



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/13**

Paper 1 Multiple Choice

**October/November 2015**

**45 minutes**

Additional Materials: Multiple Choice Answer Sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)



**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.  
Do not use staples, paper clips, glue or correction fluid.  
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.  
**DO NOT WRITE IN ANY BARCODES.**

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.  
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

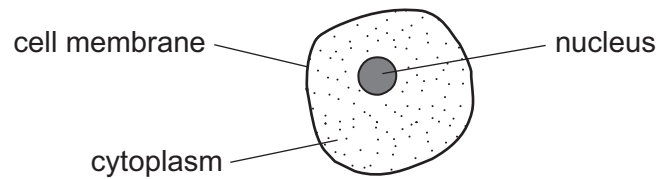
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.  
Any rough working should be done in this booklet.  
A copy of the Periodic Table is printed on page 20.  
Electronic calculators may be used.

This document consists of **18** printed pages and **2** blank pages.

1 What are three characteristics of living organisms?

	characteristic 1	characteristic 2	characteristic 3
<b>A</b>	breathing	reproduction	sensitivity
<b>B</b>	digestion	growth	movement
<b>C</b>	excretion	nutrition	transpiration
<b>D</b>	nutrition	reproduction	sensitivity

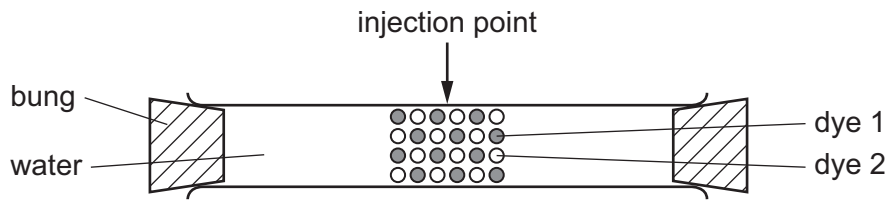
2 The diagram shows a liver cell, as seen using a light microscope.



Which of the labelled structures would also be present in a palisade cell?

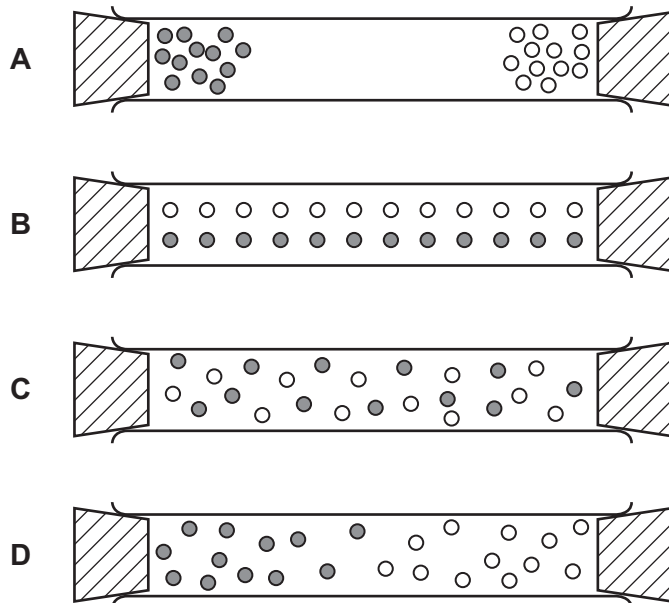
- A** all of them
- B** cell membrane only
- C** cell membrane and cytoplasm only
- D** cytoplasm and nucleus only

- 3 A student carries out an experiment to investigate diffusion. Two dyes are injected into the middle of a sealed tube of water. The diagram shows the particles of dye in the tube just after the dyes are injected.

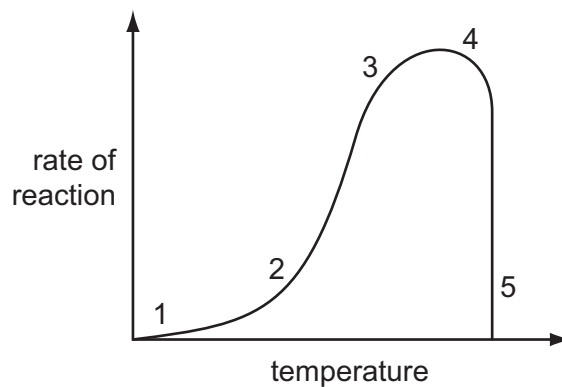


The tube is left for an hour.

