

NAME:	SCIENCE TEACHER: (circle code)	<b>10C</b>
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# SCIENCE

## Year 10 Examination 2012

### 10 C – 40 marks

**Make sure that you have answered all the questions in Paper 10B before you start this paper**

***Time allowed for both examinations: 2 hours***

Answer all questions in the spaces provided on the paper.

You may use a calculator.

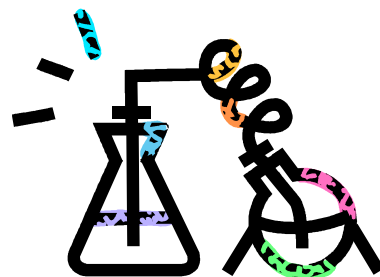
Show all your working in calculations; marks are awarded for it.

Give units for all answers (e.g. kg or m) unless they are already provided.

*For Teacher Use*

Question	1	2	3	4	5	6	7	8	9	Total
Marks gained										
Marks available	4	6	3	2	3	3	5	7	7	40

**ANSWER ALL THE QUESTIONS IN THE SPACES PROVIDED**



**Question One: READY STEADY GROW [4 marks]**

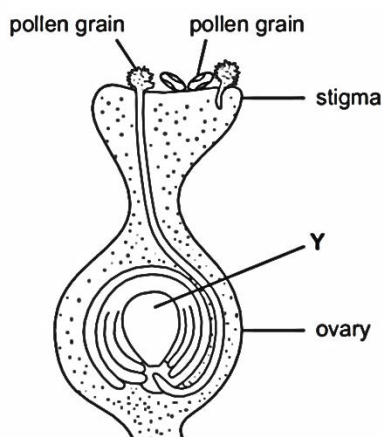
A student carried out an experiment to find out what conditions some lettuce seeds needed in order to germinate. The table shows his results.

set of seeds	air present	soil present	water present	light present	did seeds germinate?
<b>A</b>	yes	yes	yes	yes	yes
<b>B</b>	no	yes	yes	yes	no
<b>C</b>	yes	no	yes	yes	yes
<b>D</b>	yes	yes	no	yes	no
<b>E</b>	yes	yes	yes	no	no

- (a) Which conditions did the lettuce seeds need for germination?

- (b) State one factor that the student should have kept constant in his experiment.

The diagram shows two pollen tubes growing from pollen grains on the stigma of an insect-pollinated flower.



- (c) The pollen grains from which pollen tubes are growing came from the anthers of other flowers on the same plant as this flower. Is this an example of self-pollination or cross-pollination? Explain your answer.

Type of pollination:
Reason:

- (d) Two of the pollen grains shown in the diagram have not grown pollen tubes. These pollen grains were blown *by the wind* onto the stigma of this flower from a different species of plant. State two ways in which **the flower** from which these pollen grains were blown would differ from the flower shown above.

1.
2.

**Question Two: GREEN IS GREAT! [6 marks]**

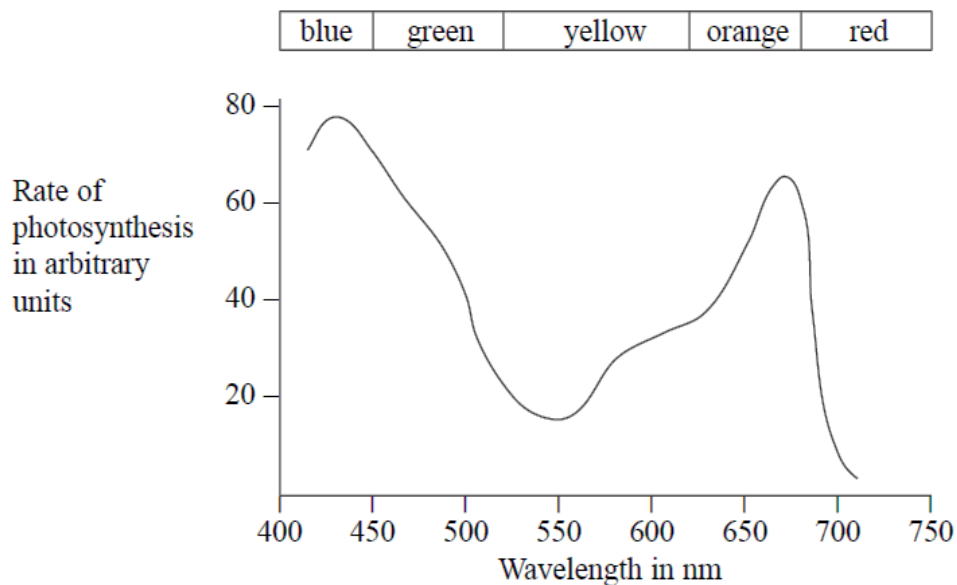
Chlorophyll is a green pigment found in plants. It absorbs light, which is used in photosynthesis.



