



BOARD OF STUDIES
NEW SOUTH WALES

**2000
SCHOOL
CERTIFICATE
TEST**

**6 November
Start 12.50 pm**

**SCIENCE
SECTION 1**

General Test Instructions

- Reading time: 10 minutes
- Working time: $1\frac{1}{2}$ hours
- The supervisor will tell you when to begin the test
- This test has TWO sections
- Attempt ALL questions
- Do NOT write in pencil
- Calculators may be used in both sections
- Write your Centre Number and Student Number at the top of the two separate answer sheets and pages 25, 29 and 33

Directions for Section 1

- 1 Allow about 45 minutes to answer this section
- 2 This section has 2 parts

Part A	Questions 1–18	(18 marks)
Part B	Questions 19–25	(7 marks)
- 3 Complete your answers to Section 1 on the separate Part A and Part B Answer sheets

Instructions for answering questions in Section 1

- Complete your answers in either blue or black pen.

- **Multiple choice**

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

Sample 1: $2 + 4 =$ (A) 2 (B) 6 (C) 8 (D) 9
 A B C D

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A B C D

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word **correct** and drawing an arrow as follows.

A B C D
 correct

- **Completing the boxes**

Write firmly and clearly. Your answer must be written from left to right. Use block letters for words. Numbers must be used for numerical answers. Decimal points and negative signs must be clearly shown in separate boxes. Do NOT let any part of the letter or number touch the sides of the answer boxes.

Sample 2: $-7 \div 2 =$

-	3	.	5		
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Sample 3: How many days are in a week?

7	
---	--

 days

Sample 4: What is the fifth month?

M	A	Y			
---	---	---	--	--	--

If you think you have made a mistake, put a line through the incorrect answer and write the correct one above the box.

M A Y

J	U	N	E		
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PART A

Complete your answers to Questions 1–18 on the Part A Answer Sheet.

- 1 The table shows a student's observations when small pieces of different metals were added to separate beakers of water.

<i>Metal</i>	<i>Observations</i>
<i>P</i>	Bubbles slowly. Some metal still present after 60 minutes.
<i>Q</i>	Fast bubbling. All metal disappears in 2 minutes.
<i>R</i>	Vigorous bubbling. Metal disappears quickly and gas above the water bursts into flame.
<i>S</i>	Only a few bubbles appear. Most metal remains after 60 minutes.

Which statement about these metals is supported by these observations?

- (A) *P* reacts faster than *Q*.
 (B) *Q* reacts faster than *R*.
 (C) *R* reacts faster than *S*.
 (D) *S* reacts faster than *P*.
- 2 The table shows some information about four people.

<i>Person</i>	<i>Mass (kg)</i>	<i>Shoe area (cm²) in contact with ground</i>
<i>A</i>	40	150
<i>B</i>	40	200
<i>C</i>	60	150
<i>D</i>	60	200

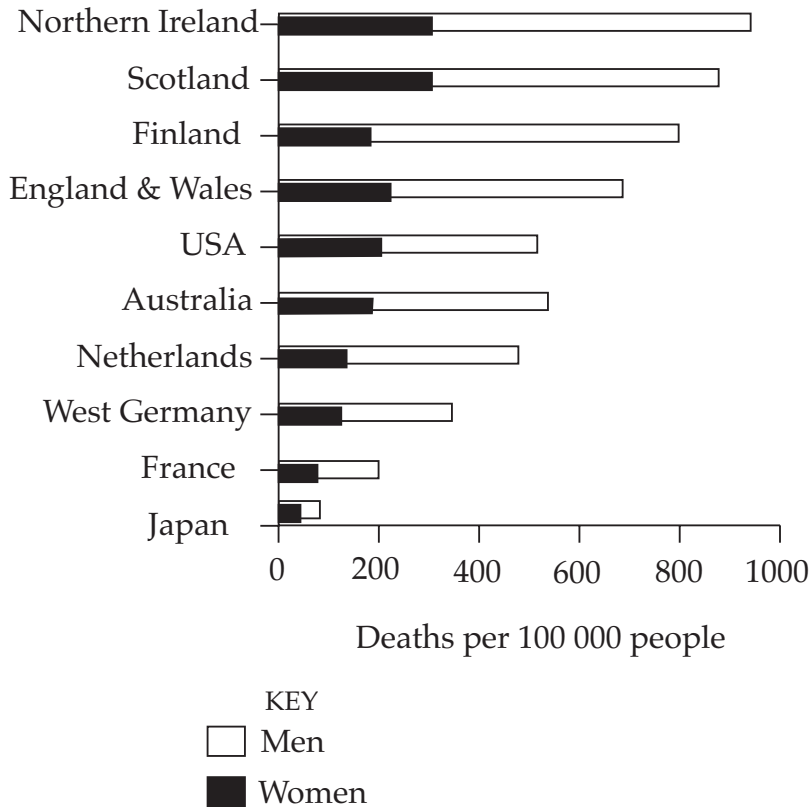
This general formula can be used to calculate the pressure exerted on the ground.

$$\text{Pressure} = \frac{9.8 \times \text{Mass}}{\text{Area}}$$

Which person would exert the greatest pressure on the ground when standing still?

- (A) *A* (B) *B* (C) *C* (D) *D*

- 3 The graph shows the number of deaths caused by heart disease in some countries.

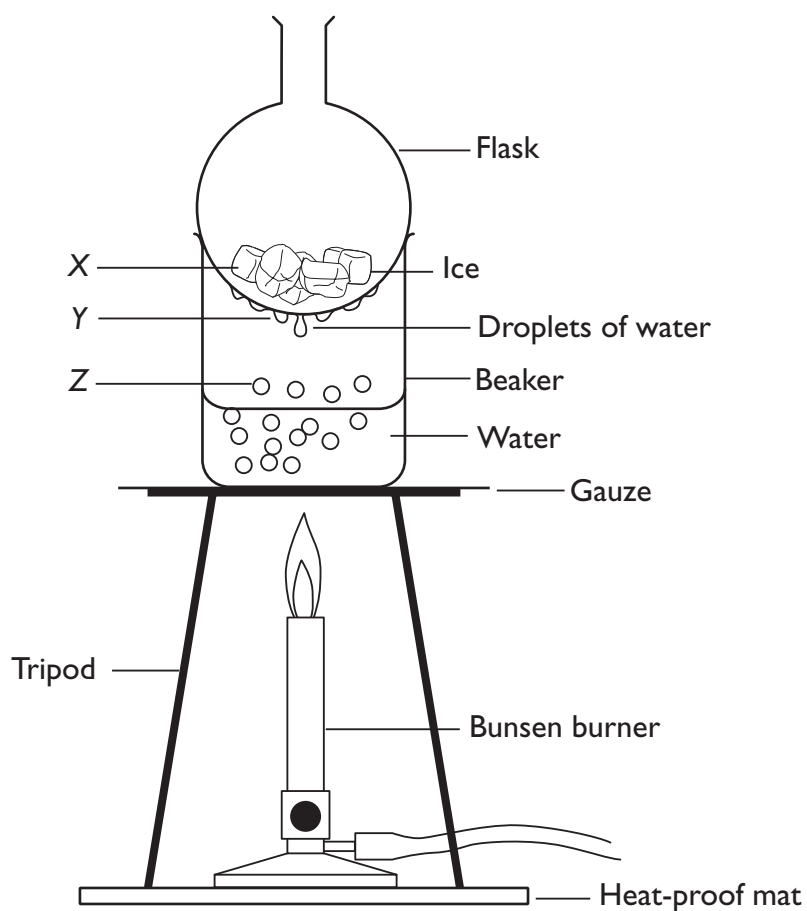


Jones, Jones and Marchington, *Balanced Science Book 2*, Cambridge University Press, 1991, p 522. © Geoff Jones

What conclusion could you draw from this graph?

- (A) People in Northern Ireland are not as healthy as people in Japan.
- (B) In Australia, 20% of those who die from heart disease are women.
- (C) In these countries, women are healthier than men.
- (D) In these countries, more men die from heart disease than women.

4



Which choice best identifies the main processes occurring at X, Y and Z?

