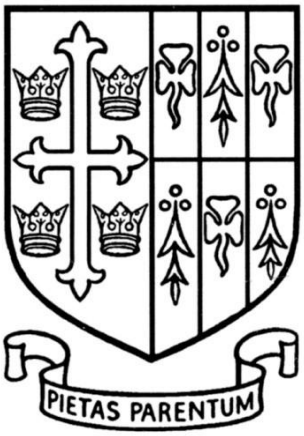
ST EDWARD'S
OXFORD



13+ Entrance Assessment

2013

Science

1 hour

Candidate Name: …….

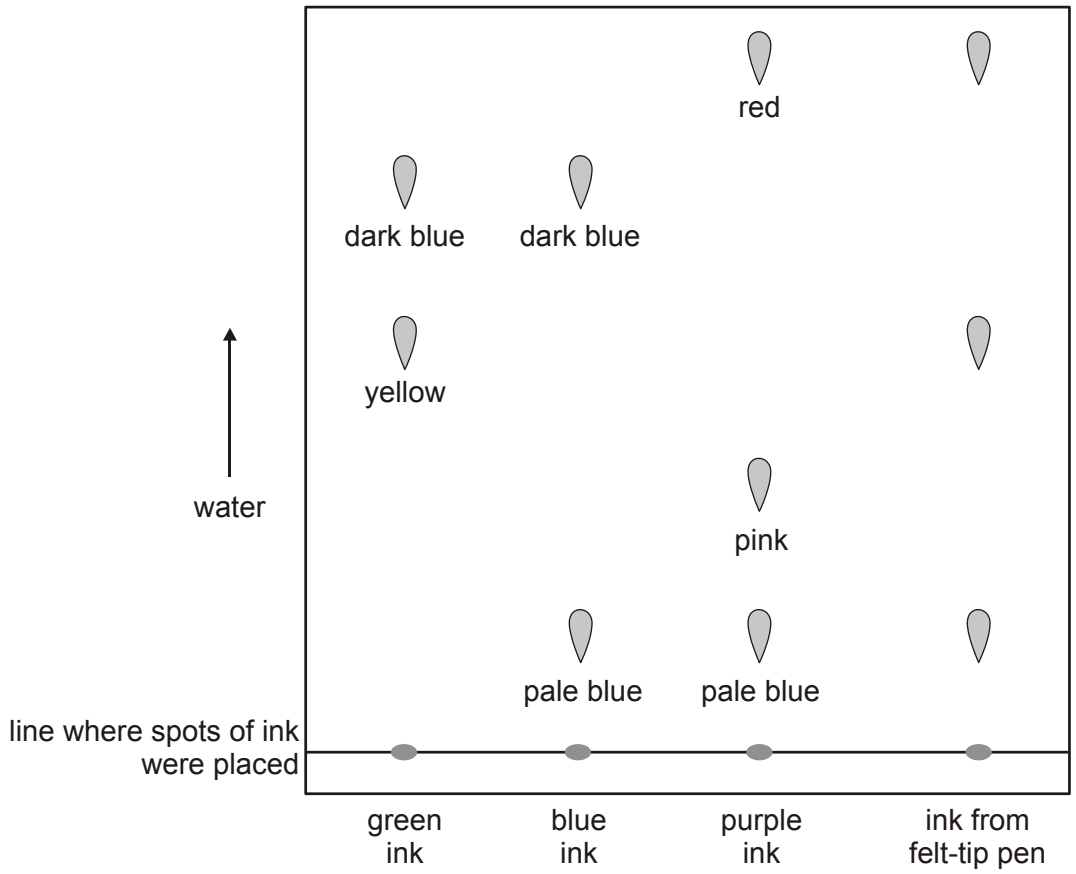
CHEMISTRY

1. Susie used chromatography to identify the coloured substances in the ink from a felt-tip pen.

She used:

- green ink
- blue ink
- purple ink
- ink from her felt-tip pen.

She used water as the solvent.



Look at the diagram above.

(a) (i) Which colours were present in the ink from the felt-tip pen?

.....

1 mark

(ii) How many coloured substances were there in green ink?

……

How can you tell?

.....

.....

1 mark

(iii) Susie placed the spots of ink on a line on the chromatography paper as shown in the diagram.
To draw the line, Susie had to choose a felt-tip pen or a pencil.

Which **one** should she use?

.....

Give the reason for your answer.

.....

.....

1 mark

(b) Susie used water as the solvent in this experiment.
When she repeated the experiment with a different set of pens, it did **not** work.
She then used ethanol instead of water.

Suggest why the experiment worked with ethanol but **not** with water.