Which diagram shows the distribution of the particles of dye after this time?



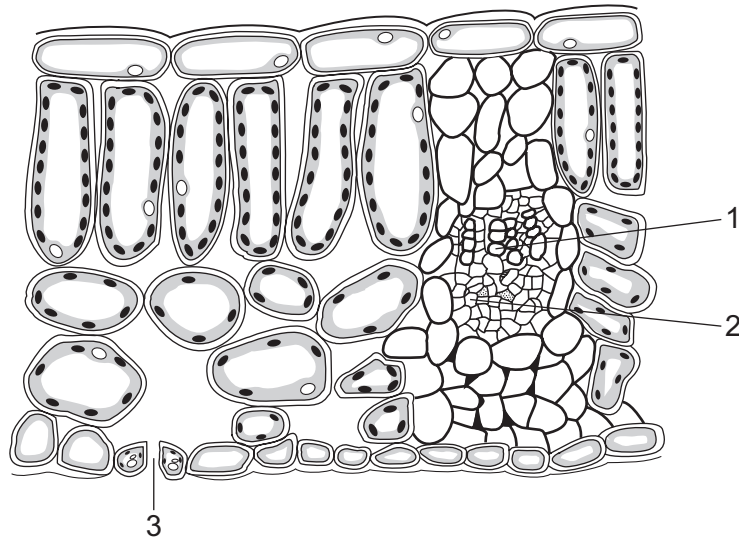
- 4 The graph shows the effect of temperature on the rate of an enzyme-controlled reaction.



Where on the graph has all the enzyme been denatured?

- A 1                      B 2 and 3                      C 3 and 4                      D 5

5 The diagram shows a section through a leaf.

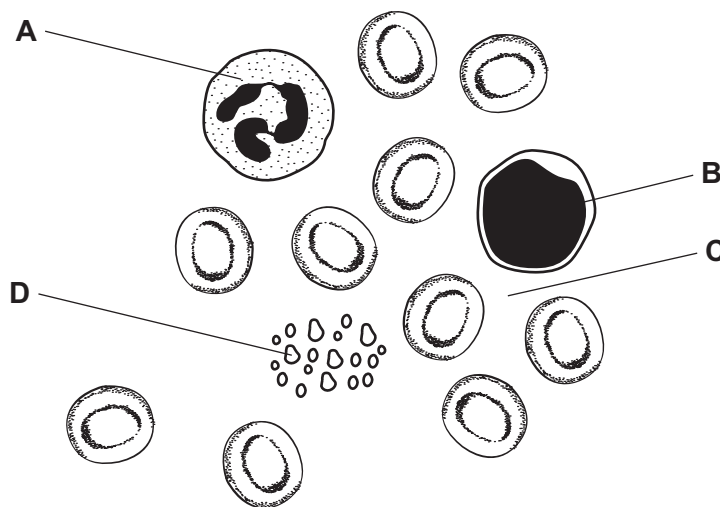


Where does carbon dioxide enter the leaf and where does water leave?

	carbon dioxide enters	water leaves
<b>A</b>	1	2
<b>B</b>	1	3
<b>C</b>	3	1
<b>D</b>	3	3

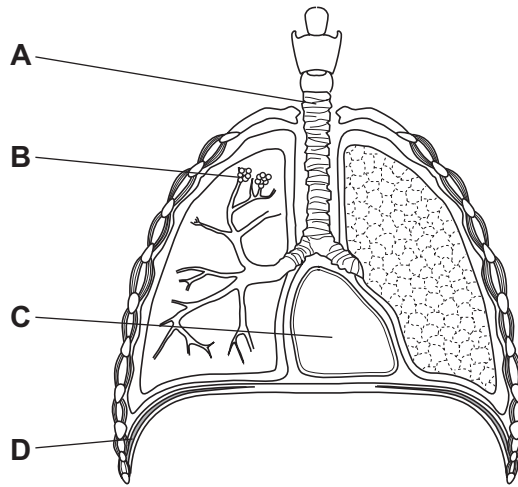
6 The drawing shows some blood, as it appears under the microscope.

