

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier
June 2013

Additional Science 1

AS1FP

Unit 5

F

Tuesday 14 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 13(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	
TOTAL	



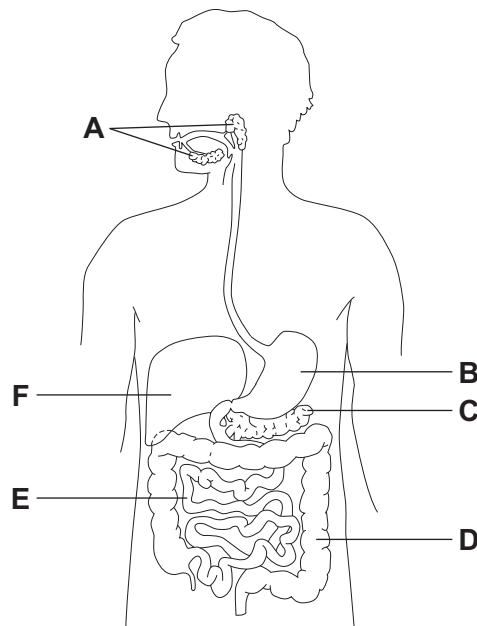
J U N 1 3 A S 1 F P O 1

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

Biology Questions

- 1 **Diagram 1** shows the digestive system.
Letters **A** to **F** show parts of the digestive system.

Diagram 1



- 1 (a) Answer each question by writing **one** letter, **A** to **F**, in each box.

1 (a) (i) Which letter shows the salivary glands?

(1 mark)

1 (a) (ii) In which **two** organs does digestion happen?

and

(2 marks)

1 (a) (iii) In which organ is bile made?

(1 mark)

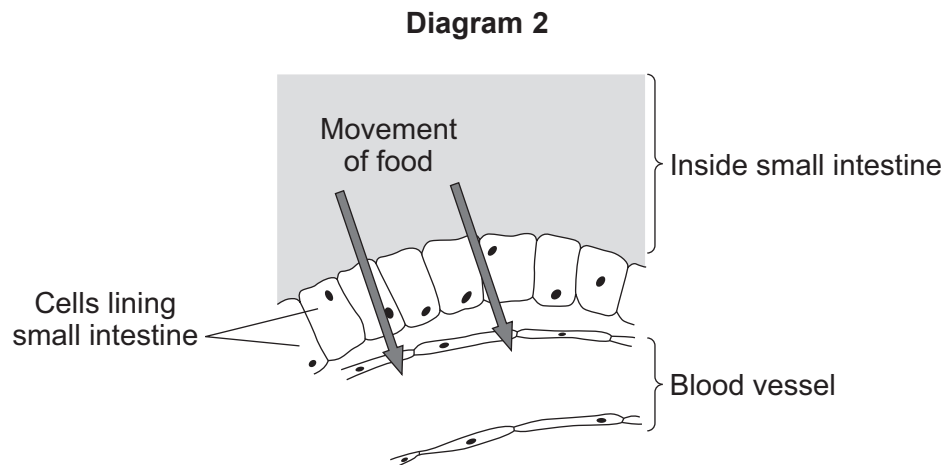
1 (a) (iv) In which organ are faeces made?

(1 mark)



- 1 (b) During absorption food moves from the small intestine into the blood.

Diagram 2 shows part of the surface of the small intestine and a blood vessel.



- 1 (b) (i) Food moves from the small intestine into the blood.

Why?

Tick (✓) **one** box.

The concentration of food is . . .	Tick (✓)
higher in the small intestine than in the blood.	<input type="checkbox"/>
lower in the small intestine than in the blood.	<input type="checkbox"/>
the same in the small intestine as in the blood.	<input type="checkbox"/>

(1 mark)

- 1 (b) (ii) How does the food move from the small intestine into the blood?