- (a) Where, in a leaf cell, would you expect to find chlorophyll?

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The graph shows the rate of photosynthesis of a plant when exposed to different colours of light. Different colours of light have different wavelengths.



- (b) (i) Which light produces the greatest rate of photosynthesis?

Colour:	Wavelength:	nm
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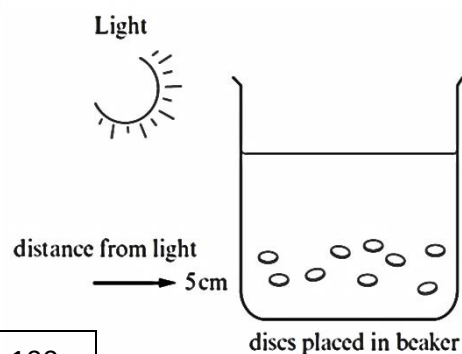
- (ii) What colour(s) of light give a rate of photosynthesis of 50 units?

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- (c) Describe the effect on the rate of photosynthesis you would expect if green light is shone on the leaf instead of blue light.

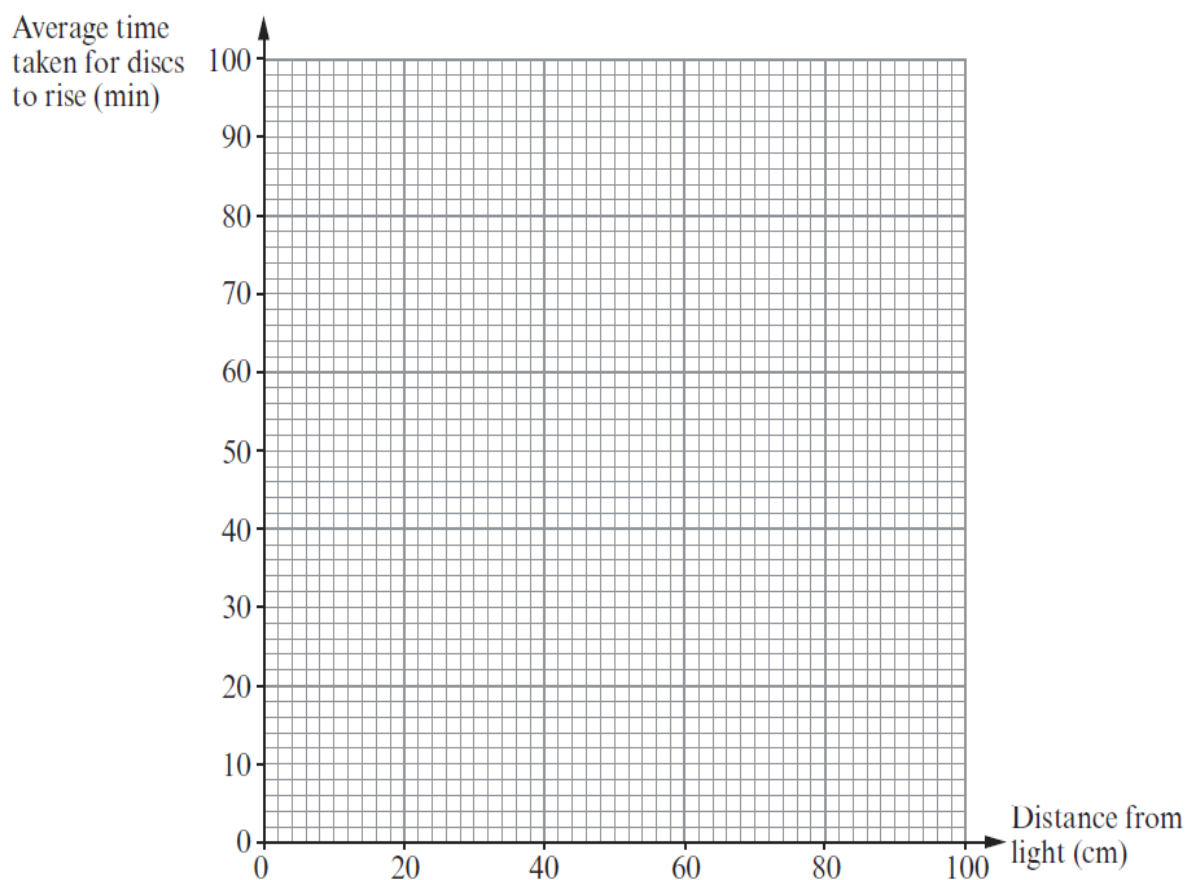

Students investigating the effect of changing light intensity on the rate of photosynthesis cut discs from a leaf. The discs sank when put in beakers of sodium hydrogen carbonate solution. Bubbles of gas formed on the leaf discs and after a while the discs rose to the surface.

The beaker was placed at different distances from the light and the results are shown below.



Distance from light (cm)	5	25	50	75	100
Average time taken for all discs to rise (minutes)	5	20	27	55	97

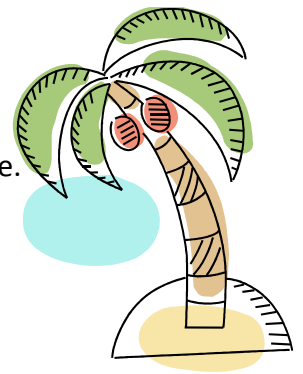