	X	Y	Z
(A)	Melting	Evaporation	Condensation
(B)	Melting	Condensation	Evaporation
(C)	Condensation	Melting	Evaporation
(D)	Condensation	Evaporation	Melting

5 This question refers to the information in the cycle.

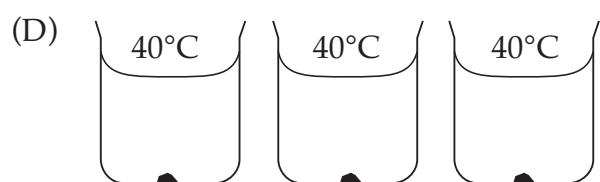
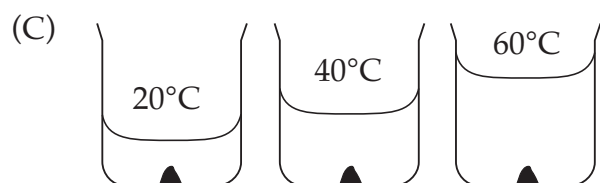
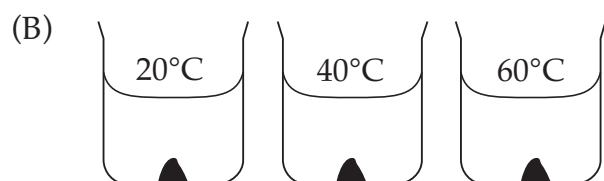
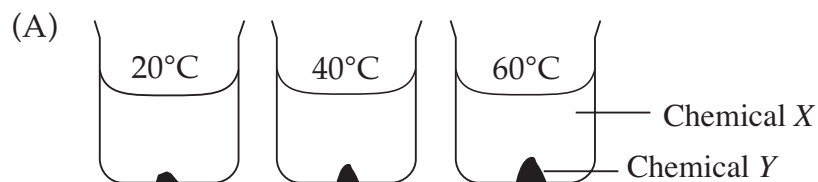
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What is the role of the liver in this cycle?








- (A) To produce insulin
- (B) To store glycogen
- (C) To detect a change in blood glucose level
- (D) To stop the production of insulin

- 6 A student wanted to investigate whether temperature affected how fast a chemical reaction occurred.

Which combination of beakers would the student need to set up to carry out a fair test to study the effect of temperature on how fast chemicals X and Y react?



7 Most clothes we buy come with washing and ironing instructions which are represented by symbols. The table shows examples of some of these symbols.

<i>Washing symbol</i>	<i>Maximum washing temperatures</i>	<i>Suitable materials</i>
	Very hot (95°C)	White cotton or linen
	Hot (60°C)	White nylon or polyester/cotton or acrylic/cotton
	Hand hot (50°C)	Coloured nylon or polyester/cotton or acrylic/cotton
	Warm (40°C)	Acrylics, acrylic/wool, polyester/wool
	Cool (30°C)	Silks, printed acetate not colour-fast at 40°C
<i>Ironing symbol</i>	<i>Maximum ironing temperatures</i>	
	Warm (160°C)	Polyester mixtures, wool
	Cool (120°C)	Acrylic, nylon, acetate, triacetate, polyester

Heinemann Science in Context, Heinemann, Port Melbourne, Vic, 1991, pp 188-189.
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Ken bought the following shirt.

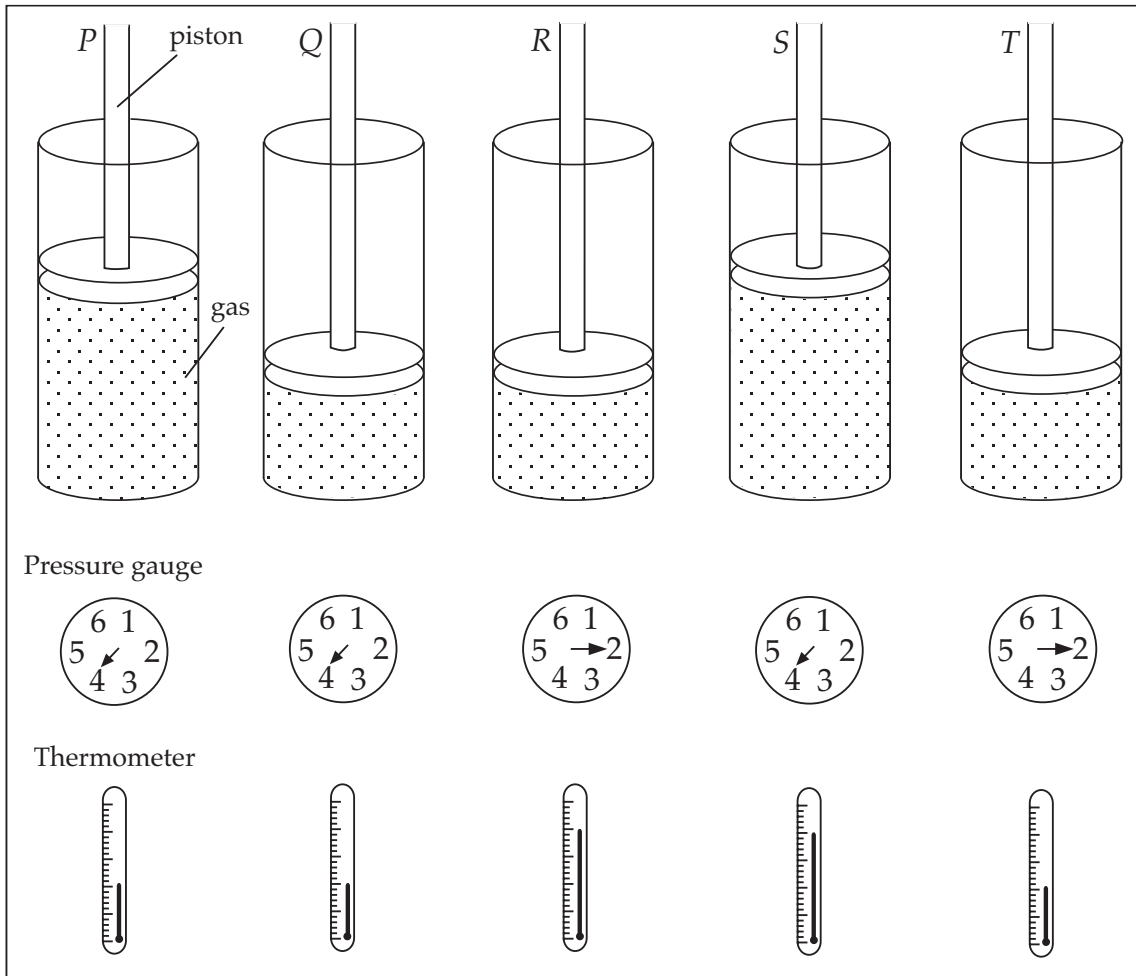
Shirt (white) Material 65% polyester 35% cotton	Washing and ironing symbols	
	?	?



What are the correct washing and ironing symbols for Ken's shirt?



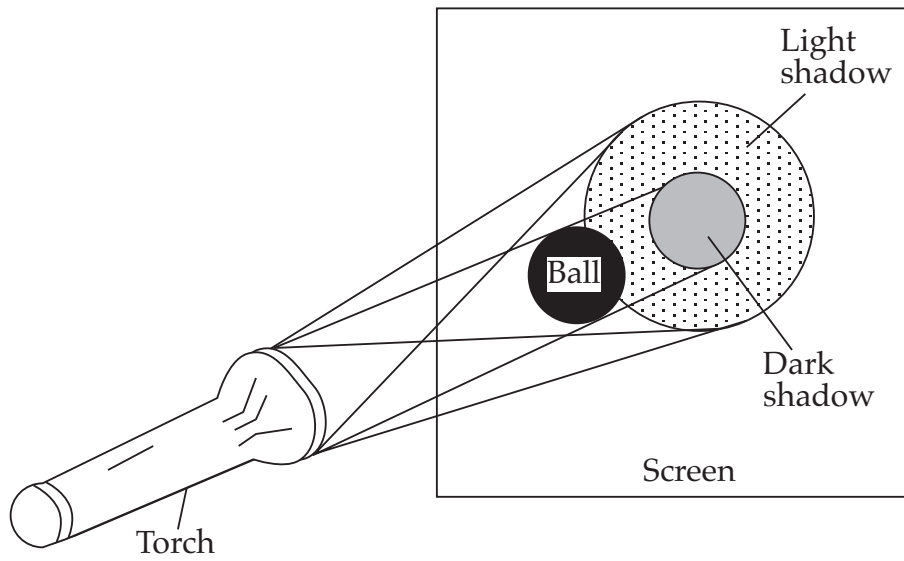
- 8 The diagrams represent five containers of gas with identical pistons, pressure gauges and thermometers. The mass and type of gas in each container is the same.



Which containers show that, at a constant pressure, if the gas temperature increases, the gas volume increases?

- (A) P and Q
- (B) P and R
- (C) Q and S
- (D) R and T

- 9 The results of an experiment using a torch, a ball and a screen are shown.