Draw a ring around the correct answer.

by diffusion

by digestion

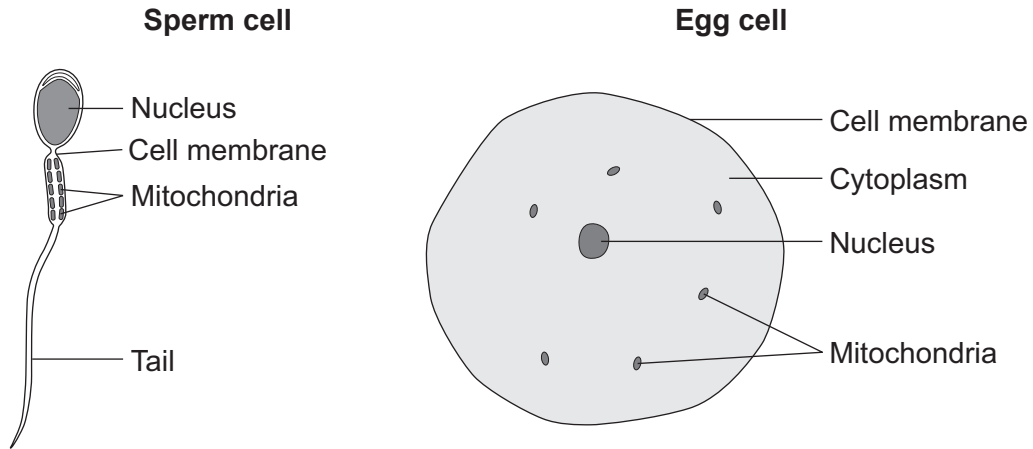
by dilution

(1 mark)

Turn over ►



2 The diagrams show a human sperm cell and a human egg cell.
The diagrams are **not** to the same scale.



2 (a) Sperm cells contain many mitochondria.

Why?

.....

.....

.....

.....

(2 marks)

2 (b) Both the sperm cell and the egg cell have a cell membrane.

Give **one** reason why cells need a cell membrane.

.....

.....

(1 mark)



2 (c) (i) In the diagram the sperm cell is 50 mm long.
The diagram of the sperm cell is magnified 1000 times.

The actual length of the sperm cell can be calculated using the formula:

$$\text{Actual length} = \frac{\text{Length of cell on the diagram}}{\text{Magnification}}$$

Calculate the actual length of the sperm cell.

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

Actual length = mm
(2 marks)

2 (c) (ii) An egg cell is about 0.15 mm across.

Compare the size of a sperm cell with the size of an egg cell.

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

A sperm cell is

smaller than
the same size as
larger than

 an egg cell.

(1 mark)

6

Turn over for the next question

Turn over ►



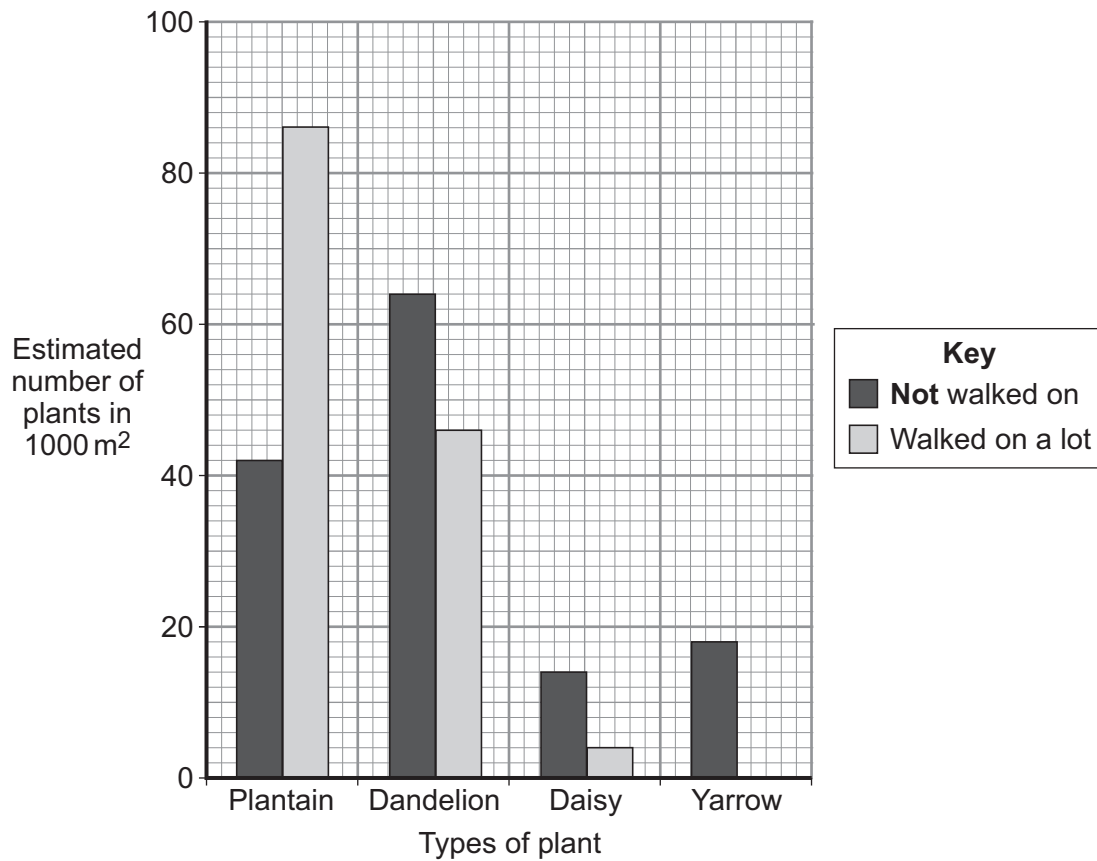
3 Students estimated the numbers of four different types of plant growing on a school field.