Which part carries glucose to muscles?



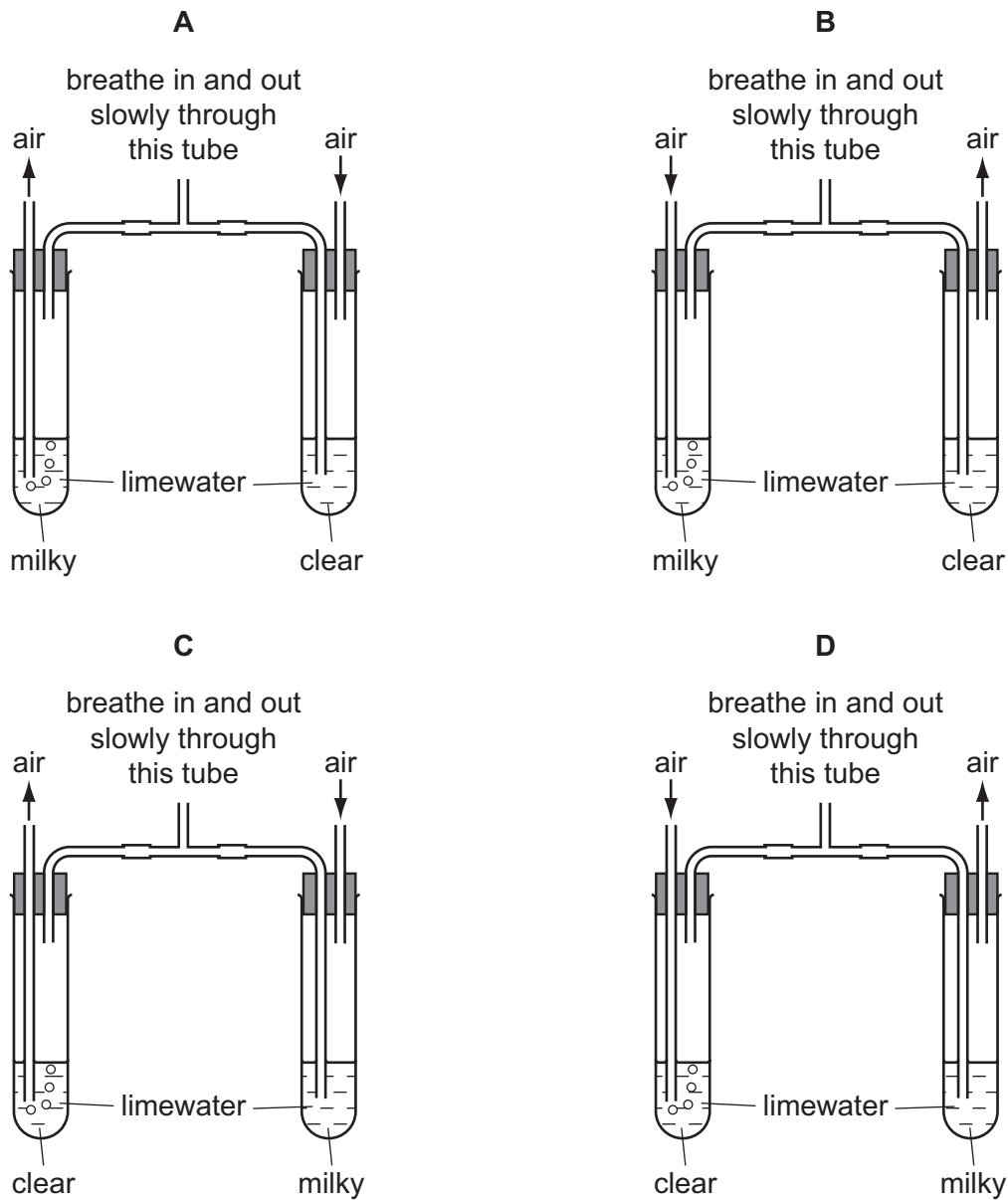
7 The diagram shows some structures in the human thorax (chest).

