins ...

... the coil of wire.

The magnet provides ...

... a steady magnetic field.

The commutator reverses ...

... the current in the coil.

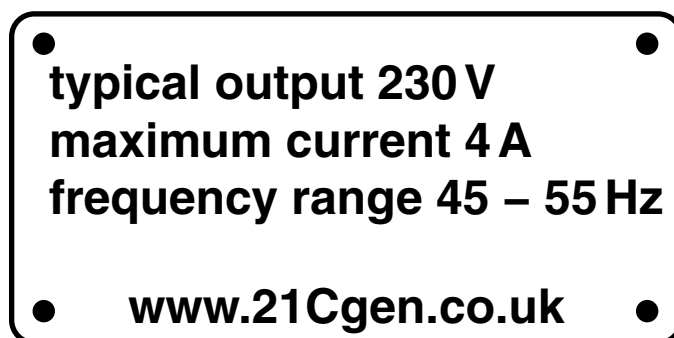
The current passes through ...

... as the field pushes on the wire.

[3]

[TOTAL: 3]

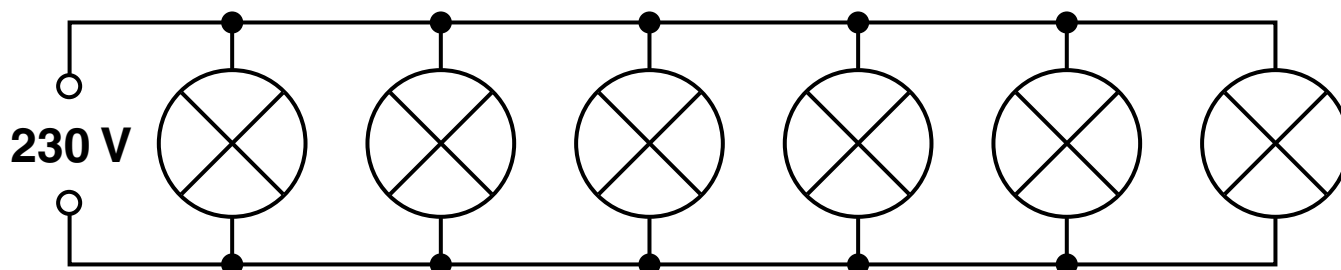
- 5 Priyanka buys a generator to run her caravan lights. She finds this information plate on the generator.



- (a) Calculate the maximum power output of the generator.

power = _____ W [1]

- (b) Priyanka's caravan has six lamps connected in parallel.



Each 230V lamp needs a current of 0.5 A.
Will the generator be able to run the lamps?
Justify your answer.

_____ [2]

[TOTAL: 3]

- 6 Jackie rubs a balloon against Sam's hair.
The hair sticks to the balloon.
When Jackie removes the balloon, Sam's hair stands
on end for a few minutes.
His hair then slowly falls back down again.**

Explain what happens to the balloon and the hair.



**The quality of written communication will be
assessed in your answer.**

[6]

[TOTAL: 6]

7 (a) This question is about DNA and the genetic code.

Complete the sentences.

Choose words from the list.

DOUBLE

FIVE

FOUR

ORDER

SINGLE

SIX

SIZE

STRUCTURE

TRIPLE

DNA has a _____ helix structure.

**Both strands of the DNA molecule are made of
_____ different bases.**

**The genetic code is in the _____
of the bases.**

[2]

**(b) Which chemicals are made from the instructions
in the genetic code?
Put a tick (✓) in the box next to the correct answer.**

bases

☐

carbohydrates

☐

fats

☐

proteins

☐

[1]

- (c) Ben reads about two different parts of an animal cell, part A and part B.

Part A contains DNA, but part B does not.

Copies of genes move from part A to part B.

What can you conclude about part A and part B?

Put a ring around the correct choice to complete each sentence.

Part A is the cell

CYTOPLASM

MEMBRANE

NUCLEUS

VACUOLE

Part B is the cell

CYTOPLASM

MEMBRANE

NUCLEUS

VACUOLE

[2]

[TOTAL: 5]

8 Scientists are trying to use stem cells to treat multiple sclerosis, a disease that damages nerve cells.

(a) Put a tick (✓) in the box next to the correct word to complete each sentence.

Stem cells are

MEIOTIC.	
SPECIALISED.	
UNSPECIALISED.	

Stem cells have

ALL	
NONE	
SOME	

of the same genes as
damaged nerve cells.

Nerve cells have

ALL	
NONE	
SOME	

of their genes switched on.

[2]

BLANK PAGE

- (b) In multiple sclerosis the body's immune system attacks insulating cells in the brain and spinal cord.**

Experiments in test tubes and on laboratory animals suggest that stem cells from bone marrow may offer an effective treatment.

The next stage is to try using stem cells in people with multiple sclerosis.

Some patients discuss this treatment.

SCOTT

I'm scared. I'll wait until the treatment is tested on other people.

TOM

I don't want to take the risk until we know this is 100% safe.

MEGAN

I see no ethical problems with the treatment because they use your own stem cells, not cells from embryos.

OLIVIA

This is a good use of modern technology.

Which patient makes an unreasonable statement?