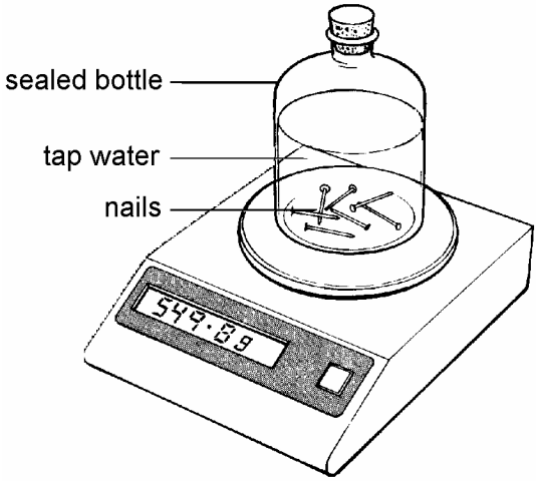
.....

.....

1 mark

maximum 4 marks

2. An experiment was set up to investigate rusting. Some clean, shiny, iron nails were sealed in a glass bottle containing some tap water. The sealed bottle was then placed on a top-pan balance. The reading on the balance was 549.8 g.



The sealed bottle was left for one week. After one week the nails were rusty.

(a) (i) What would you expect the reading on the balance to be after one week?

.....

1 mark

(ii) Give a reason for your answer.

.....

1 mark

(b) (i) Rust is an oxide of iron. Another oxide of iron is iron(III) oxide.
Write a word equation for the formation of iron(III) oxide from its elements.

.....

1 mark

(ii) Which one of the following words describes the formation of iron(III) oxide from its elements?

combustion **condensation** **decomposition** **oxidation**

.....

1 mark

Maximum 4 marks

3. Some pupils predicted that water will evaporate faster if the surrounding air temperature is higher.

To investigate their prediction they placed some water in containers in two different rooms.

(a) Give **two** factors they should keep the same to make their investigation fair.

1. .....

1 mark

2. .....

1 mark

(b) They recorded the mass of the water and the container in room 1 and room 2 every day for 5 days.

The table below shows their results.

time (days)	**mass of water and container (g)**	
	room 1	**room 2**
0	100	100
1	92	85
2	80	72
3	72	54
4	60	45
5	46	30

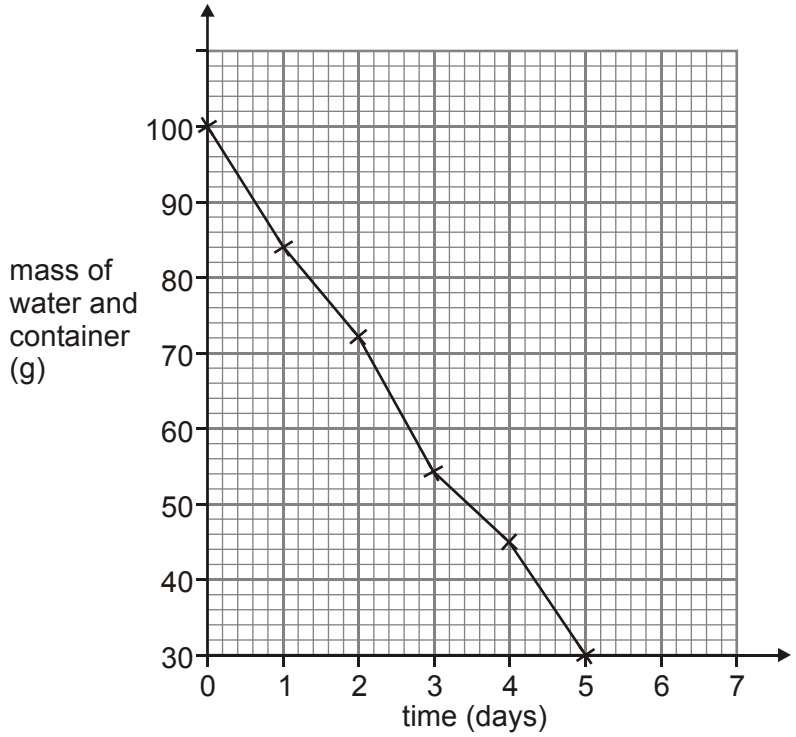
The data shown in their table is **not** sufficient to test their prediction.
Explain why.

.....

.....

1 mark

They plotted their data for room 2 and attempted to draw a line of best fit.



(c) Describe the mistake they made in drawing the line of best fit.

.....

.....

1 mark

(d) Using the data in the table plot the points for room 1.

1 mark

(e) Draw a line of best fit of the points you have drawn.

1 mark

(f) In which room did the water evaporate more quickly?
Tick **one** box.

room 1 ☐ room 2 ☐

Use their data to explain your answer.