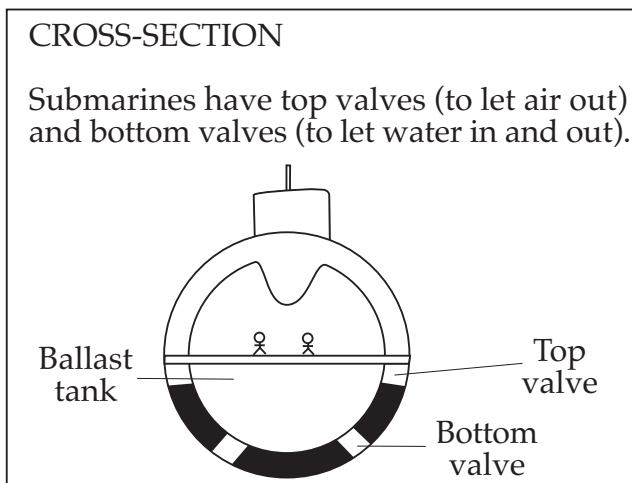
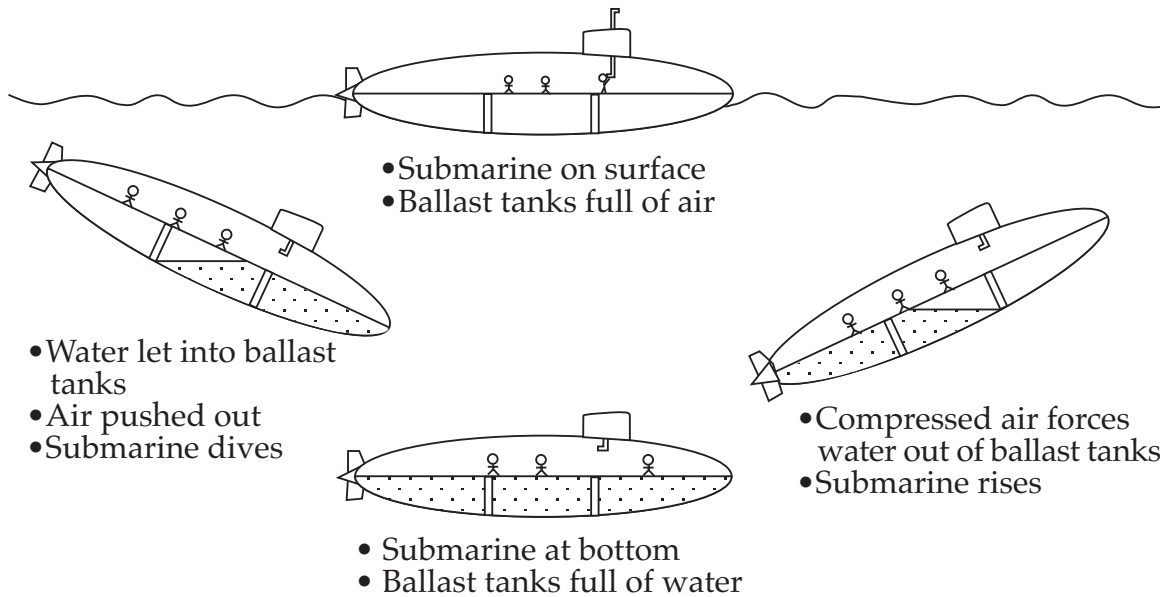


Which choice correctly identifies information about this experiment?

	<i>Experiment models</i>	<i>Ball represents</i>	<i>Screen represents</i>
(A)	Total eclipse of the sun	Moon	Earth
(B)	Total eclipse of the sun	Earth	Moon
(C)	Total eclipse of the moon	Moon	Earth
(D)	Total eclipse of the moon	Earth	Moon

10

HOW SUBMARINES DIVE AND RISE



Which choice correctly shows the position of the valves when a submarine is diving?

	<i>Top valves</i>	<i>Bottom valves</i>
(A)	closed	closed
(B)	closed	open
(C)	open	closed
(D)	open	open

- 11 The table shows the result of an experiment conducted by four students to test the effect of selected antibiotics on two different types of bacteria.

<i>Antibiotic</i>	<i>% Bacteria X remaining after 24 hours</i>	<i>% Bacteria Y remaining after 24 hours</i>
<i>P</i>	70	90
<i>Q</i>	35	70
<i>R</i>	85	50
<i>S</i>	50	60

Each student wrote a conclusion from their results.

LEE: Bacteria X are a weaker type than Bacteria Y.

CHRIS: Antibiotic Q is the strongest of the four antibiotics used.

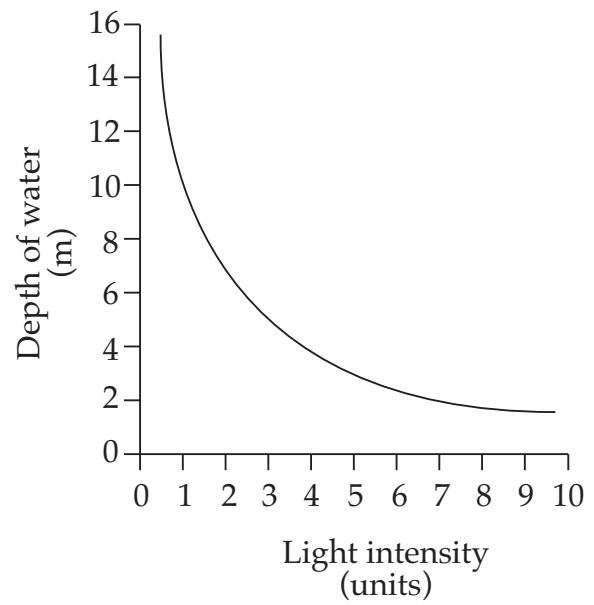
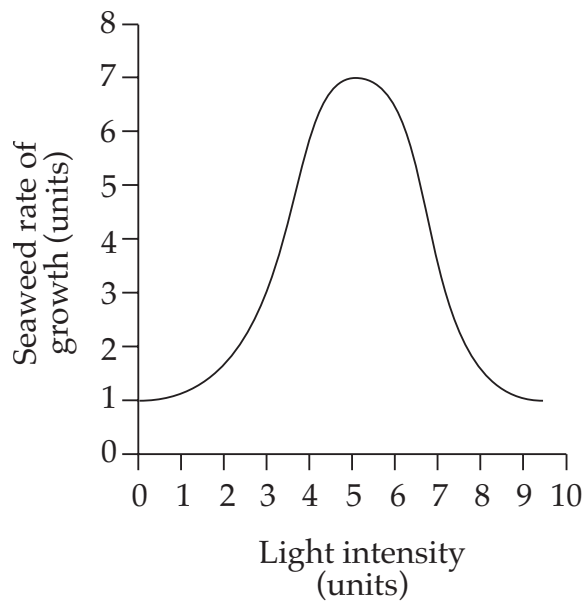
KIM: Bacteria Y are more sensitive to these antibiotics than Bacteria X.

ASSIFA: Antibiotic S affects these bacteria more than Antibiotic P does.

Whose conclusion is justified by these experimental results?

- (A) Lee's
- (B) Chris's
- (C) Kim's
- (D) Assifa's

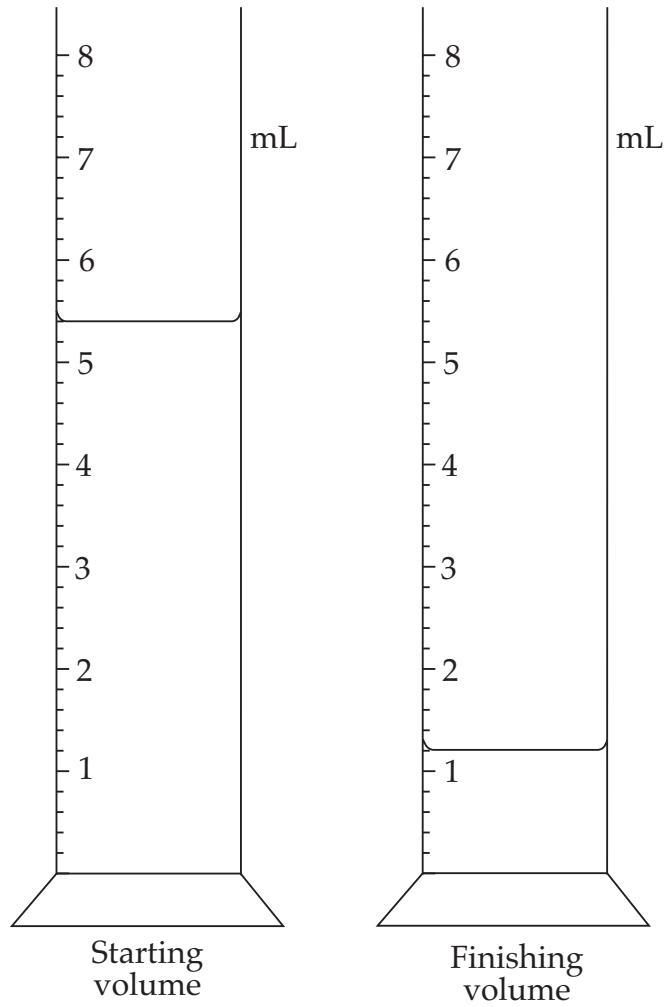
12 The graphs show the result of a study of the growth of a particular seaweed.



According to this data, at what depth does this seaweed grow best?