Into which part does carbon dioxide pass immediately after leaving the blood?



8 Carbon dioxide turns limewater milky (cloudy).

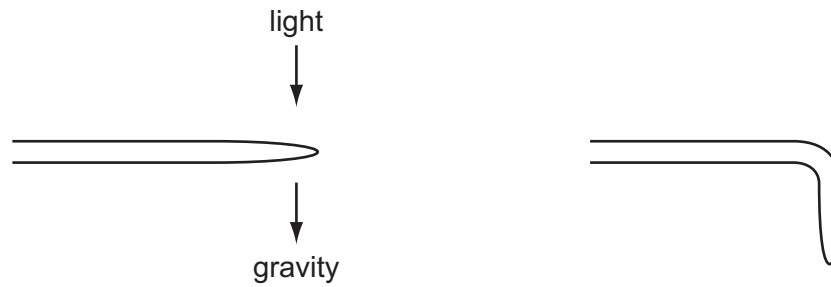
Which diagram shows apparatus being used to demonstrate that expired air contains more carbon dioxide than inspired air?



9 Which are effects of the hormone adrenaline?

	increase in blood glucose concentration	decrease in pulse rate
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

10 The diagram shows the root of a plant exposed to light and gravity, and the same root a day later.



Light does **not** influence the growth of roots in this plant.

Which row shows how the root has responded?

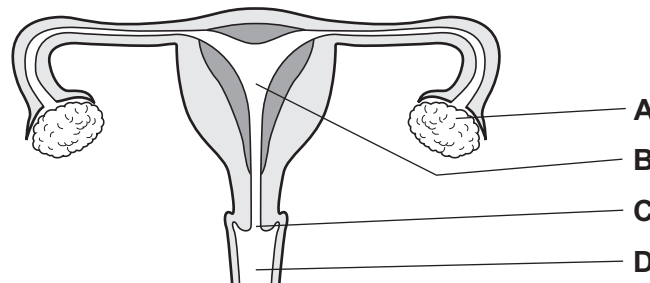
	geotropism	phototropism
<b>A</b>	grows away from the stimulus	no response
<b>B</b>	grows towards the stimulus	no response
<b>C</b>	no response	grows away from the stimulus
<b>D</b>	no response	grows towards the stimulus

11 Which structure in a flower produces pollen?

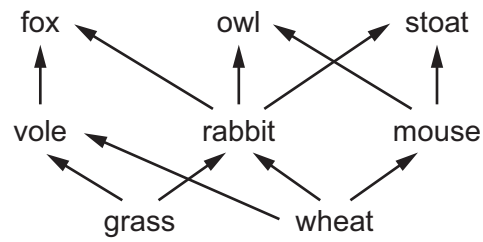
- A sepal
- B stamen
- C stigma
- D style

12 The diagram shows the female reproductive system.

Which labelled structure is the cervix?



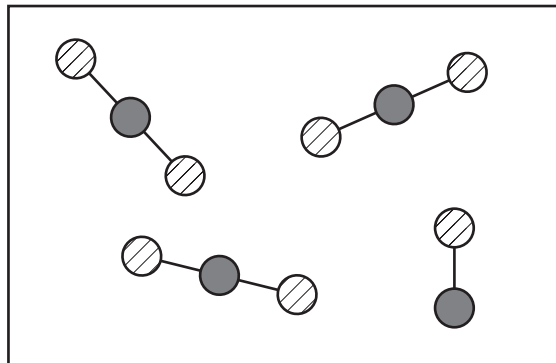
13 The diagram shows a food web.



Which food chain is part of this food web?

- A grass → mouse → owl
- B grass → vole → stoat
- C wheat → mouse → owl
- D wheat → vole → stoat

14 The diagram represents a mixture of carbon dioxide, CO<sub>2</sub>, and carbon monoxide, CO.



Which statement is correct?