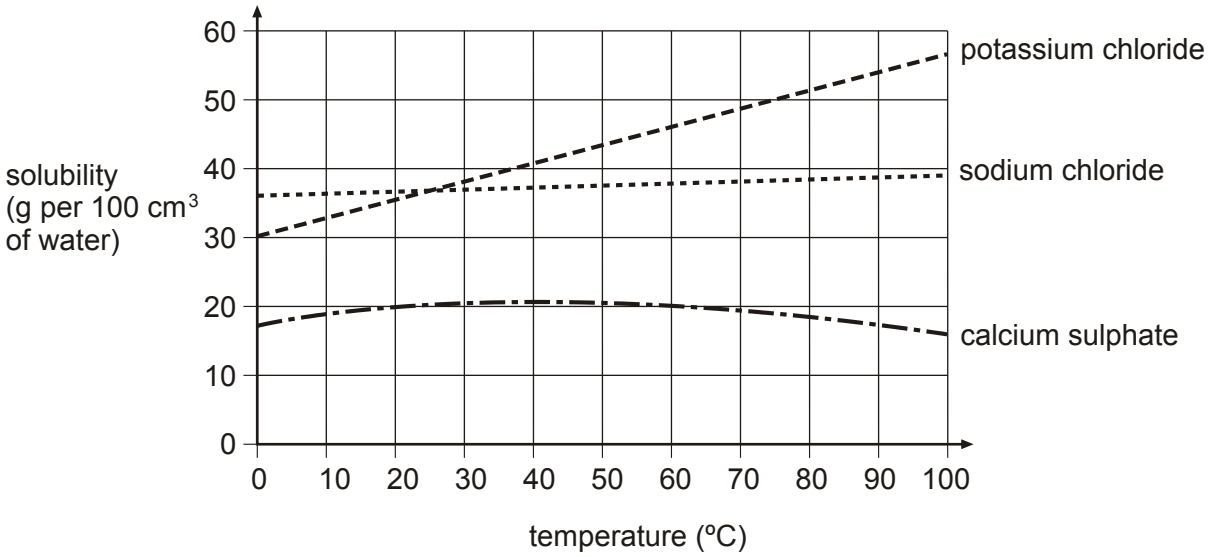
.....

.....

1 mark

maximum 7 marks

4. The graph below shows how the solubility of three salts, sodium chloride, potassium chloride and calcium sulphate, changes as the temperature changes.



(a) (i) Use the graph above to compare the solubility of sodium chloride and potassium chloride in the temperature range 10°C to 90°C.

.....

.....

.....

.....

2 marks

(ii) Ken had a beaker containing 54 g of potassium chloride dissolved in 100 cm^3 of water at 90°C.

He cooled the solution to 40°C.

What would he see in the beaker as the solution cooled to 40°C?

Use the graph to help you.

.....

1 mark

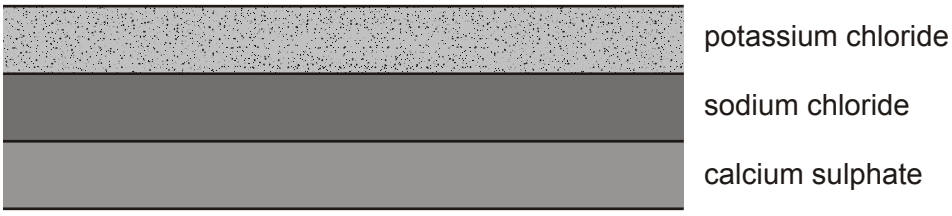
Explain your answer.

.....

.....

1 mark

(b) The water in a lake had the three salts dissolved in it. The water evaporated from the lake and the salts were deposited in layers in the order shown below.



Look at the graph above.

(i) What evidence is there that these three salts were deposited at a temperature above 25°C?

.....

1 mark

(ii) In what order would the salts be deposited at 10°C?

top.....

middle.....