(d) Plot the results above on the graph below, and join the points with a suitable freehand line.



(e) Using these results, write down the relationship (pattern) between the rate of photosynthesis and the distance that the light source is away from the discs.


### Question Three: NUTS [3 marks]

The diagram shows the two forces which act on a coconut as it falls from a tall palm tree. There is no wind.



(a) On the diagram name the forces acting on the coconut as it falls. Choose from:

- air resistance ● buoyancy ● gravity ● up thrust ● weight ●

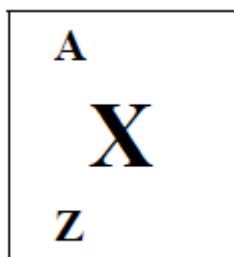


(b) Explain in terms of the forces involved why the coconut accelerates as it just begins to fall.


(c) What happens to size of the upward force as the coconut accelerates?


**Question Four: IT'S ATOMIC! [2 marks]**

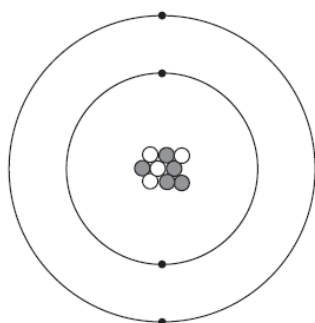
(a) Every atomic nucleus can be represented like this. Use the letters **A**, **X** and **Z** to complete the table.



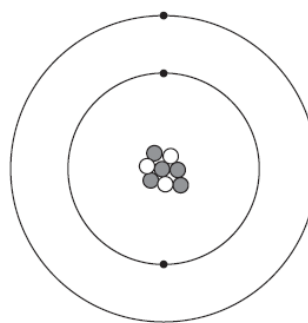
	Letter
Atomic number	
Mass number	
Chemical symbol	

Some elements can exist as isotopes. Isotopes are the atoms of the same element, however their mass numbers are different.

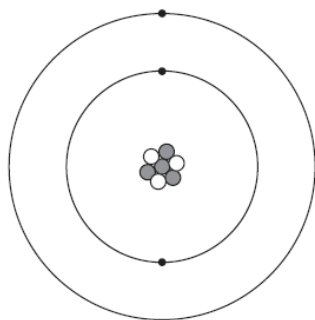
The diagram represents four atoms **W**, **X**, **Y**, and **Z**.