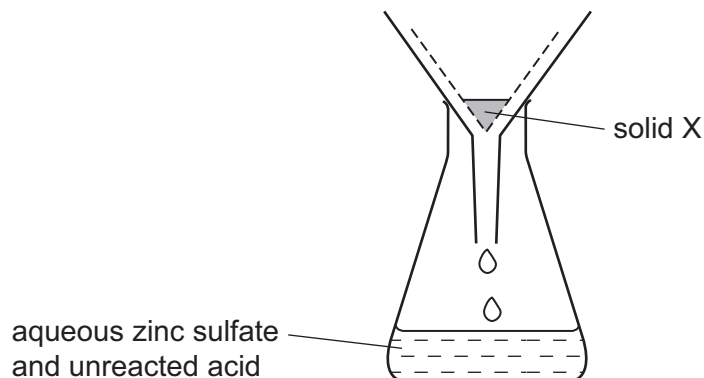
- A The mixture contains 4 elements.
- B The mixture contains 4 molecules.
- C The mixture contains 11 elements.
- D The mixture contains 11 molecules.



- 15 In an experiment, a mixture of 0.5 g of copper and 3 g of zinc is added to an excess of dilute sulfuric acid.

The copper acts as a catalyst.

After all the zinc has dissolved, the resulting mixture is filtered.



What is solid X and what is its mass?

	solid X	mass of pure X
<b>A</b>	copper	less than 0.5 g
<b>B</b>	copper	0.5 g
<b>C</b>	copper(II) oxide	0.5 g
<b>D</b>	copper(II) oxide	greater than 0.5 g

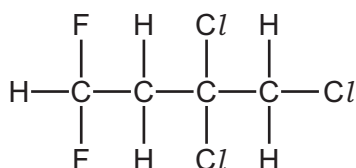
- 16 Element Y has a proton number of 18 and a nucleon number of 40.

Which statements about element Y are correct?

- 1 It has 40 neutrons in its nucleus.
- 2 It has 22 electrons.
- 3 It is unreactive.
- 4 It is in Group 0 of the Periodic Table.

- A** 1 and 2      **B** 2 and 3      **C** 2 and 4      **D** 3 and 4

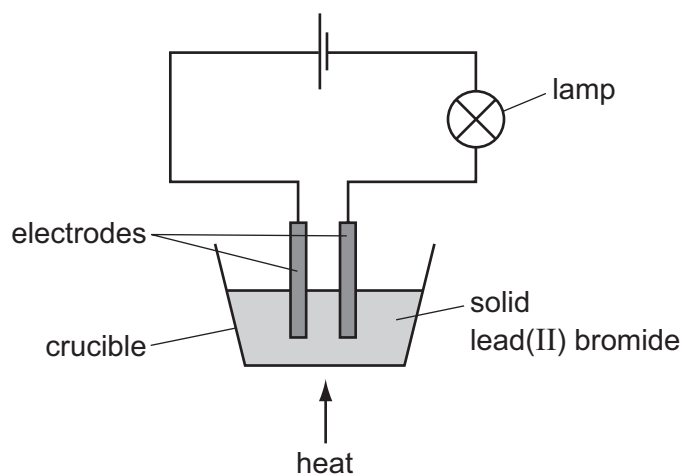
- 17 The structure of a compound is shown.



What is the formula of the compound?

- A** CHClF      **B** C<sub>4</sub>H<sub>5</sub>Cl<sub>2</sub>F<sub>2</sub>      **C** C<sub>4</sub>H<sub>5</sub>Cl<sub>3</sub>F<sub>2</sub>      **D** C<sub>4</sub>H<sub>5</sub>Cl<sub>3</sub>F

18 The apparatus shown is set up.



The crucible needs to be heated for the lamp to give out light.