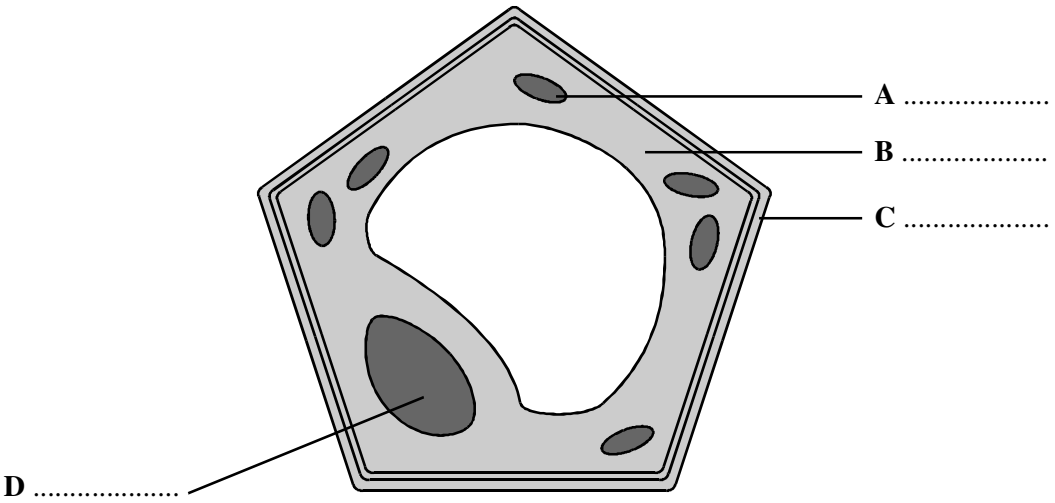
bottom.....

1 mark

maximum 6 marks

BIOLOGY

1. The diagram shows a cell from a blade of grass.



(a) On the diagram, use words from the list to name the parts labelled **A-D.**

cell membrane	**cell wall**	**chloroplast**
cytoplasm	**nucleus**	**vacuole**

(4)

(b) Name **two** parts of the grass cell which are **not** found in any of the cells in an animal.

1 .....

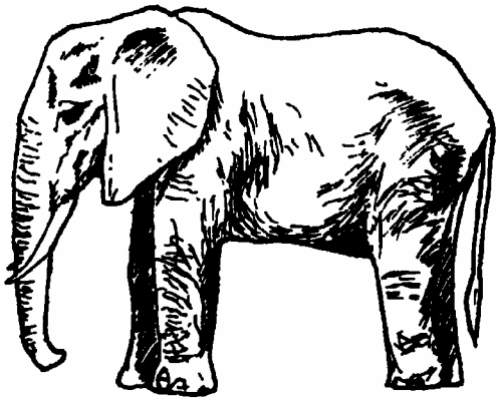
2 .....

(2)

(Total 6 marks)

2. The elephant is likely to become extinct in parts of Africa.

Use the information below to explain **three** reasons why.



* The African elephant eats lots of trees and other plants for food.
* In Africa the human population is increasing and more food is needed to feed the extra people.
* More trees are cut down for fuel and to clear land for growing crops.
* Elephants are killed by poachers who want the ivory from their tusks.
* A herd of elephants needs a large area in which to live and feed.

1 .....

.....

2 .....

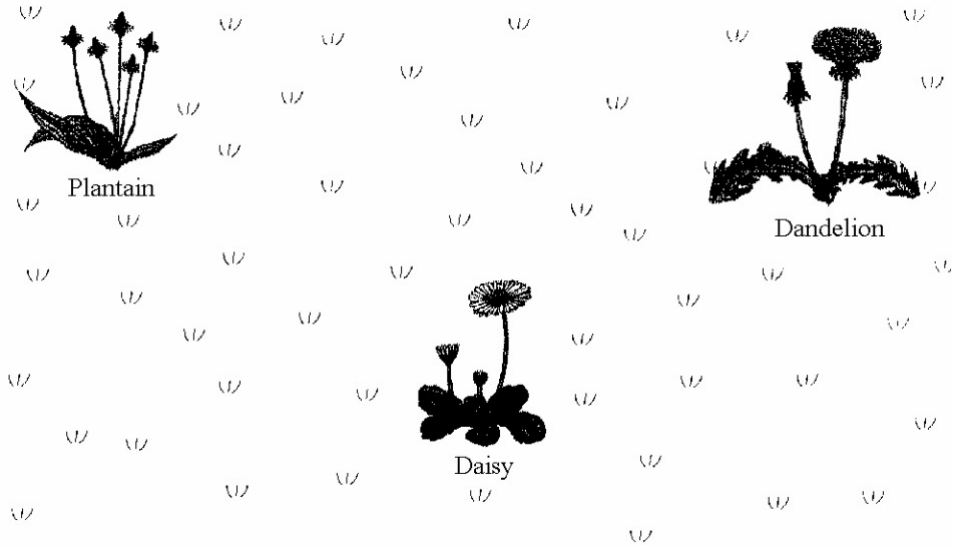
.....

3 .....

.....

(Total 3 marks)

3. The diagram shows three plants on a lawn.



(a) State **one** way in which the leaves of these plants are adapted to survive. Give a reason for your answer.

.....

.....

(2)

(b) Why does grass **not** grow underneath the leaves?

.....

.....

(1)
(Total 3 marks)

4. Complete the table to show which part of the blood carries out each function.

Choose your answers from the list.