- (A) 2.0 m
- (B) 3.0 m
- (C) 4.0 m
- (D) 5.0 m

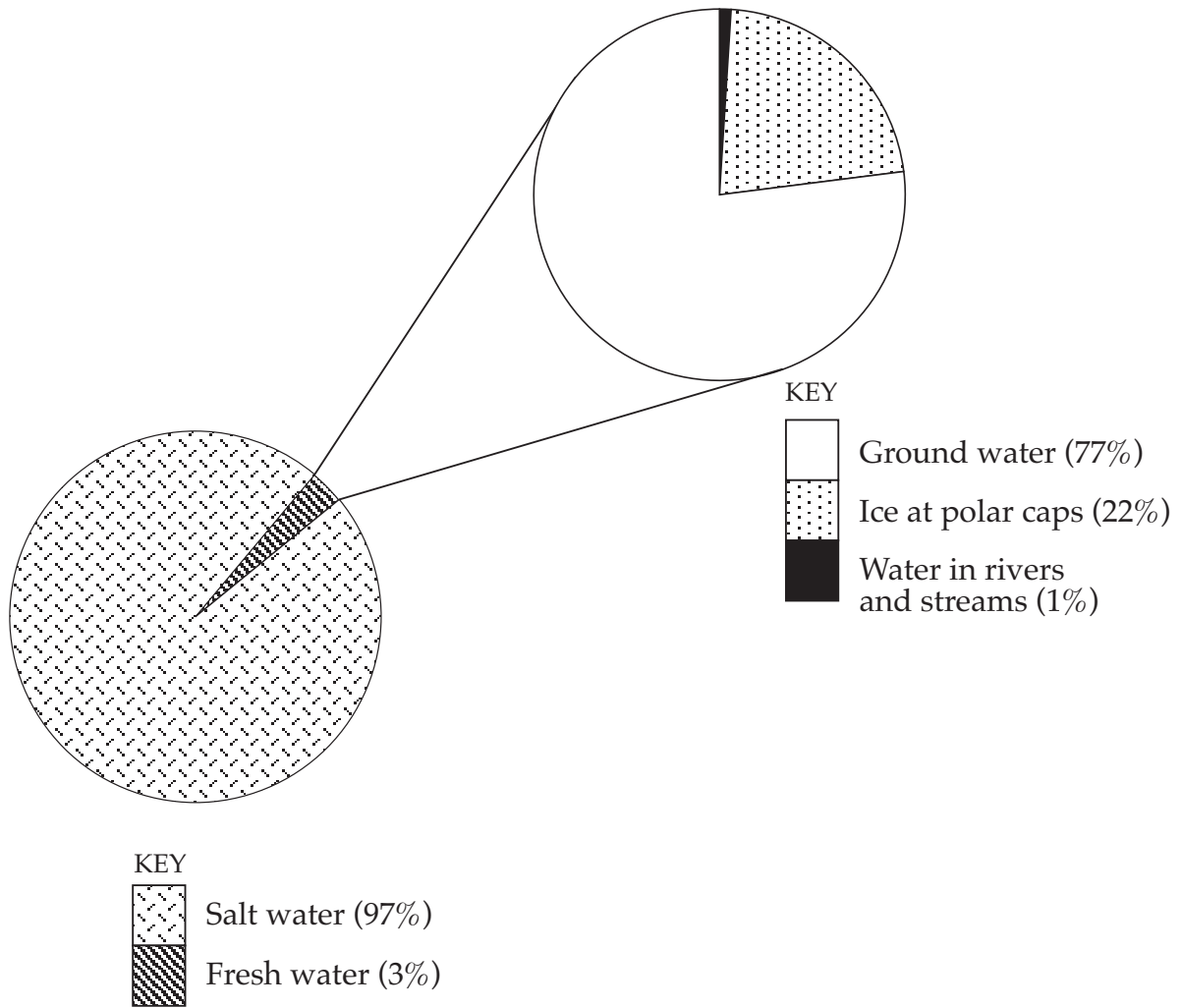
13 Use the diagram to answer this question.



What is the change in the volume of liquid in these measuring cylinders?

- (A) 4.0 mL
- (B) 4.1 mL
- (C) 4.2 mL
- (D) 4.3 mL

14 The diagram represents the distribution of water on Earth.



What percentage of Earth's total water is in rivers and streams?

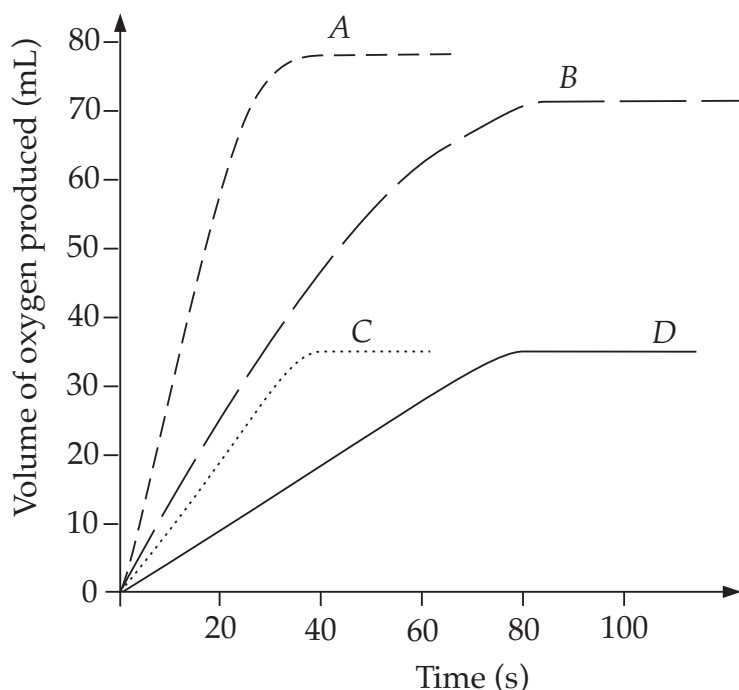
- (A) 0.03%
- (B) 0.3%
- (C) 1.0%
- (D) 3.0%

15 Use this information to answer Question 15.

- Hydrogen peroxide breaks down to produce oxygen and water.
- When the temperature is higher, the hydrogen peroxide breaks down faster.
- A change in temperature does not change the total volume of oxygen produced from a given amount of hydrogen peroxide.

When 20 mL of hydrogen peroxide is at 40°C, 35 mL of oxygen is produced. This takes 35 seconds.

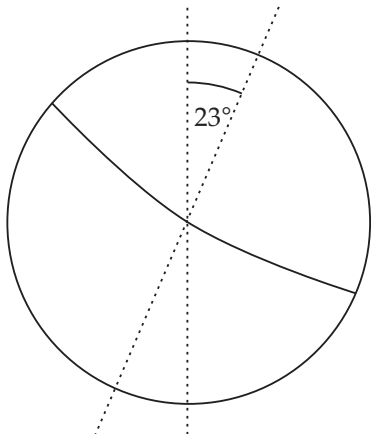
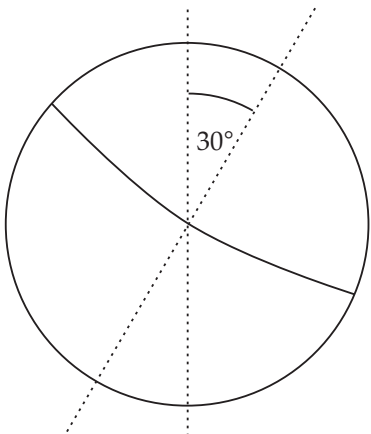
Which graph shows the production of oxygen when 20 mL of hydrogen peroxide is at 20°C?



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- (A) A
(B) B
(C) C
(D) D

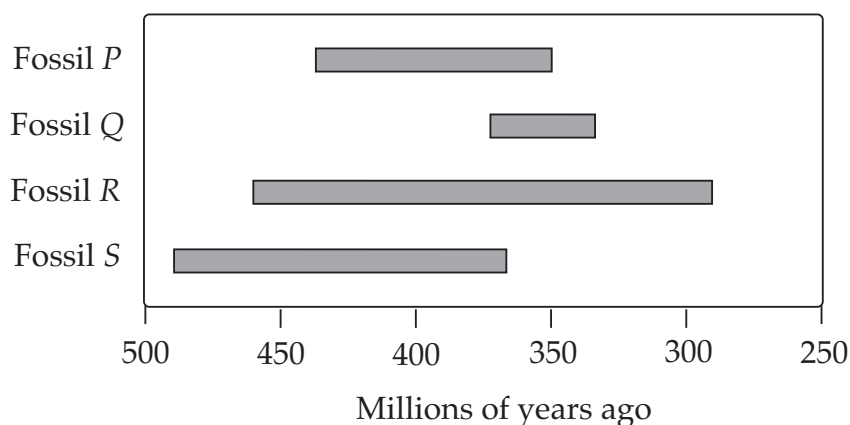
- 16 The table shows information about two planets, *X* and *Y*. They have identical orbits around the same sun.

	<i>Planet X</i>	<i>Planet Y</i>
Diameter	1500 km	1500 km
Distance from sun	200 million km	200 million km
Time to orbit sun	400 Earth days	400 Earth days
Atmosphere	20% oxygen 80% nitrogen	20% oxygen 80% nitrogen
Tilt on axis	23°	30°
	 Planet <i>X</i>	 Planet <i>Y</i>

Which statement about the two planets is true?