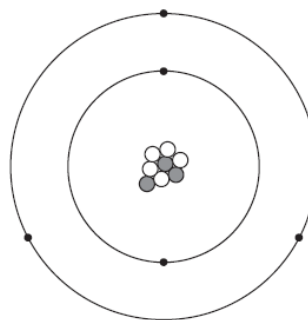
Atom **W**



Atom **X**



Atom **Y**



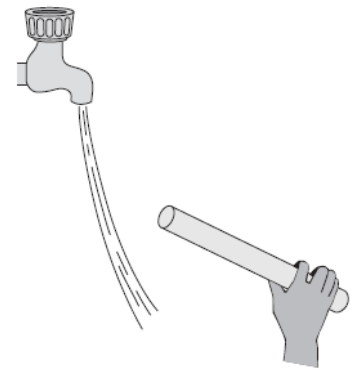
Atom **Z**

(b) Which **two** of the atoms are isotopes of the same element? Give a reason for your answer.

Atoms ____ and ____
Reason:

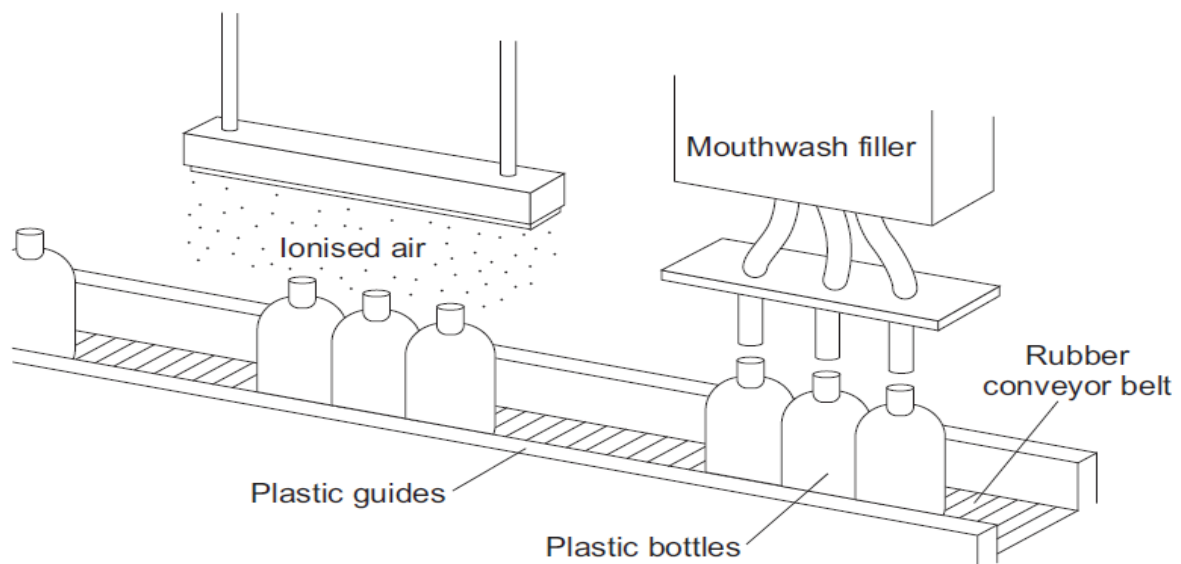
**Question Five: WATER, WATER, EVERYWHERE!!! [3 marks]**

The diagram shows a negatively charged plastic rod held close to a thin stream of water. The water is attracted towards the rod.



- (a) How could the rod be given a charge?


A company that produces bottles of mouthwash found a problem with the automatic filling system. As the bottles go towards the filler, they move around on the conveyer belt and become electrostatically charged. This causes the stream of mouthwash to move sideways, missing the open top of the bottle.