The students surveyed:

- an area **not** walked on
- an area walked on a lot.

Each area was 1000 m².

The bar chart shows the results.



3 (a) The students did **not** count every daisy plant in each 1000 m² area.

The students used a quadrat to estimate the number of daisies in the area that was walked on.



3 (a) (i) Describe how the students should have used the quadrat to get the results shown in the bar chart.

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

(4 marks)

3 (a) (ii) The numbers of daisies growing on the field are only estimates.
Why are these numbers only estimates?

.....
.....

(1 mark)

3 (b) Look at the bar chart.

3 (b) (i) Compare the walked on area with the area **not** walked on.

Describe **two** differences in the distribution of plantain, dandelion and yarrow in the two areas.

1

.....

2

.....

(2 marks)

3 (b) (ii) Suggest **one** reason for the differences you described in part (b)(i).

.....
.....

(1 mark)

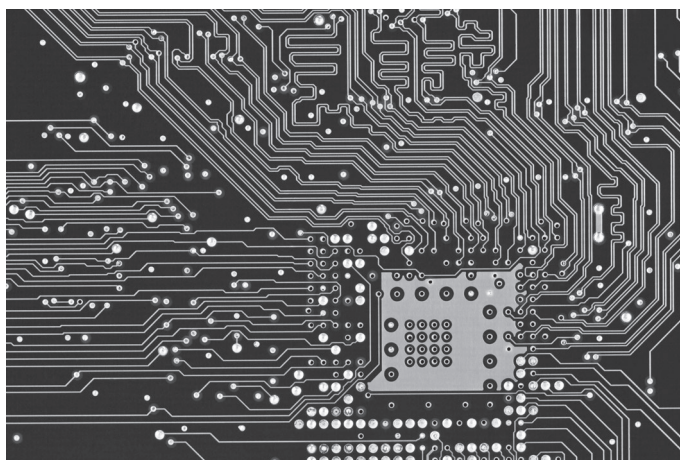
8

Turn over ►

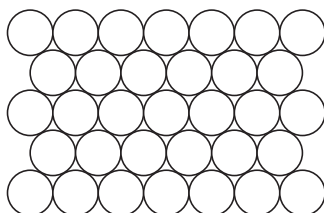


Chemistry Questions

- 4 Silver can be used to make electrical connections in circuit boards.



- 4 (a) The diagram below shows how the atoms are arranged in silver metal.



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

The atoms in silver are arranged in a

covalent structure.

giant structure.

simple molecule.

(1 mark)



4 (a) (ii) Explain how the structure of silver allows it to be pulled into thin wires.

Use the diagram of the arrangement of atoms in silver to help you answer this question.

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

(2 marks)

4 (b) The table shows the cost and electrical conductivity of three metals.

Metal	Cost in £ per kg	Electrical conductivity in arbitrary units
Aluminium	1	37
Copper	6	59
Silver	707	62

4 (b) (i) Which of these metals is the best electrical conductor?

.....
(1 mark)

4 (b) (ii) Copper is used for electrical wiring in houses.

Use information from the table to help you complete the following sentences.

Silver is **not** used for electrical wiring in houses because

.....

Aluminium is **not** used for electrical wiring in houses because

.....