- (A) Winter on *Y* will be colder than winter on *X*.
- (B) Winter on *Y* will be warmer than winter on *X*.
- (C) Winter on *Y* will be longer than winter on *X*.
- (D) Winter on *Y* will be shorter than winter on *X*.

- 17 In the same room, a metal door handle feels colder to touch than a wooden door handle. Which of the following statements is the best *explanation* for this observation?
- (A) Most metals have a higher density than most woods.
 - (B) Metals conduct heat away from the hand more efficiently than wood.
 - (C) Heat receptors in the hand are unable to detect the temperature of wood directly.
 - (D) Metals are good conductors of electricity, while wood is an insulator.
- 18 The diagram shows when four different fossil organisms lived. The approximate age of rocks can be determined by examining the fossils found in them. For example, a rock containing fossil *P* only is aged between 350 to 440 million years old.



The presence of which fossils in a rock would allow a scientist to find the age of the rock most accurately?

- (A) Fossils *Q* and *R* only
- (B) Fossils *Q* and *S* only
- (C) Fossils *P*, *Q* and *R* only
- (D) Fossils *P*, *R* and *S* only

PART B

Complete your answers to Questions 19–25 on the Part B Answer Sheet.

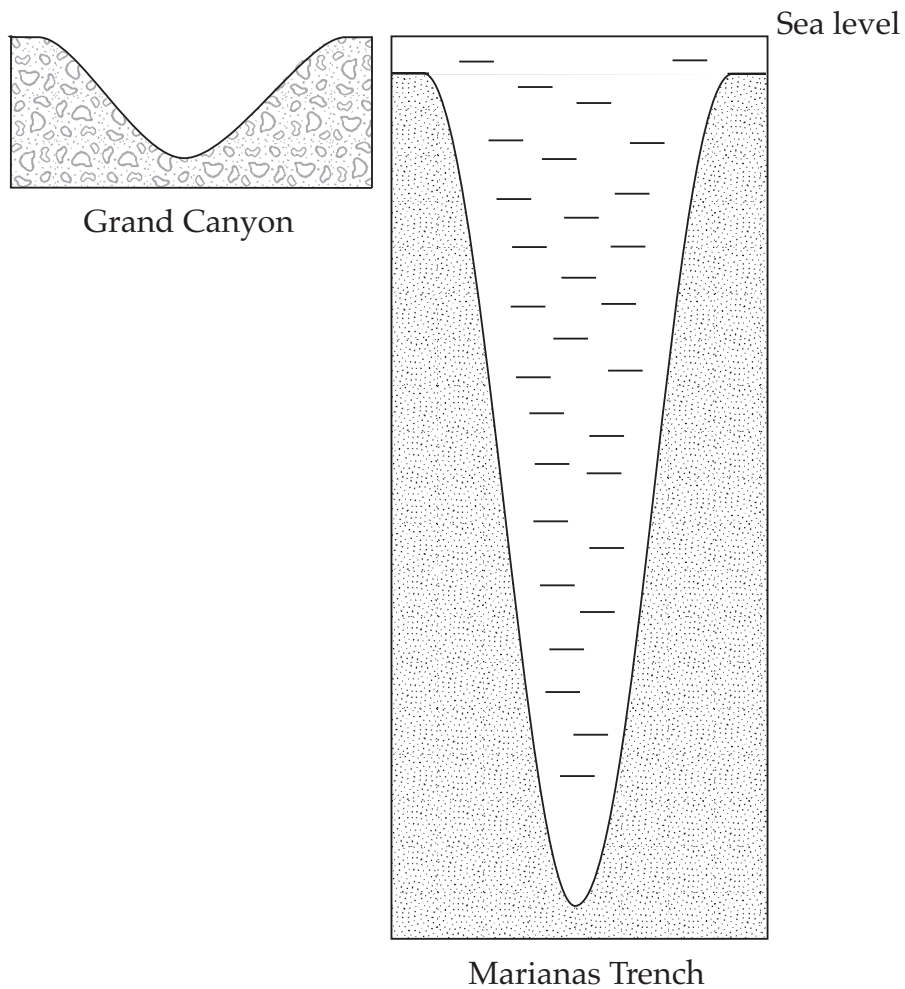
19 Use the key to answer this question.

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A rock is dark in colour and feels grainy, but individual grains are not easily visible.

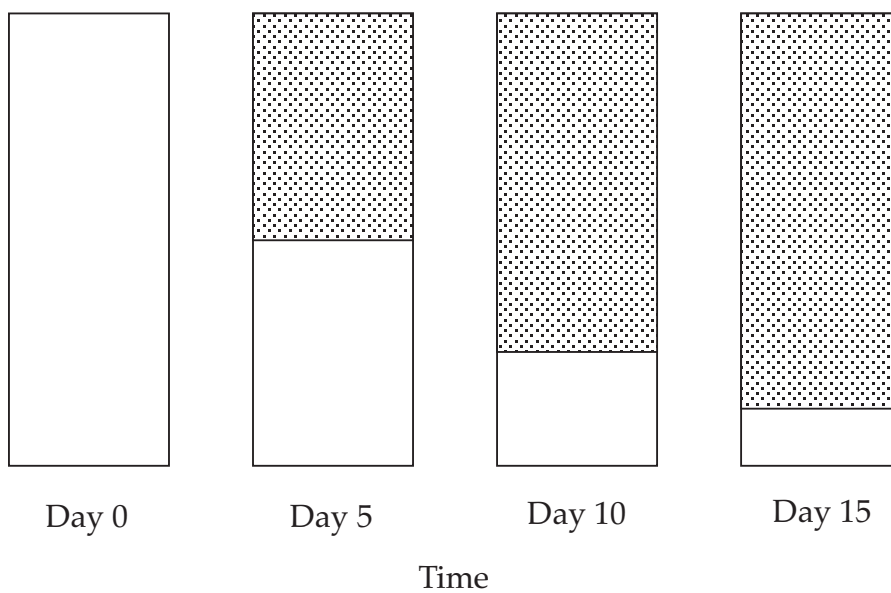
What is the rock?

- 20 The diagram shows the deepest canyon on the Earth's surface, the Grand Canyon, which is 1600 m deep, and the deepest canyon on the ocean floor, the Marianas Trench. They are drawn to the same scale.

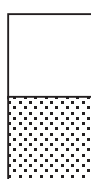


How far is the bottom of the Marianas Trench below sea level (to nearest 100 m)?

- 21 The diagram shows the proportion of radioactive material in a sample as time passes.



KEY

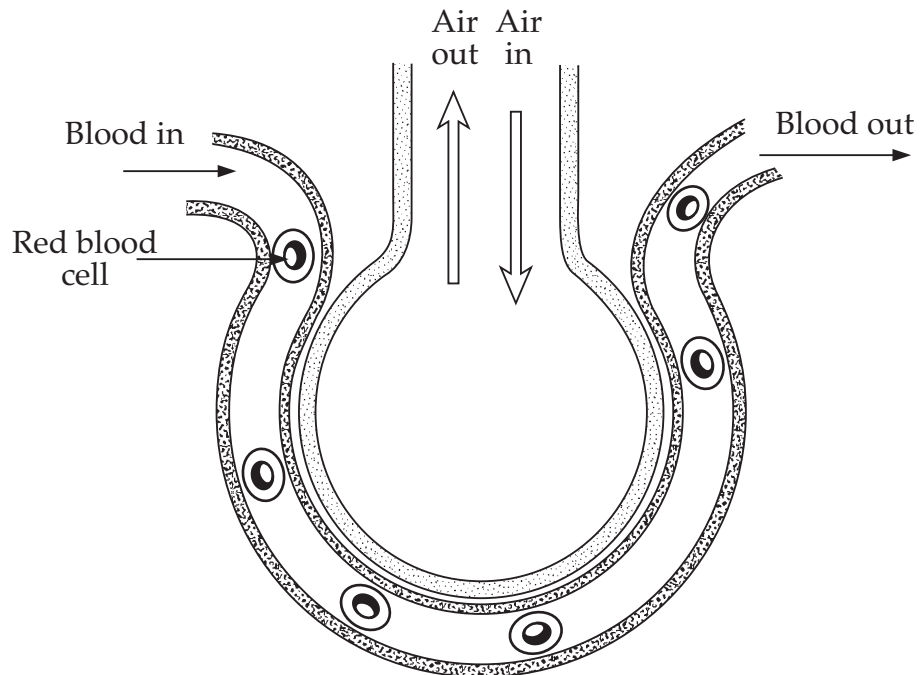


Radioactive material

Non-radioactive material formed

If there was originally 64 grams of the substance, how much would still be radioactive on Day 25?