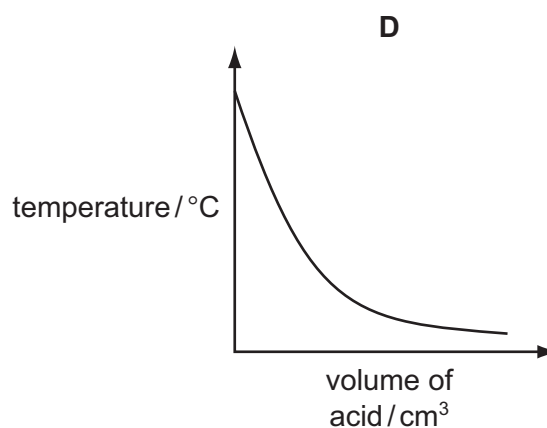
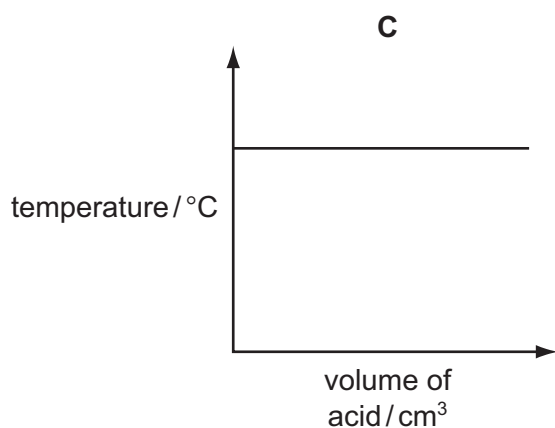
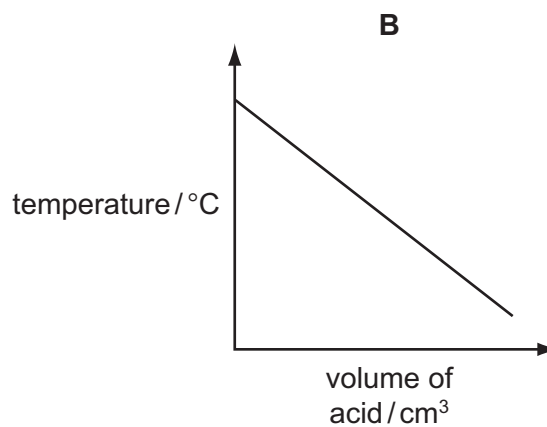
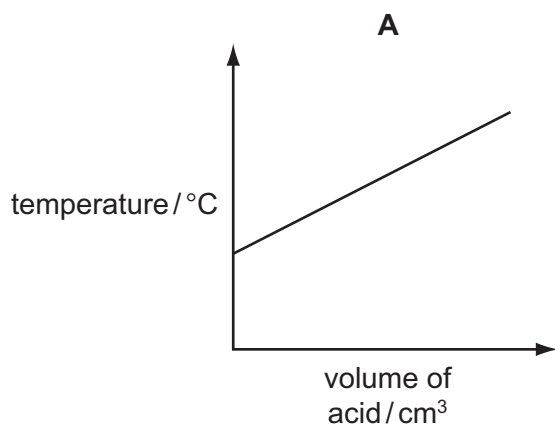
Why is heat needed?

- A** An exothermic reaction takes place in the crucible.
- B** Electrodes only conduct electricity when hot.
- C** Heat causes the lead(II) bromide to react with air.
- D** The lead(II) bromide must be molten.

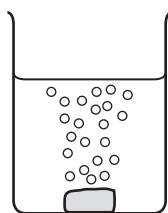
19 Hydrochloric acid is slowly added to sodium hydroxide in an insulated beaker.

The reaction is exothermic.

Which graph shows how the temperature changes during the reaction?



20 When a solid lump of calcium carbonate is added to excess hydrochloric acid, it reacts and bubbles can be seen.



Which change does **not** increase the rate of reaction?

- A** Increase the concentration of the acid.
- B** Increase the surface area of the solid.
- C** Increase the temperature.
- D** Increase the volume of the acid.

- 21 Copper sulfate crystals are prepared by reacting copper oxide with sulfuric acid.

Which process is **not** used in the preparation of copper sulfate crystals?

- A chromatography
- B crystallisation
- C evaporation
- D filtration

- 22 A substance reacts with dilute acid, producing a gas.

The gas ignites with a pop when tested with a lighted splint.

What is the substance?

- A copper
- B copper(II) oxide
- C magnesium
- D magnesium carbonate

- 23 The positions of four elements are shown in the outline of the Periodic Table.

Which element has a high melting point and forms coloured compounds?

								<b>A</b>												<b>B</b>
<b>C</b>	<b>D</b>																			

- 24 Element X has a high density and is used as a catalyst.