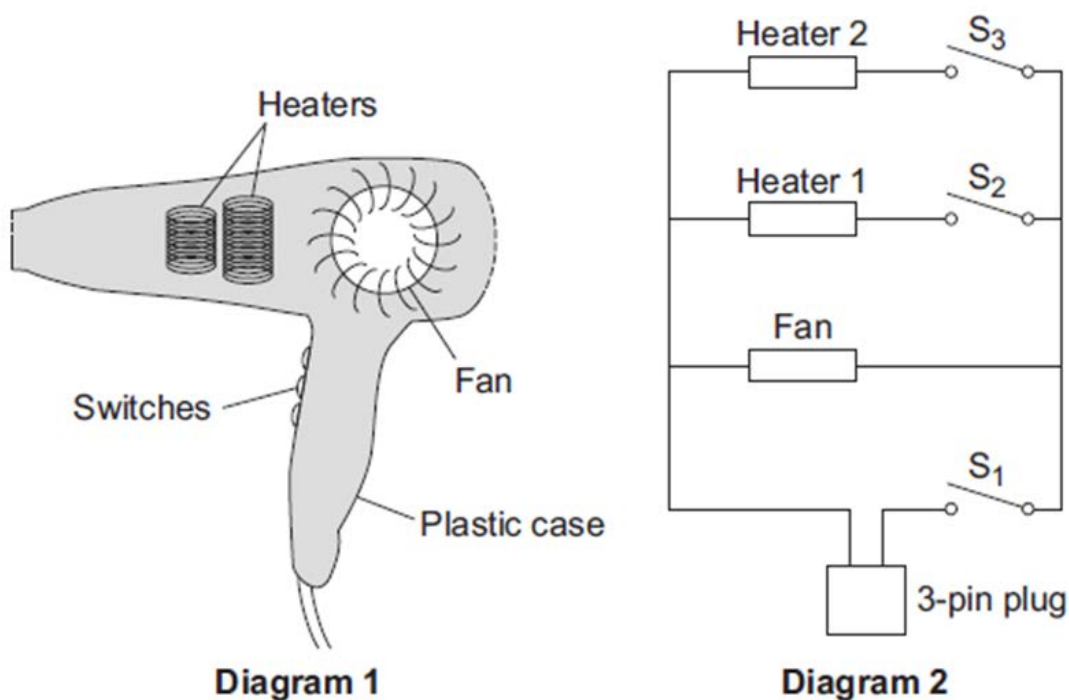
- (b) The company came up with a solution to the problem. Before the bottles reach the filler, they pass through a stream of ionised air. Ions are charged particles. The ions in the air neutralise the charge on the bottles.

Explain why the plastic bottles become charged.


- (c) Earthing the conveyor belt with a conducting wire (attaching a wire to the rubber conveyor belt) would not have solved this problem. Give a reason why.


**Question Six: A LOT OF HOT AIR [3 marks]**

Diagram 1 shows a hairdryer. Diagram 2 shows how the heaters and fan of the hairdryer are connected to a plug.



All the switches are shown in the OFF position.

(a) Which switch or switches have to be ON to make: (circle your answer(s))

(i) only the fan work                       $S_1$      $S_2$      $S_3$

(ii) heater 2 work?                       $S_1$      $S_2$      $S_3$

(b) The heaters can only be switched on when the fan is also switched on. Explain why, in terms of the circuit diagram.




### Question Seven: SMOKING – THE COOL KILLER! [5 marks]

When tobacco is burned in cigarettes, carbon monoxide is formed.

A device called a 'Smokerlyzer' measures the percentage of carbon monoxide in a person's breath. This indicates the percentage of carbon monoxide in the person's blood.

Four people tested their breath using a 'Smokerlyzer'. They repeated the test every two hours during one day at work.



The results are shown in the table.

Name	Percentage of carbon monoxide in the blood			
	9 am	11 am	1 pm	3 pm
Richard	3.6	2.9	3.4	2.8
Alan	1.8	1.3	1.2	1.2
Jenny	6.3	5.0	4.3	3.8
Elizabeth	0.5	0.3	0.3	0.3

- (a) Which **two** people are most likely to have smoked tobacco before 9 am?

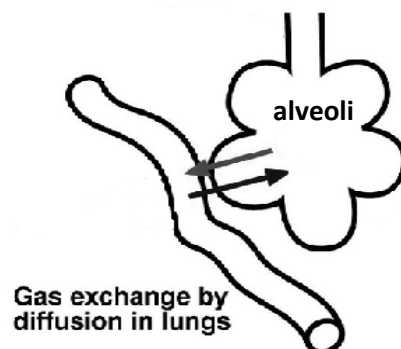
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Red blood cells transport oxygen from the lungs to the muscles. The oxygen is used in respiration to release energy which the muscles use to shorten and lengthen. If the air we breathe in contains carbon monoxide, the red blood cells will take up carbon monoxide instead of oxygen.