22 The diagram is a representation of what happens in the air sacs in our lungs.

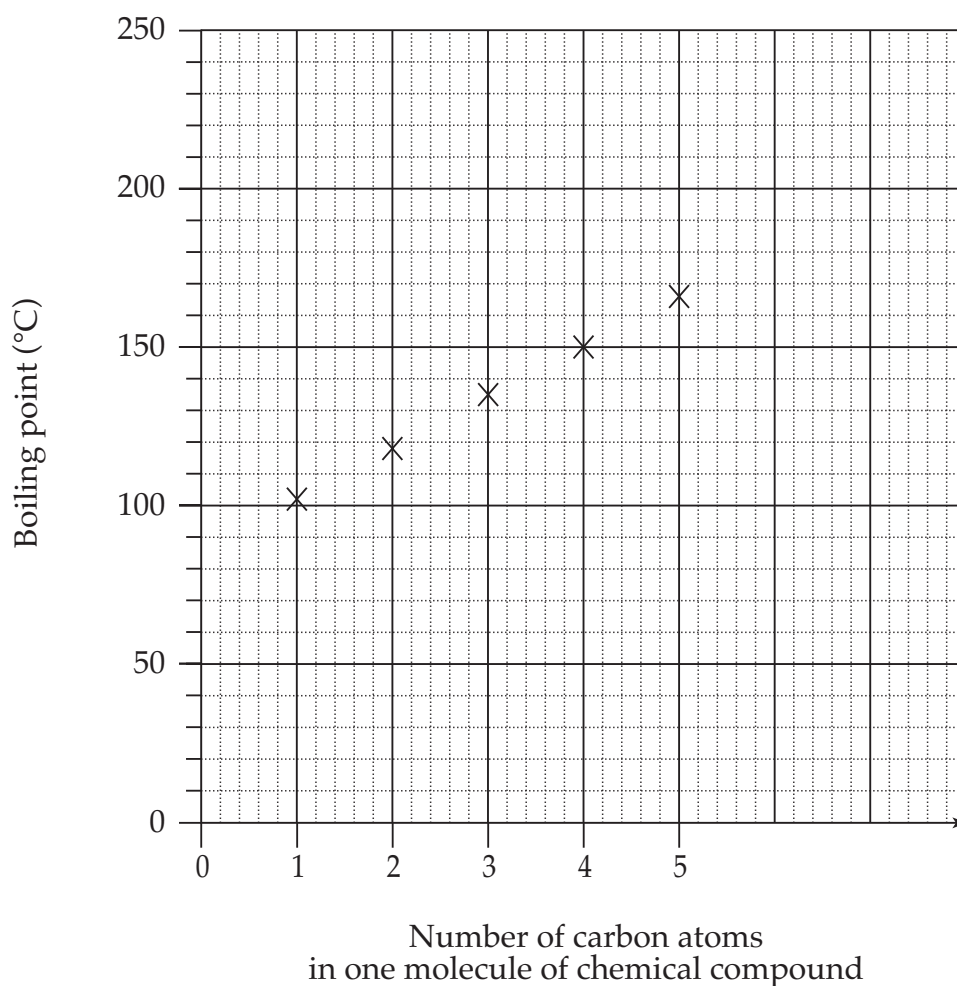


Jones, Jones and Marchington, *Balanced Science Book 2*, Cambridge University Press, 1991, p 522. © Geoff Jones

Which type of blood vessel is shown in this diagram?

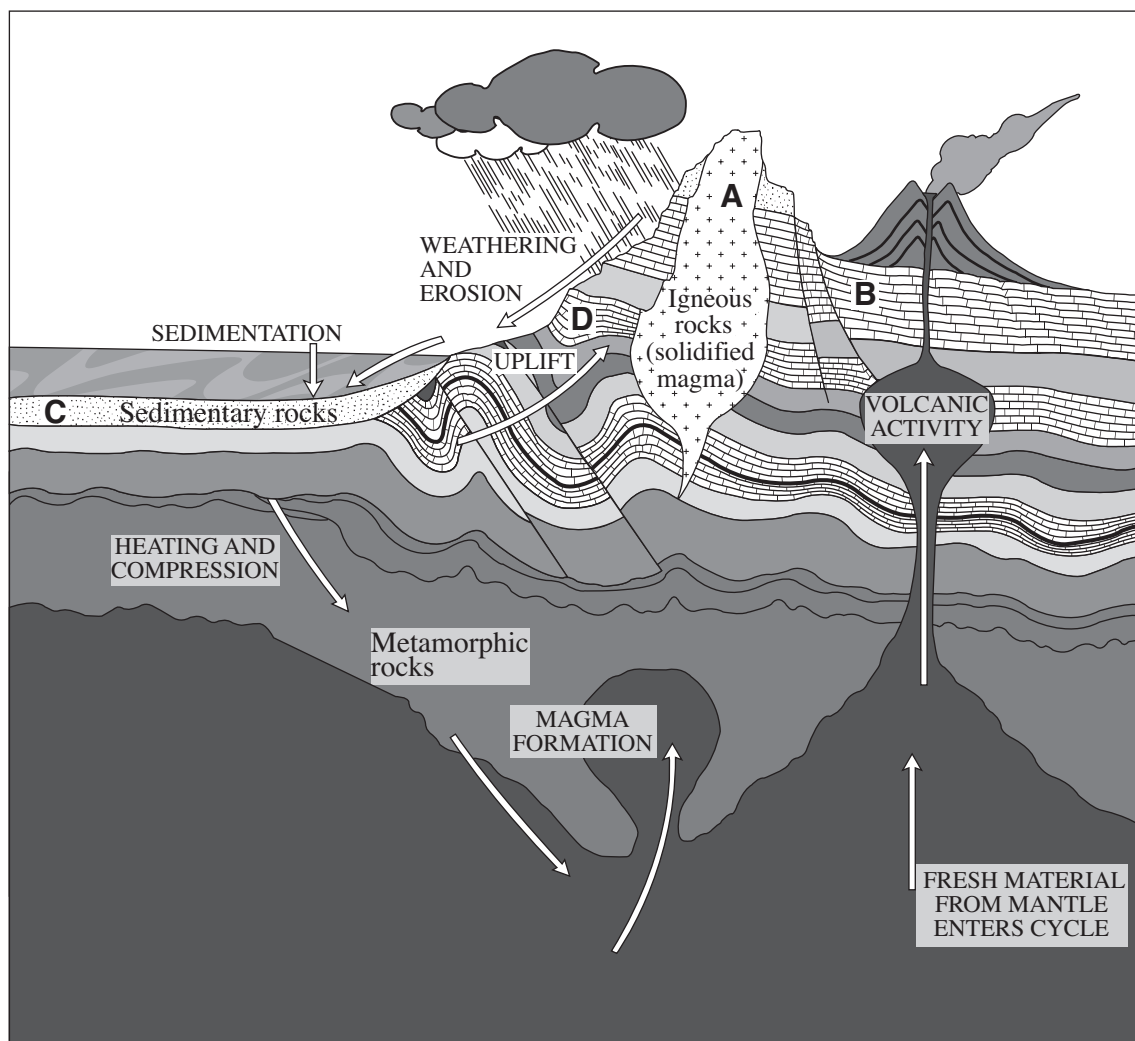
Use the information provided to answer Questions 23 and 24. The table shows the boiling points of five compounds. The graph shows the number of carbon atoms in one molecule of each of these compounds.

Chemical compound	Boiling point (°C)
A	150
B	135
C	118
D	166
E	102



- 23 How many carbon atoms are there in one molecule of compound C?
- 24 Use the data to estimate the boiling point of a compound containing seven carbon atoms in each molecule.

25 The diagram below is a representation of the rock cycle.



Jones, Jones and Marchington, *Balanced Science Book 2*, Cambridge University Press, 1991, p 522. © Geoff Jones

What is the order in which rocks *A*, *B*, *C*, and *D* were formed, from first formed (oldest) to most recently formed (youngest)?

End of Section 1

Go on to Section 2



BOARD OF STUDIES
NEW SOUTH WALES

**2000
SCHOOL
CERTIFICATE
TEST**

6 November

**SCIENCE
SECTION 2**

CENTRE NUMBER

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STUDENT NUMBER

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Directions for Section 2

- 1 Allow about 45 minutes to answer this section
- 2 This section has **THREE** parts