(2 marks)

6

Turn over for the next question

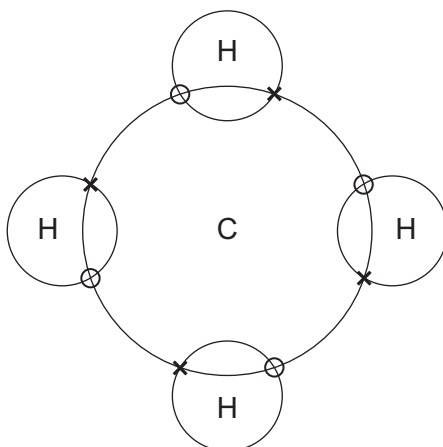
Turn over ►



- 5 A Bunsen burner burns natural gas. Natural gas is mainly methane.



- 5 (a) The diagram below represents a methane molecule.



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

Methane is
 a compound.
 an element.
 a metal.

Methane is a
 giant
 polymer
 simple
 molecule.

(2 marks)



5 (a) (ii) What is the chemical formula of methane?

.....

(1 mark)

5 (a) (iii) What is the name of the particle represented by the symbols \times and \circ on the diagram?

.....

(1 mark)

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

5 (b) (i) The atoms in methane are held together by

covalent

ionic

bonds.

metallic

(1 mark)

5 (b) (ii) Methane is a gas at room temperature. The boiling point of methane is

-161 °C.

100 °C.

161 °C.

(1 mark)

5 (c) Why does methane **not** conduct electricity?

.....

.....

(1 mark)

7

Turn over for the next question

Turn over ►



- 6** 'Laughing gas' is used to reduce pain during childbirth.
Laughing gas is nitrous oxide.

The chemical formula of nitrous oxide is N_2O

- 6 (a)** The relative formula mass (M_r) of N_2O is 44

Relative atomic masses (A_r): N=14, O=16

Calculate the percentage of oxygen in N_2O

Use the equation to help you answer this question.

$$\text{Percentage (\%)} \text{ of element} = \frac{\text{relative atomic mass of element}}{\text{relative formula mass of compound}} \times 100$$

.....

.....

.....

.....

Percentage of oxygen = %
(2 marks)

- 6 (b)** Draw a ring around the correct answer to complete the sentence.

The mass of one mole of N_2O is

14 g.

16 g.

44 g.

(1 mark)

3



7 The Mary Rose is a wooden ship that sank in 1545.

In 1982 the ship was brought to the surface.



7 (a) A polymer called PEG was used to help preserve the ship.

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

PEG is a thermosoftening polymer because it has

cross-linked

rigid

polymer chains.

tangled

(1 mark)

7 (b) Complete the following sentence.

PEG melts when heated. Polymers that do **not** melt when heated are called

thermo..... polymers.

(1 mark)

7 (c) Short-chained PEG was used in the Mary Rose. A different type of PEG is long-chained PEG.

Use words from the box to complete the sentence.

catalyst

gas

solid

temperature

Compared to making short-chained PEG, the reaction to make long-chained PEG uses a different and a different

(2 marks)

4

Turn over ►



Physics Questions

8 This question is about electrical circuits.

- 8 (a) **List A** shows the names of three electrical components.
List B shows the circuit symbols for some electrical components.

Draw **one** line between each electrical component and the correct circuit symbol.

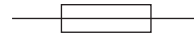
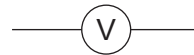
List A
Electrical components

Voltmeter

Diode

Fuse

List B
Circuit symbols

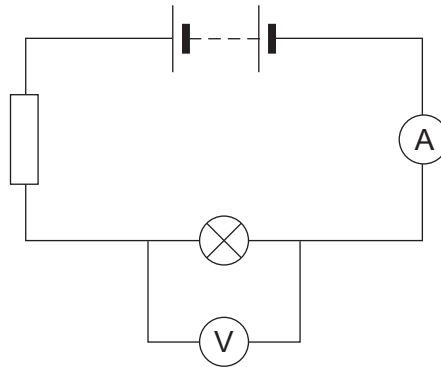


(3 marks)



- 8 (b)** A student is investigating how the resistance in a circuit affects the brightness of a bulb. She connects the following circuit.

Diagram 1



The student replaces the resistor with one which has a greater resistance.

- 8 (b) (i)** Draw a ring around the correct answer in each box to complete each sentence.