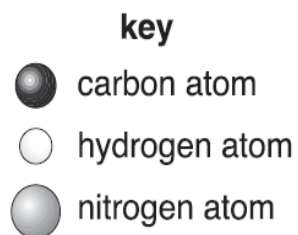
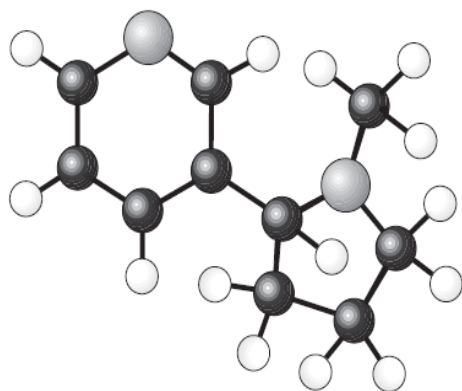
- (b) Use this information to explain why, when they are running, many smokers become out of breath sooner than **non**-smokers do.


- (c) Alveoli are structures found in the lungs. Name the gases moving into and out of the alveoli.



Gas moving into the alveoli :
Gas moving out of the alveoli:

Nicotine is a substance found in cigarettes. The diagram shows a nicotine molecule. It contains atoms of three elements.



(d) Nicotine is a compound. How does the diagram show this?


(e) Use the key to write down the chemical formula of nicotine.

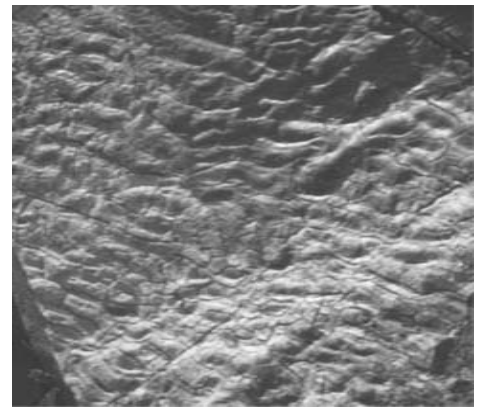
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### Question Eight: ROCK ON! [7 marks]

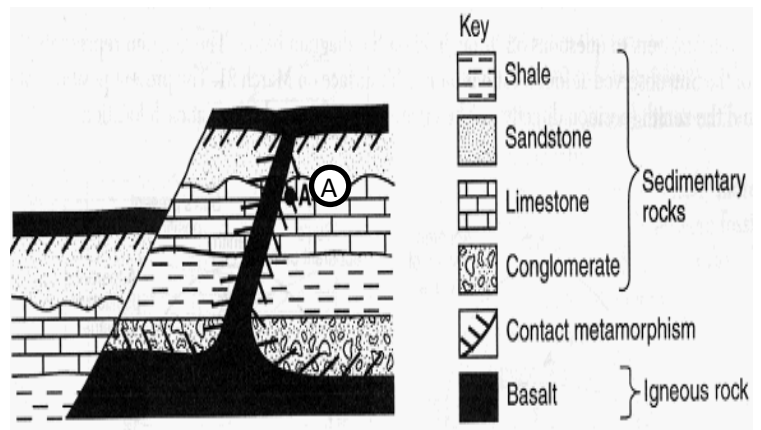
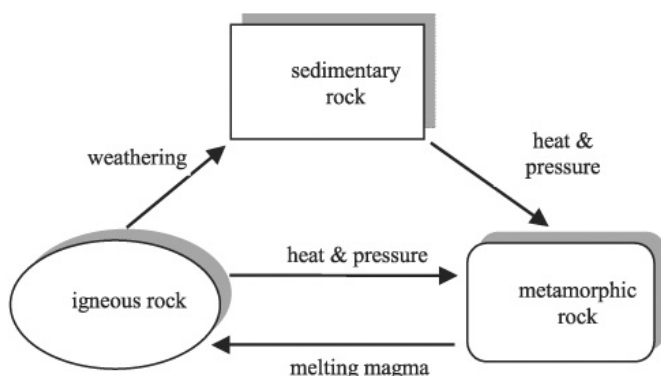
The picture shows ripple marks on a piece of sedimentary rock.

These ripple marks were formed when the sediments were first laid down.

- (a) Explain how these ripple marks could have been formed.

Study the two diagrams below.