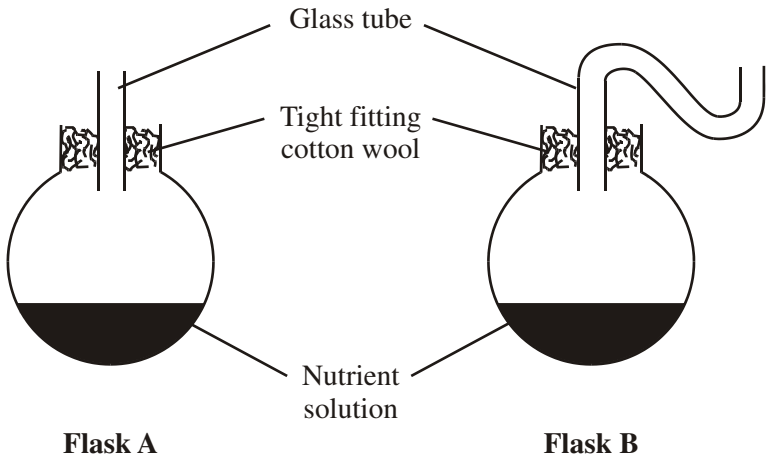
plasma **platelet** **red blood cell** **white blood cell**

The first answer has been done for you.

Function	Part of the blood
Transports most of the carbon dioxide	*plasma*
Transports most of the oxygen	
Helps blood to clot at a wound	
Defends the body against microorganisms	
Transports the products of digestion	

(Total 4 marks)

5. In the 1800s, Louis Pasteur investigated the reasons why food goes rotten.
To check one of Pasteur's experiments, a student set up the two flasks shown in the diagram.



After three days the nutrient solution in both flasks had gone rotten.

(a) What makes the nutrient solution go rotten?

.....

(1)

(b) The student then set up two more similar flasks. This time, she boiled the nutrient solution in both flasks for ten minutes.

(i) Why did she boil the nutrient solution?

.....

(1)

(ii) Why did the nutrient solution in flask **A** go rotten?

.....

(1)

(iii) Why did the nutrient solution in flask **B not** go rotten?

.....

.....

(1)

(Total 4 marks)

PHYSICS

1. Oliver clamped a wooden plank to a desk. There was a 40 cm overhang as shown in diagram 1.

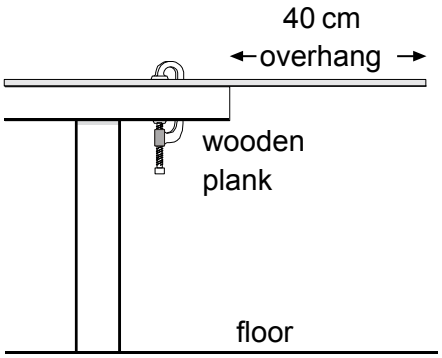


diagram 1

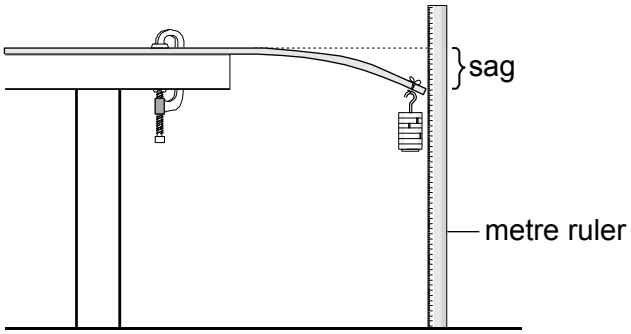
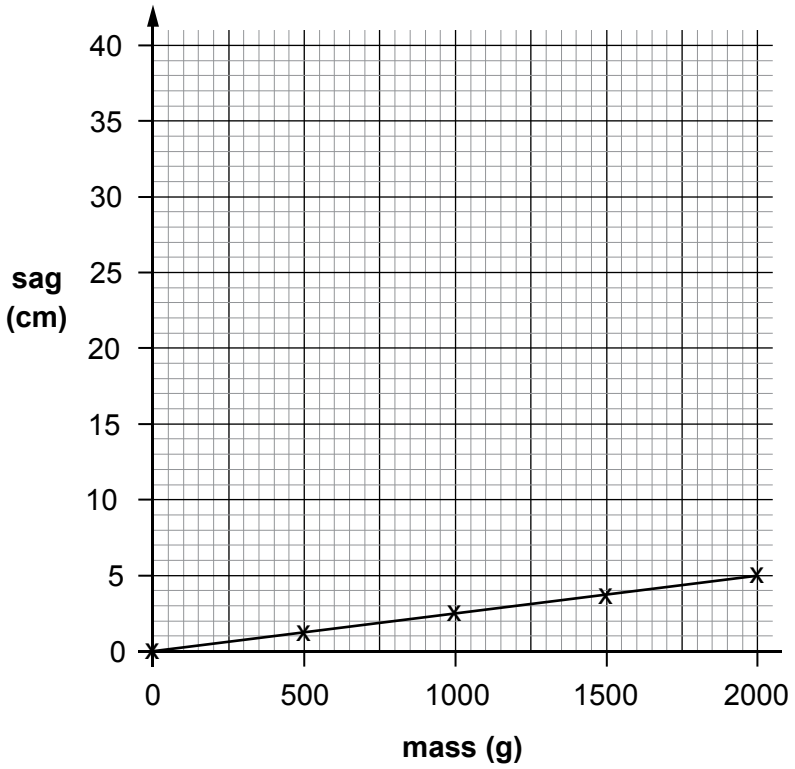