The reading on the ammeter

decreases.
increases.
stays the same.

The brightness of the bulb

decreases.
increases.
stays the same.

(2 marks)

Question 8 continues on the next page

Turn over ►

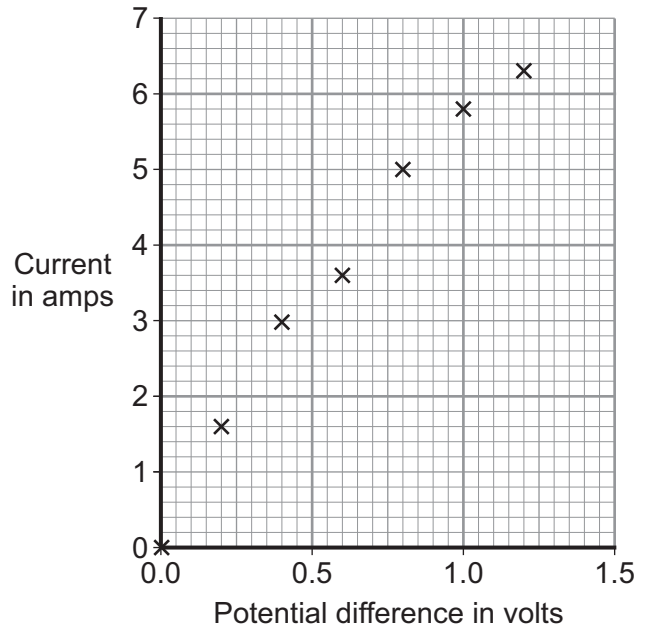


8 (b) (ii) The student replaces the resistor in **Diagram 1** with a variable resistor.

The student varies the resistance and takes readings from the voltmeter and the ammeter. She writes the results in a table.

She uses the readings to plot a current-potential difference graph.

Potential difference in volts	Current in amps
0.0	0.0
0.2	1.6
0.4	3.0
0.6	3.6
0.8	5.0
1.0	5.8
1.2	6.3



One of the student's results is anomalous.

Draw a ring around the anomalous result **on the graph**.

(1 mark)

8 (b) (iii) Suggest **one** reason for the anomalous result.

.....

(1 mark)

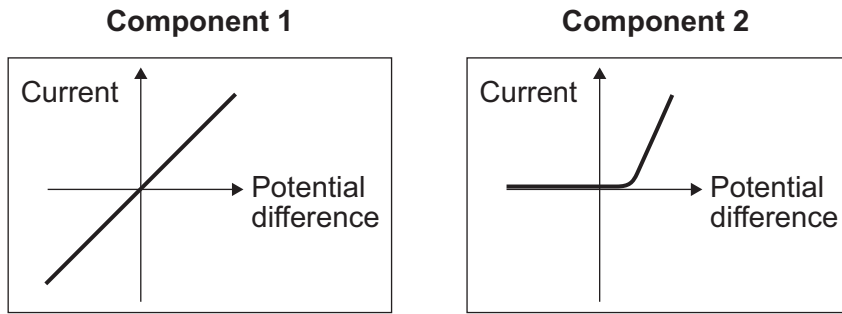
8 (b) (iv) Suggest **one** improvement the student could make to her investigation.

.....

(1 mark)



8 (c) The current-potential difference graphs for two electrical components are shown below.



Name the **two** components.

Component 1

Component 2

(2 marks)

10

Turn over for the next question

Turn over ►



- 9** The International Space Station (ISS) is a scientific research laboratory in space.
The photograph shows a rocket carrying supplies for the ISS ready for take-off.



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

The resultant force on the rocket before take-off is

- | |
|--------|
| zero. |
| large. |
| small. |

(1 mark)

- 9 (b)** The mass of the rocket before take-off is 500 000 kg.
The resultant force on the rocket just after take-off is 6 000 000 N.

Calculate the acceleration of the rocket just after take-off.

Use the correct equation from the Physics Equations Sheet.

.....

Acceleration =

Draw a ring around the correct unit.

- m** **m/s** **m/s²**

(3 marks)



9 (c) In the first second after take-off the speed of the rocket increases.

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

As the speed of the rocket increases the frictional force on the rocket

- decreases.
- increases.
- stays the same.

(1 mark)

9 (d) The mass of the rocket decreases as fuel is burnt.