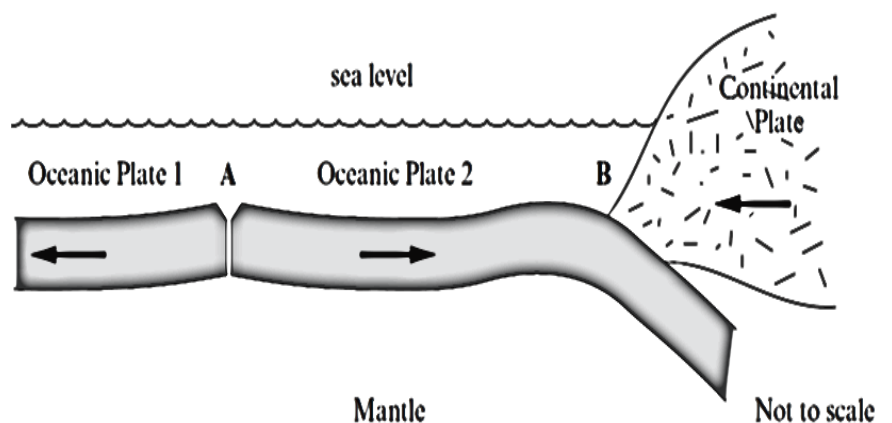
- (b) Explain how basalt ended up in the different layers in the diagram.


- (c) What type of rock could be forming at A as a result from basalt forming there? Explain your answer.

Type of rock:
Reason:

The Earth's crust (lithosphere) is broken up into huge plates. The diagram below shows two plate boundaries A and B.

- (d) Name the process that occurs at plate boundary A.