diagram 2

Oliver added masses to the end of the wooden plank as shown in diagram 2.
He measured the sag.
The graph below shows his results.



(a) What measurements would Oliver need to take to work out the sag?

.....

.....

1 mark

(b) Oliver repeated his test with a new plank with an 80 cm overhang. His results are shown below.

mass (g)	sag (cm)
0	1.0
500	15.0
1000	25.0
1500	31.0
2000	35.0

(i) Plot the results from Oliver's second test on the grid above.
Use the points to draw a line of best fit.

2 marks

(ii) In the second test the plank sagged with **no** mass added to it.
Explain what caused this sag.

.....

1 mark

(c) Compare the results of Oliver's two tests.

(i) How are the results **similar** for each test?

.....

.....

1 mark

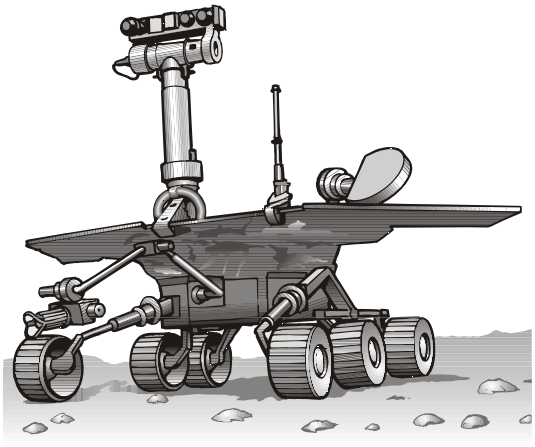
(ii) How are the results **different** in the second test?

.....

.....

1 mark
maximum 6 marks

2. The drawing below shows a space buggy on the surface of Mars.



(a) The distance between Earth and Mars is 192 000 000 km.

It took a spacecraft 200 days to take the buggy from Earth to Mars.

Calculate the speed at which the spacecraft travelled.

Give the unit.

.....

.....

2 marks

(b) The weight of the buggy was 105 N on Earth and 40 N on Mars.

Why was the weight of the buggy less on Mars than on Earth?

.....

.....

1 mark

(c) The buggy uses solar panels to generate electrical energy.

The solar panels generate less electrical energy on Mars than on Earth.

Give a reason why.

.....

.....

1 mark

(d) The weight of the buggy was 40 N on Mars.
When the buggy landed on Mars it rested on an area of 0.025 m^2.

Calculate the pressure exerted by the buggy on the surface of Mars.

Give the unit.

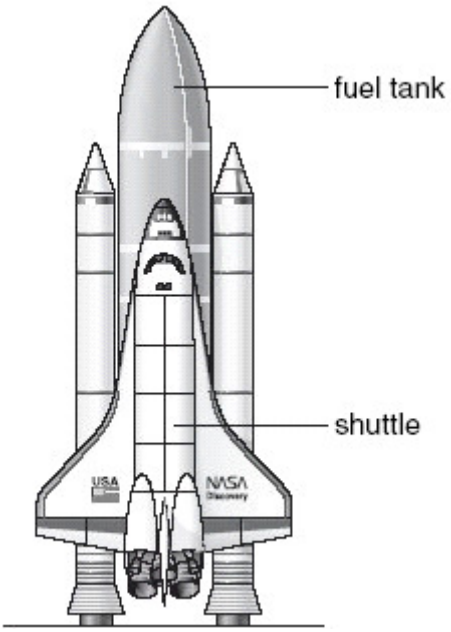
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2 marks

maximum 6 marks

3. The shuttle is a spacecraft which is used to take satellites into space.
The drawing below shows the shuttle just about to take off.



(a) The shuttle has a separate fuel tank containing liquid hydrogen and liquid oxygen.

Explain why hydrogen and oxygen are transported as liquids rather than as gases.

.....

.....