Before connecting with the ISS, the velocity of the rocket is 0.05m/s and the mass of the rocket is 15 000 kg.

Calculate the momentum of the rocket before connecting with the ISS.

Use the correct equation from the Physics Equations Sheet.

.....

.....

.....

Momentum = kg m/s
(2 marks)

Question 9 continues on the next page

Turn over ►



9 (e) It is important to reduce the velocity of the rocket to zero as it connects with the ISS.

Suggest **two** possible problems if the rocket does **not** have zero velocity when it connects with the ISS.

1

.....

2

.....

(2 marks)

9 (f) It has cost over 90 billion pounds to build and maintain the ISS for the last 30 years.

Do you think the cost is justified?

Draw a ring around your answer. **Yes** / **No**

Give a reason for your answer.

.....

.....

.....

(1 mark)

10



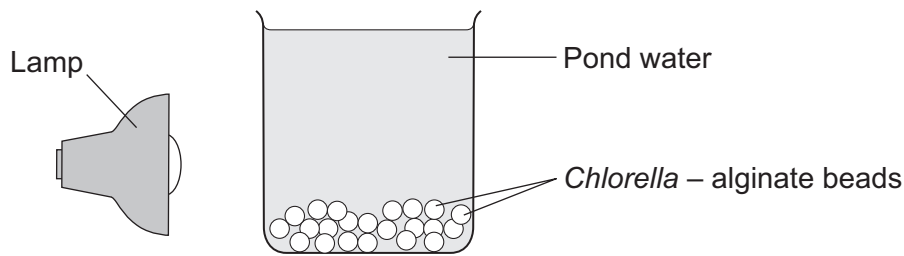
Biology Questions

- 10** Students investigated the effect of light intensity on the rate of photosynthesis by an alga called *Chlorella*.

The students:

- used *Chlorella* to make alginate beads
- put *Chlorella*-alginate beads into each of five beakers of pond water
- put lamps at different distances from each beaker.

The diagram shows how the investigation was set up.



- 10 (a)** The students needed to control variables in their investigation to make the investigation fair.

Give **one** control variable the students should have used in the investigation.

.....
(1 mark)

- 10 (b)** The students switched on the lamps.

Soon afterwards, the *Chlorella*-alginate beads floated to the surface of the water.

Each floating bead had tiny bubbles around it.

Which gas was in the bubbles?

Draw a ring around the correct answer.

carbon dioxide

nitrogen

oxygen

(1 mark)

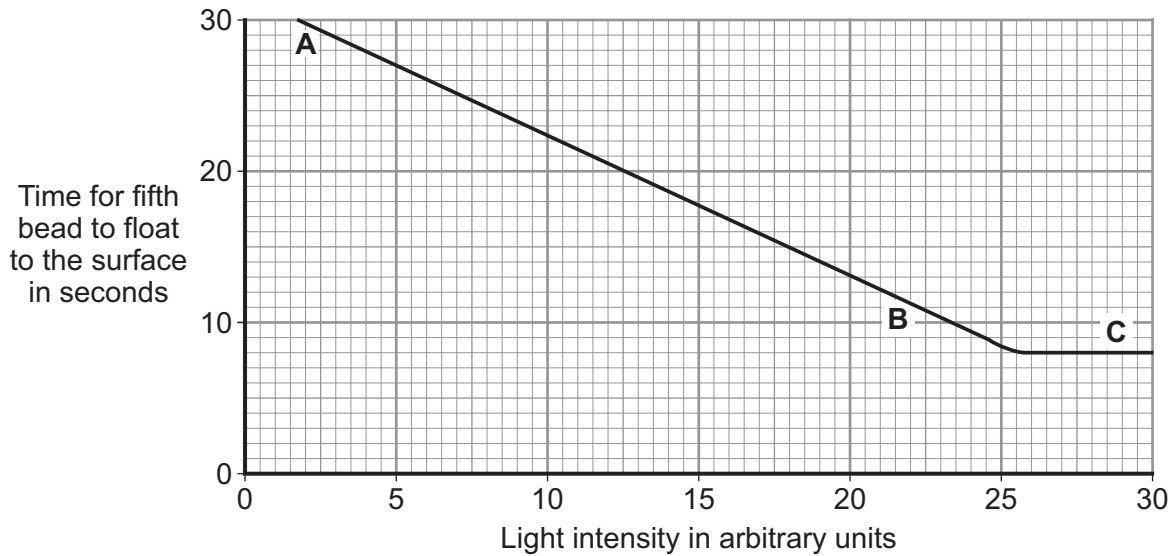
Question 10 continues on the next page

Turn over ►



- 10 (c)** The students measured the light intensity for each beaker. For each light intensity, the students recorded the time taken for the fifth bead to float to the surface of the water.