Justify your answer.

Name _____

Justification _____

[2]

- (c) In the tests on laboratory animals there was one case where the stem cells did not work.**

Does this mean that the treatment should not be tried on people?

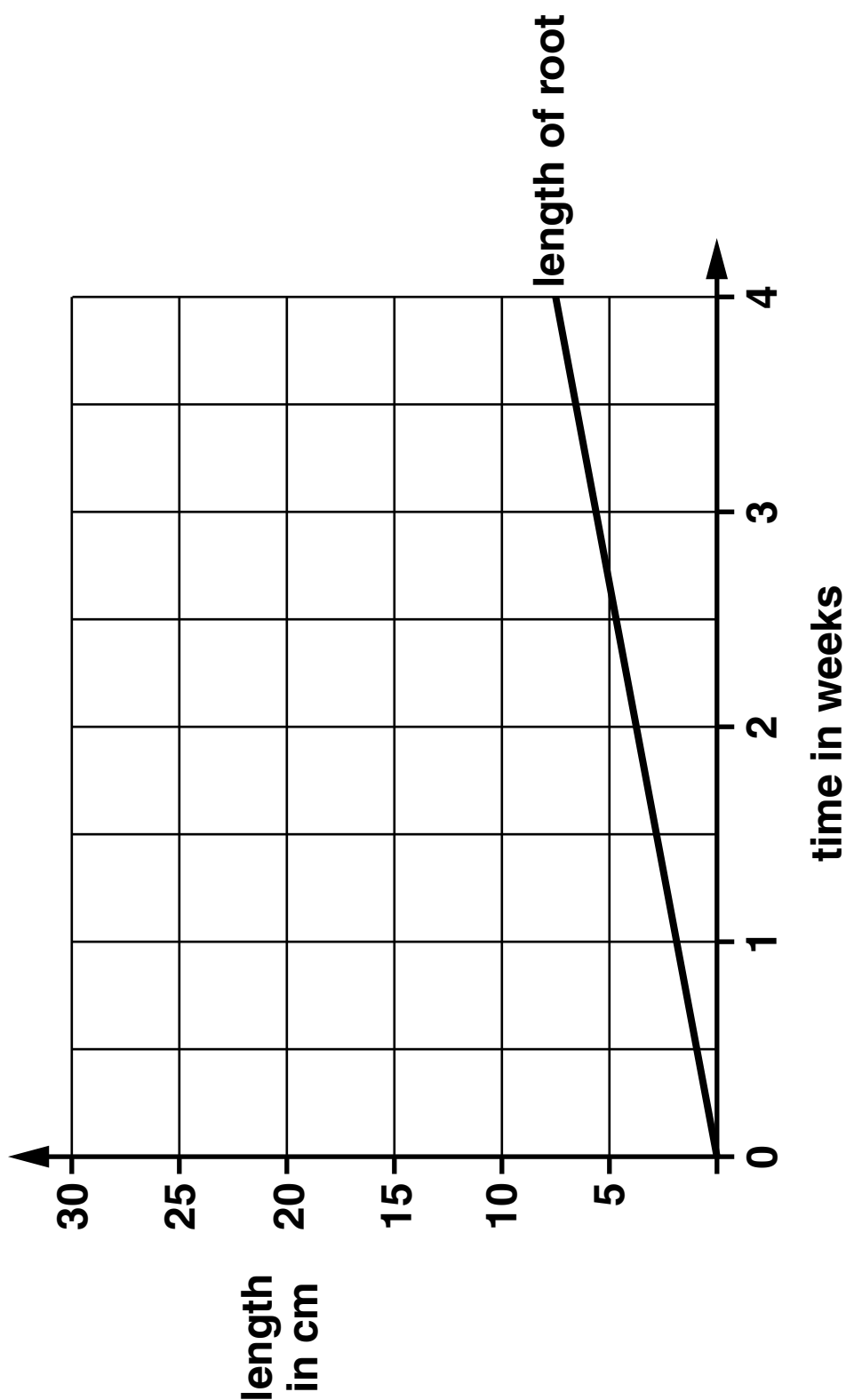
Explain your answer.

[1]

[TOTAL: 5]

- 9 Tony sees a bush in his friend's garden.
He takes a cutting to make a clone of the bush to grow
in his own garden.

Tony measures the length of the root every week and
plots his data on a graph.



He then measures the length of the STEM every week so that he can plot a second line on his graph.

WEEK	LENGTH OF STEM IN cm
0	15
1	15
2	16
3	20
4	25

- (a) Plot the length of the STEM on the same graph and include a curve of best fit for the stem. [2]
- (b) Tony concludes that this plant is NOT growing during the first week.

Explain how Tony came to this conclusion and explain why the conclusion is wrong.

[2]

[TOTAL: 4]

10 In humans, sperm cells and skin cells are made by different types of cell division.

Sperm cells have a different number of chromosomes to skin cells.

Compare the types of cell division that make sperm cells and skin cells in order to explain why it is important for sperm cells to be formed by a different type of cell division.



The quality of written communication will be assessed in your answer.

[6]

[TOTAL: 6]

END OF QUESTION PAPER

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