1 mark

(b) Oxygen is needed to burn the fuel in the shuttle's engines.
Vehicles on Earth do **not** need a tank containing oxygen.

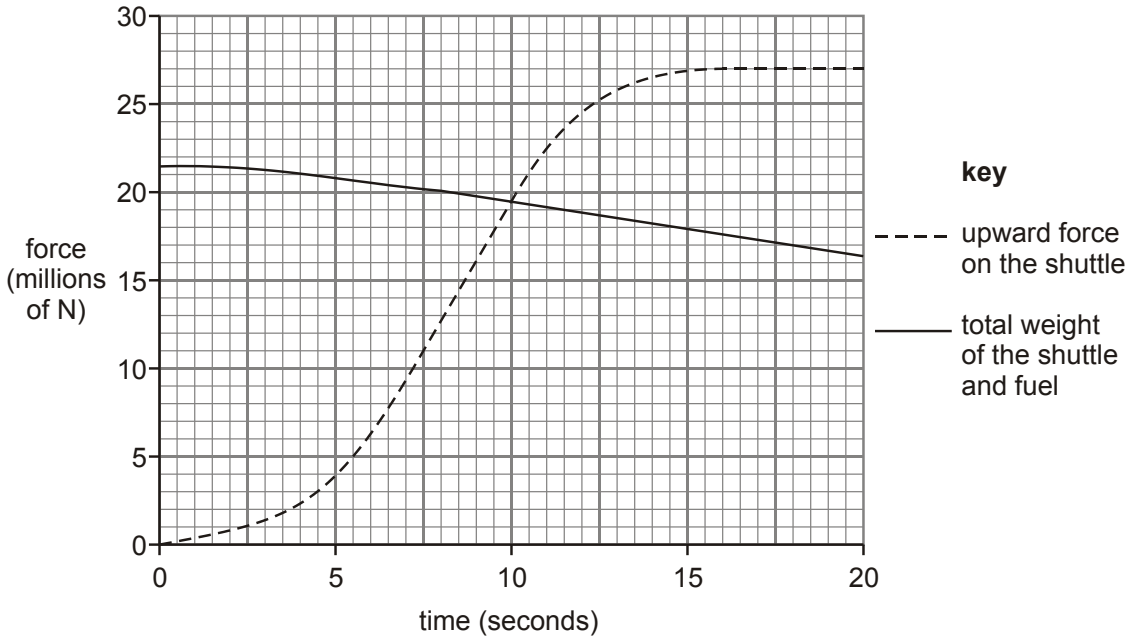
Why does the shuttle need to have a tank containing oxygen?

.....

.....

1 mark

(c) The graph below shows how the upward force and the weight of the shuttle, including fuel, change during the first 20 seconds, after the fuel is ignited.



Why does the total weight of the shuttle **decrease** during the first 20 seconds?

.....

.....

1 mark

(d) (i) Look at the graph. At 20 seconds, what is the value of:

the upward force on the shuttle?

..... millions of N

the total weight of the shuttle and fuel?

..... millions of N

1 mark

(ii) At 20 seconds, what is the **resultant** force on the shuttle?

..... millions of N

1 mark

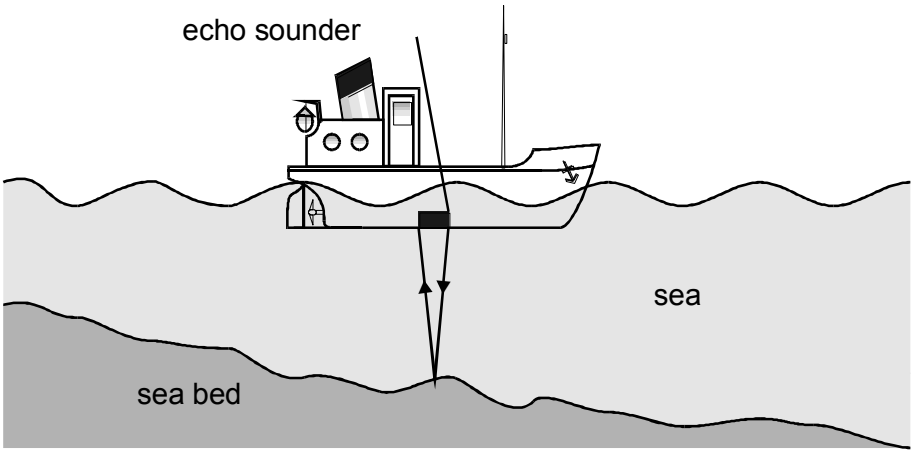
(iii) Use the graph to explain why the shuttle **cannot** take off before 10 seconds.

.....

.....