The graph shows the results.



The results were used to measure the rate of photosynthesis.

- 10 (c) (i)** Between points **A** and **B** on the graph the time for the fifth bead to float to the surface of the water decreases.

Explain why.

.....

.....

.....

.....

.....

.....

(3 marks)

- 10 (c) (ii)** At point **C**, increasing light intensity does **not** increase the rate of photosynthesis.

Give **one** reason why.

.....

.....

(1 mark)



10 (d) Scientists are planning to build laboratories on the moon.
The people who work in the laboratories will need food.

Scientists are investigating using algae such as *Chlorella* as food.

10 (d) (i) Suggest **one** advantage and **one** disadvantage of using algae such as *Chlorella*, and **not** vegetables, as food.

Advantage

.....

.....

Disadvantage

.....

.....

(2 marks)

10 (d) (ii) Give **one** other advantage of keeping algae such as *Chlorella* in laboratories on the moon.

Do **not** include food in your answer.

.....

.....

(1 mark)

9

Turn over for the next question

Turn over ►



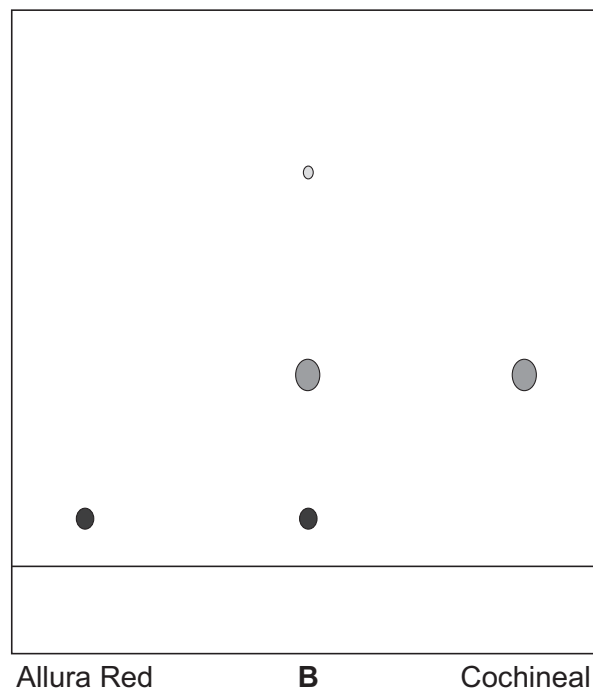
Chemistry Questions

11 A company making sweets uses different colour additives in different countries. In some countries the company uses Allura Red to colour sweets red.

Some European countries recommend children do **not** eat Allura Red. In Europe the company uses Cochineal instead of Allura Red to colour sweets red.

A different red food colouring, **B**, was compared with Cochineal and Allura Red using paper chromatography.

The diagram shows the results.



11 (a) (i) How can you tell from the diagram that the three food colourings are **not** the same?

.....

.....

.....

.....

(2 marks)



11 (a) (ii) The red food colouring, **B**, is **not** suitable for use in sweets sold in European countries.
Suggest **one** reason why.

.....
.....

(1 mark)

11 (b) Give **two** reasons why food scientists use instrumental methods instead of paper chromatography to analyse food colourings.

1

.....

2

.....

(2 marks)

5

Turn over for the next question

Turn over ►



12 Herbs and spices can be treated with radiation to kill bacteria. Radiation from the isotope $^{60}_{27}\text{Co}$ is used to treat the herbs and spices. This means the herbs and spices can be stored for a long time.

12 (a) The most common isotope of cobalt is $^{59}_{27}\text{Co}$
Complete the table.