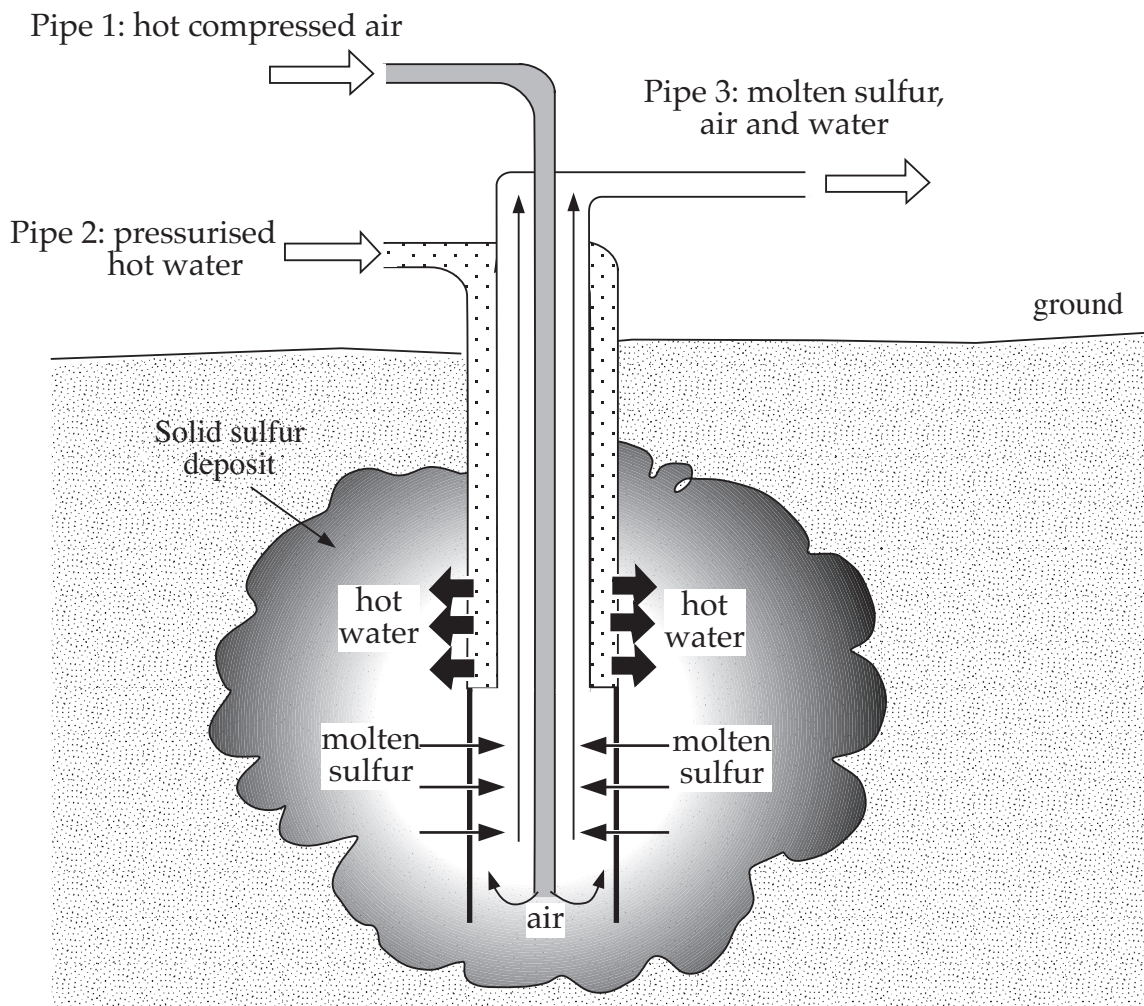
Part C	Questions 26–27	(9 marks)
Part D	Questions 28–29	(8 marks)
Part E	Question 30	(8 marks)
- 3 Complete your answers to Section 2 on the lines or in the spaces provided on pages 26 to 36
- 4 Write your Centre Number and Student Number at the top of this page **AND** at the top of pages 29 and 33

PART C

- Complete your answers in this booklet

Question 26 (6 marks)

Sulfur is found as a yellow solid in volcanic areas around the world. To obtain sulfur from underground deposits, three pipes inside each other are used. These pipes are sunk into the ground. This is illustrated in the following diagram.



Hill, Graham, Chemistry Counts, London, Hodder & Stoughton, 1986, p 171.

- (a) State ONE property of sulfur that makes hot water suitable for this process.

.....

.....

- (b) What is the main purpose of the hot compressed air in this process?

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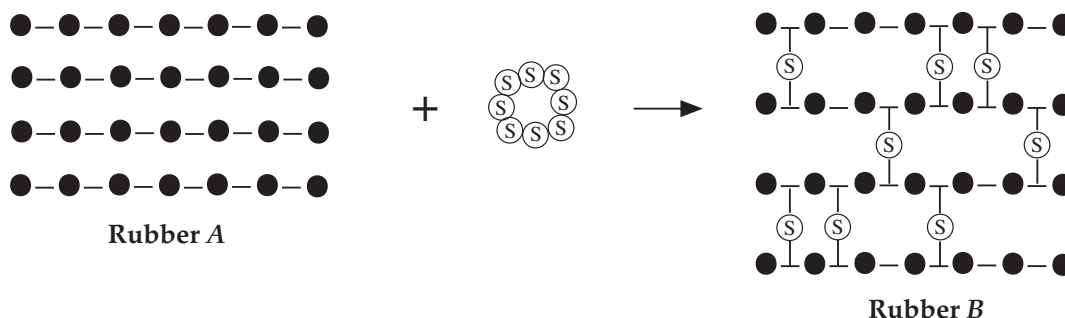
Question 26 (Continued)

- (c) The mixture from Pipe 3 is cooled, and the sulfur, which is now solid, is separated from the water by filtration.

In the space provided on the right, draw a labelled diagram showing how this filtration would be done in a school laboratory.



- (d) Rubber is a widely used material in industry because of its flexible nature. The diagram illustrates one industrial process involving the addition of sulfur to rubber.



Hill, Graham, Chemistry Counts, London, Hodder & Stoughton, 1986, p 170.

- (i) Does the diagram illustrate a physical process or a chemical process?

.....



- (ii) Justify your answer.

.....

- (e) Because of the addition of the sulfur, Rubber B is not as flexible as Rubber A. Suggest a reason for this.

.....

Question 27 (3 marks)

DRIVING YOUR CAR DAMAGES OUR FORESTS!	
<p>The combustion of fossil fuels, for example, oil or coal in power stations and petrol in cars, releases sulfur oxides and nitrogen oxides into the air. The sulfur and nitrogen oxides dissolve in water droplets in clouds, making the droplets acidic. These droplets fall as acid rain.</p>	<div style="text-align: center;">  </div> <p>Plants may be damaged when acid rain falls on them. Acid rain soaking into the soil dissolves toxic chemicals which wash into streams, rivers and lakes. Fish and other organisms may be killed.</p>
	

Jones, Jones and Marchington, *Balanced Science Book 2*, Cambridge University Press, 1991, p 522. © Geoff Jones

Draw a flow chart to show how acid rain forms from fossil fuels. Your flow chart must show what happens (processes) in diamonds (◊) and what is formed by each process (products) in rectangles (□).

End of Section 2 Part C

CENTRE NUMBER

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STUDENT NUMBER

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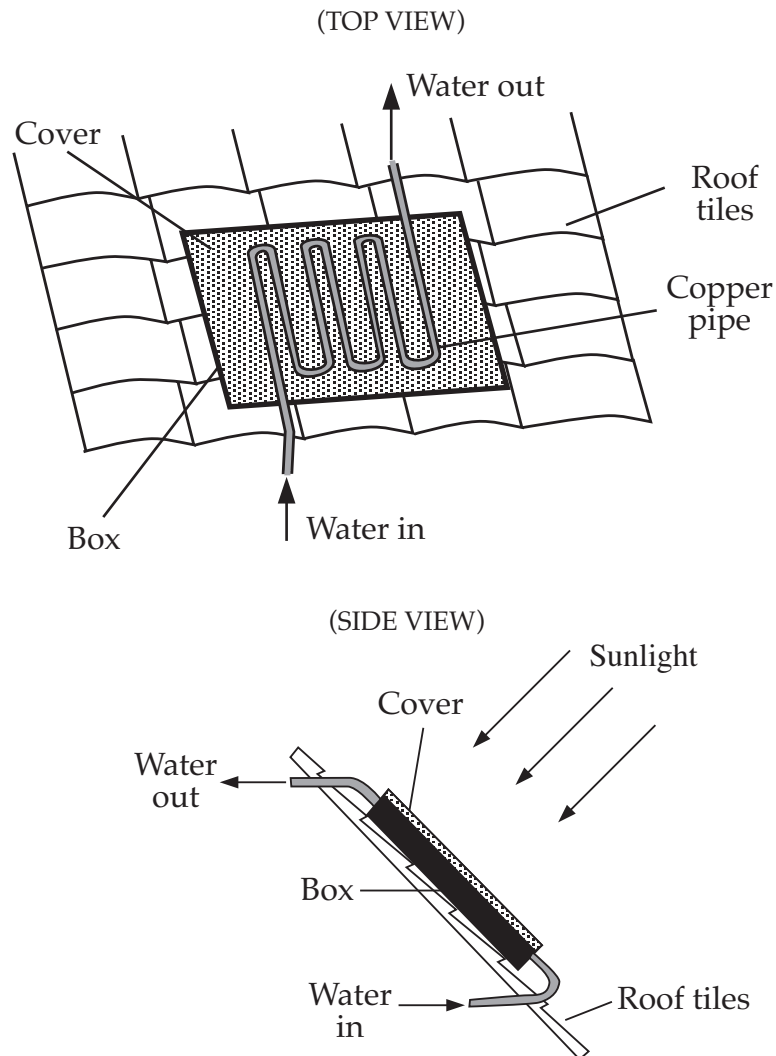
PART D

- Write your Centre Number and Student Number at the top of this page
- Complete your answers in this booklet

Question 28 (3 marks)

The diagram shows a solar panel on a roof, facing the Sun. A solar panel consists of a pipe and box, with or without a cover. A pump circulates water through the pipe in the box. The solar panel absorbs some of the Sun's radiation and heats the water.