1 mark
maximum 6 marks

4. The diagram shows a boat using an echo sounder. It sends a pulse of sound waves which is reflected from the sea bottom. The reflected sound waves are detected by a sensitive microphone.



The time between sending and receiving the pulse is 0.005 s. The device calculates the depth of the sea, using the speed of sound in sea water, which is 1500 m/s.

(a) Calculate the depth of the sea. Show your working.

.....

.....

.....

2 marks

(b) The boat moves into very deep water. Explain why the reflected pulse is too weak to be detected.

.....

.....

1 mark

(c) The boat's 'echo sounder' could **not** be used in an aeroplane to measure its height above the ground unless it had been modified.

Explain why the device will **not** give correct heights above the ground.

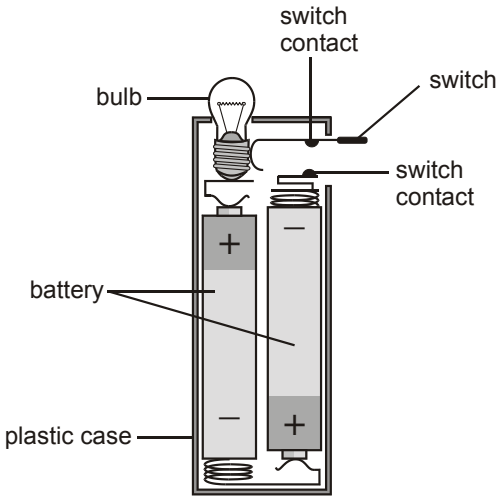
.....

.....

1 mark

Maximum 4 marks

5. (a) The drawing below shows the parts of a torch.



(i) Paul closed the switch.
Why did this turn on the torch?

.....

.....

1 mark

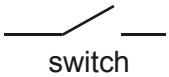
(ii) The diagrams below show symbols for a battery, a bulb and a switch.
Connect the symbols to make a series circuit for the torch.



bulb



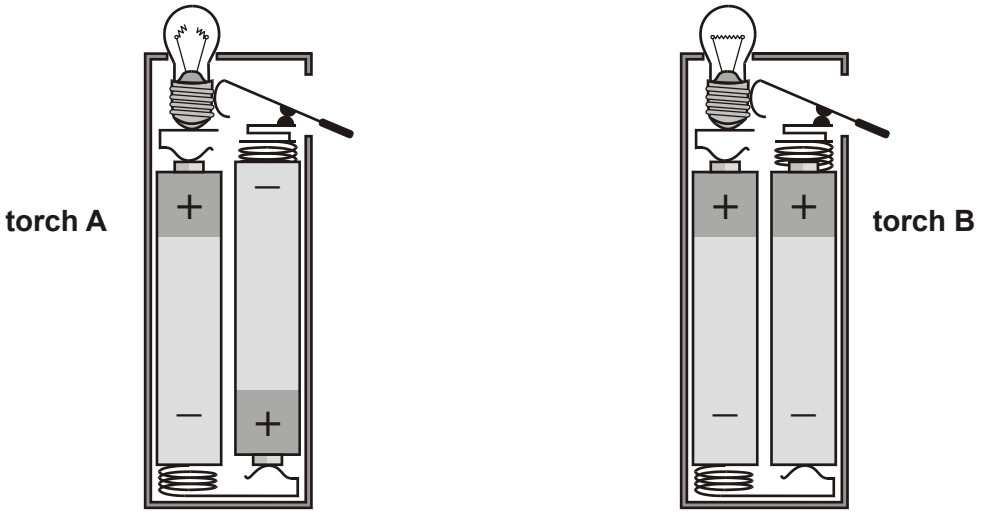
battery



switch

1 mark

(b) The drawings below show two other torches. In both torches, the bulbs will **not** light even when Paul closes the switches.



Look carefully at the drawings.

(i) Why is the circuit of torch A **not** complete?

.....

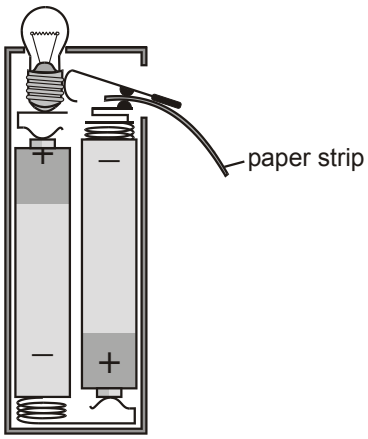
1 mark

(ii) What could you do to torch B to get the bulb to light?

.....

1 mark

(c) When Paul bought his torch there was a paper strip between the contacts of the switch as shown below.



Paul had to remove the paper strip before he could turn the torch on.
Give the reason for this.

.....

.....

1 mark

maximum 5 marks