	$^{59}_{27}\text{Co}$	$^{60}_{27}\text{Co}$
Number of protons		
Number of neutrons		
Mass number		

(3 marks)

12 (b) The European Union does **not** allow the sale of most foods treated with radiation from $^{60}_{27}\text{Co}$

In America, food is allowed to be treated with radiation from $^{60}_{27}\text{Co}$

In America, food treated with radiation from $^{60}_{27}\text{Co}$ must be labelled with the symbol shown below.



Suggest an explanation why a symbol is used on the labels of food treated with radiation.

.....

.....

.....

.....

(2 marks)



Turn over for the next question

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

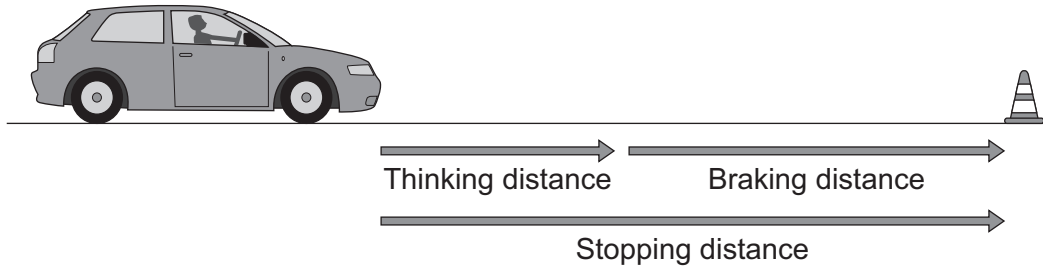
Turn over ►



Physics Questions

13 (a) A driver on a motorway sees a hazard ahead and brakes to stop.

The stopping distance of the car is the thinking distance added to the braking distance.



13 (a) (i) What is meant by:

thinking distance

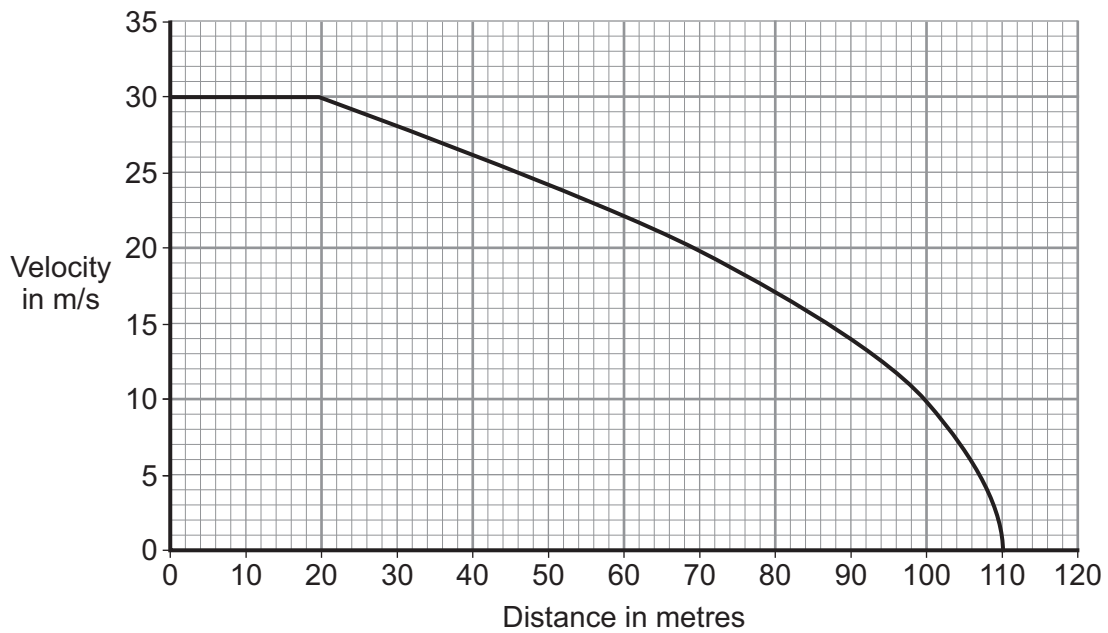
.....

braking distance

.....

(2 marks)

13 (a) (ii) The graph shows how the velocity of the car changes during the stopping distance.



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**

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

- Question 4: Photograph of Circuit board © Thinkstock
Question 5: Photograph of Bunsen burner © Thinkstock
Question 7: Diagram of Mary Rose © Thinkstock
Question 9: Photograph of Soyuz rocket © Thinkstock