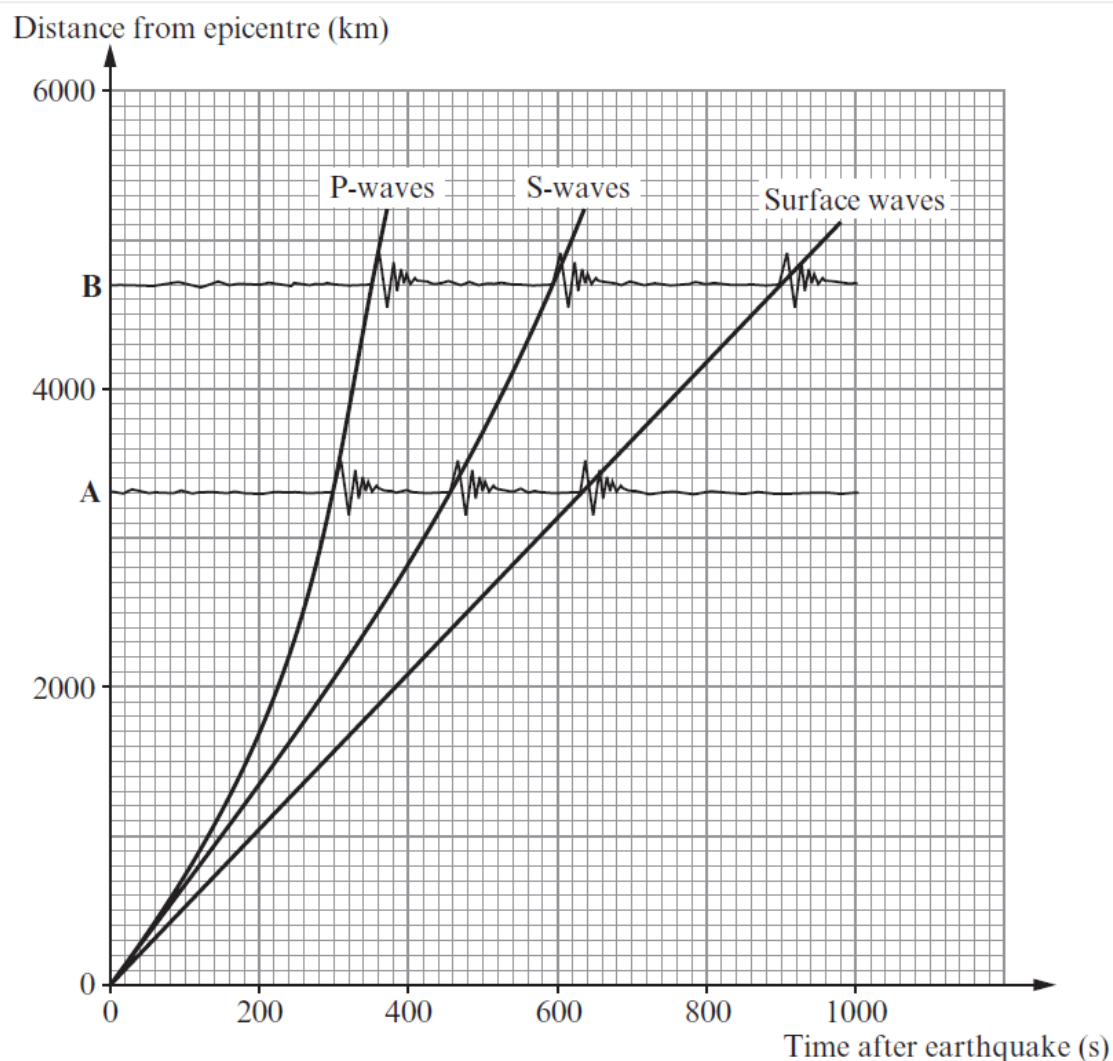



The two types of plate have different densities as shown in the table.

Type of plate	Density ( $\text{g/cm}^3$ )
Continental	2.7
Oceanic	3.0

- (e) Explain what is occurring at plate boundary B, and why.


The graph shows how the P, S and Surface waves spread out from the epicentre of an earthquake. A and B are seismic stations.



- (f) Use the graph to find the time delay between the arrival of the P and S waves at station A.


- (g) Explain how the graph shows that the speed of the surface waves is constant.


**Question Nine: WE ARE WATCHING YOU! [7 marks]**

During a police investigation, a forensic scientist tests a powder she suspects contains the compound called potassium chloride.

The forensic scientist carries out some tests on the powder. She identifies the type of salt by comparing her results to the table below.



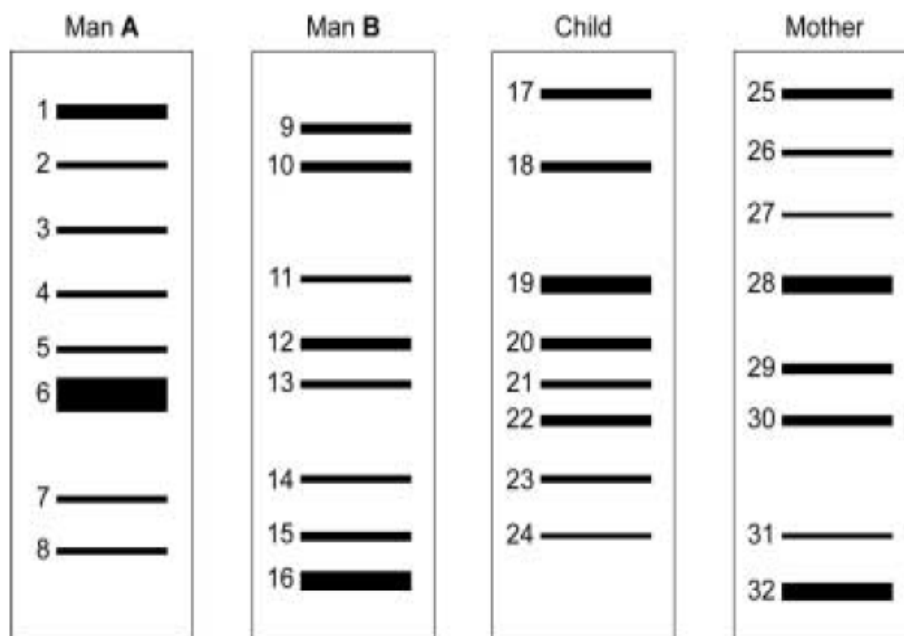
Procedure	Expected observation	Type of compound
Add hydrochloric acid	Carbon dioxide is given off	Carbonate
Add nitric acid and then silver nitrate solution	Thick white precipitate	Chloride
Add iron(II)sulfate solution followed by sulfuric acid	Brown ring forms	Nitrate
Add barium chloride solution	White precipitate	Sulfate

- (a) State which procedure could be used to show the powder is a chloride.


- (b) The forensic scientist finds blood in some samples of the powder collected. State two pieces of information that can be obtained from the blood.


- (c) The SoCO can also carry out chromatography on the blood to see if the suspect has been taking drugs. Describe the process of paper chromatography. You may use a diagram to help answer your question.


The numbers refer to the bars on the DNA fingerprints. Only half the bars of the child's DNA fingerprint match the mother's DNA fingerprint.



- (d) Which man, A or B, is more likely to be the father of the child? Use the numbers on the DNA fingerprints to explain your choice. In your answer you should refer to all four people.

[illegible]

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