A SOLAR PANEL

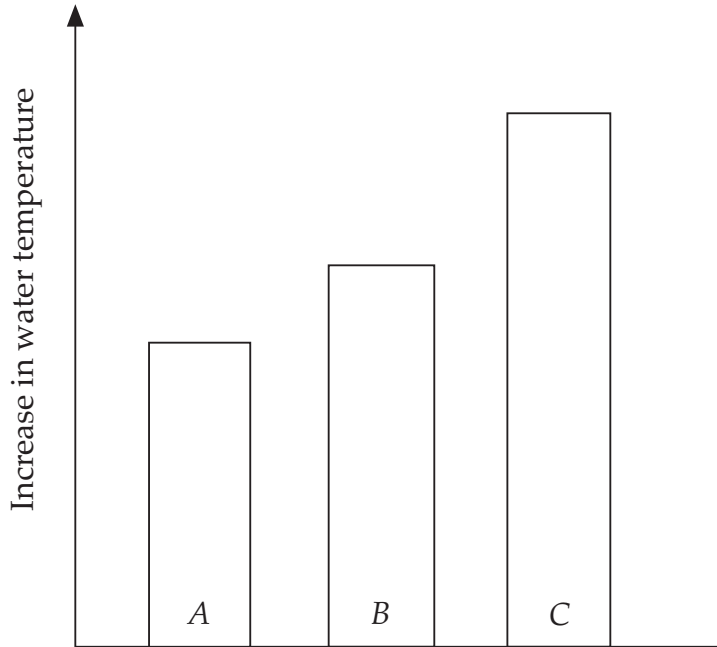


Jones, Jones and Marchington, *Balanced Science Book 2*, Cambridge University Press, 1991, p 522. © Geoff Jones

Question 28 continues on page 30

Question 28 (Continued)

The histogram shows increases in the temperature of water after it has passed through the pipe, for three different conditions.



KEY

A — open box, copper pipe

B — box with cover, copper pipe

C — box with cover, blackened copper pipe

(a) Why is the water temperature highest when the blackened copper pipe is used?

.....

(b) The temperature of the water coming out of the solar panel will be even higher if the water flow through the pipe is reduced. Explain why.

.....

(c) Why are solar hot water systems considered to be 'environmentally friendly'?

.....

Question 29 (Continued)

- (b) Imagine you have carried out this experiment. Your results supported the idea you tested.

Design and complete a table to show the results you obtained.

End of Section 2 Part D

Go on to Part E

CENTRE NUMBER

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STUDENT NUMBER

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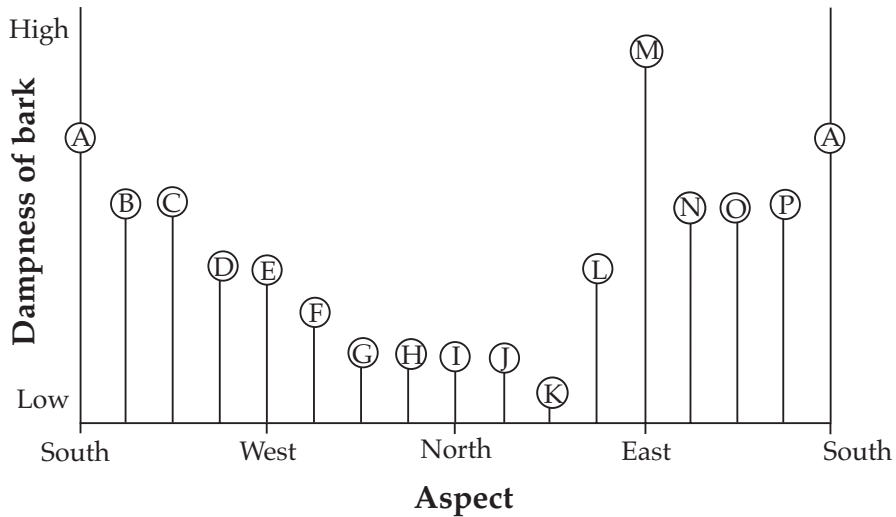
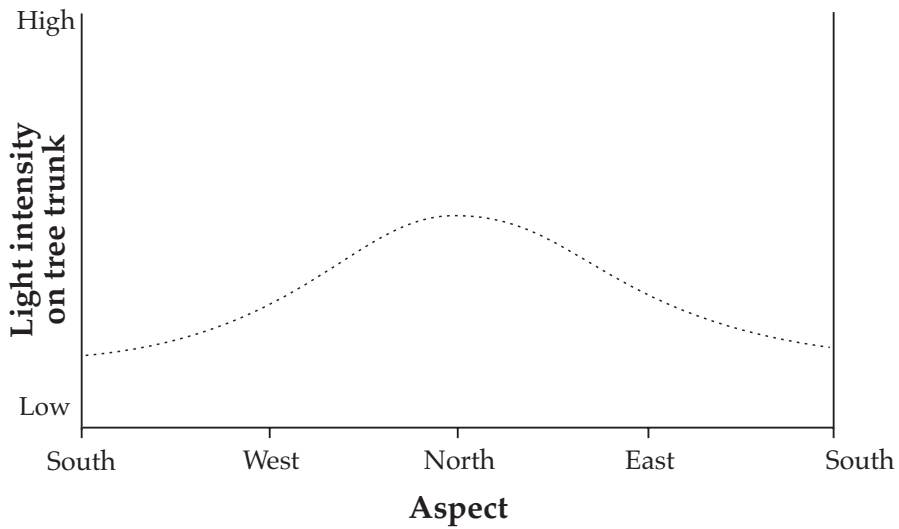
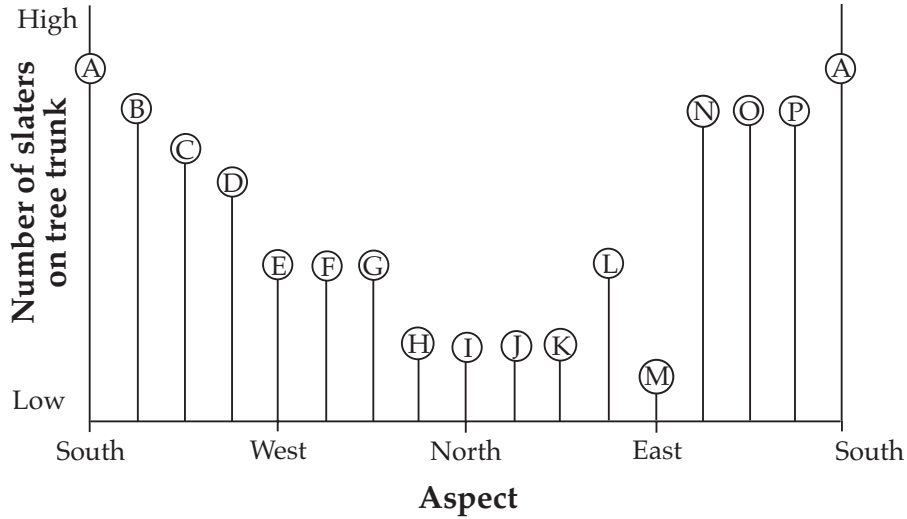
PART E

- Write your Centre Number and Student Number at the top of this page
- Complete your answers in this booklet

Please turn over

Question 30 (8 marks)

The graphs show average values for data collected by a group of students studying slaters living on trees in a forest. The students collected data from 16 positions (labelled A to P) around each tree trunk. They recorded the data according to the direction the position faced (the **aspect**).



Question 30 (Continued)

(a) What was the purpose of collecting the data shown in the three graphs?

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

(b) What are TWO conclusions that could be drawn from this data?

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

(c) (i) The data from one POSITION on the tree trunks does not follow the general patterns. What position is this?

Position

(ii) Given that ALL the data is correct, suggest a reason for the data at this position NOT following the general pattern.

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

Question 30 continues on page 36

Question 30 (Continued)

The table shows the number of slaters living on a particular tree. Use this information together with the information in the graphs on page 34 to answer questions (d) and (e).

<i>Height above ground (m)</i>	ASPECT				<i>Deep crack in bark</i>
	<i>South</i>	<i>West</i>	<i>North</i>	<i>East</i>	
1.2–2.0	1	1	0	0	4
0.6–1.2	2	0	0	0	6
0.3–0.6	4	2	0	3	10
0.0–0.3	8	5	3	6	18
TOTAL	15	8	3	9	38

- (d) Consider where the slaters live on the tree. What conclusion can you make about their environmental living conditions at the base of the tree?

.....

.....

.....

- (e) The students took some slaters back to the laboratory and weighed them. The students then placed the slaters in a dry container and reweighed them after an hour. The results are shown.

<i>Average mass at start (g)</i>	1.5
<i>Average mass after 1 hour (g)</i>	1.1

How do THESE results help explain the distribution of the slaters on the tree?

.....

.....

.....

.....

End of test