What is X?

- A carbon
- B sodium
- C sulfur
- D vanadium

25 A metal is added to water. It floats and reacts vigorously.

What is the pH of the resulting solution?

- A 1                      B 5                      C 7                      D 14

26 What is a chemical test for water?

- A Blue cobalt chloride paper turns pink.  
B Measure its boiling point which is 100 °C.  
C Measure its melting point which is 0 °C.  
D Pink cobalt chloride paper turns blue.

27 Gas oil is a fraction formed when petroleum is fractionally distilled.

What is a use of gas oil?

- A bottled gas  
B cooking  
C diesel engine fuel  
D heating

28 A tunnel is 50 km long. A train takes 20 min to travel between the two ends of the tunnel.

What is the average speed of the train in the tunnel?

- A 2.5 km/hour  
B 16.6 km/hour  
C 150 km/hour  
D 1000 km/hour

29 Which of the following has the same unit as weight?

- A density  
B energy  
C force  
D mass

30 Which items of apparatus are used to determine the density of a liquid?

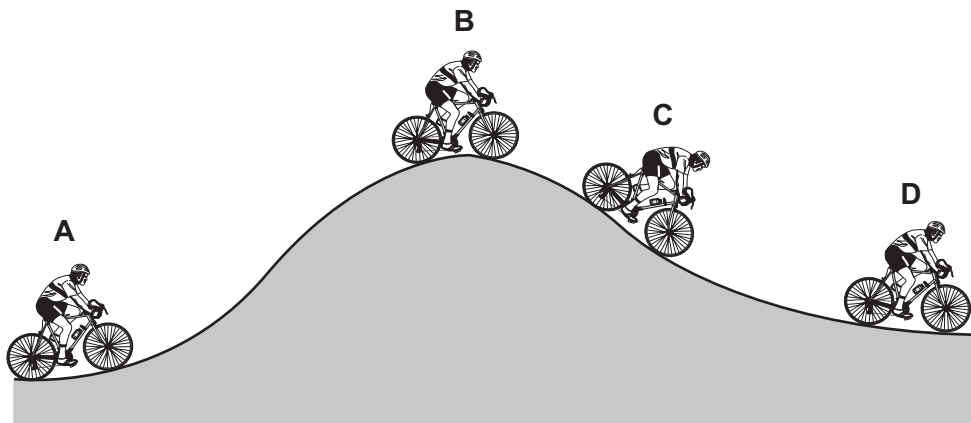
- A balance and measuring cylinder
- B balance and thermometer
- C metre rule and measuring cylinder
- D metre rule and thermometer

31 What is the unit for work and what is the unit for power?

	work	power
A	J	N
B	J	W
C	N	W
D	W	J

32 The diagram shows a cyclist riding along a hilly road.

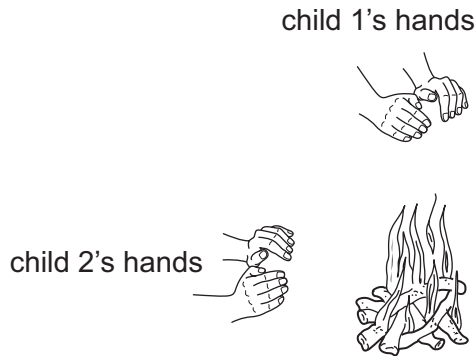
At which position does the cyclist have the least gravitational (potential) energy?



33 Which statement describes the molecules in a gas?

- A They are close together and move about quickly.
- B They are close together and move about slowly.
- C They are far apart and move about quickly.
- D They are far apart and move about slowly.

34 On a cold night, two children sit next to a camp fire to warm their hands. Their hands are the same distance from the fire. Child 1 holds his hands over the fire and child 2 holds her hands in front of the fire.



How does the heat from the fire reach each child's hands?

	child 1	child 2
<b>A</b>	convection only	radiation only
<b>B</b>	convection and radiation	radiation only
<b>C</b>	radiation only	convection and radiation
<b>D</b>	radiation only	convection only

35 A girl writes the word **LEFT** on a piece of card.



She looks at the image of this card, made by reflection by a plane mirror.

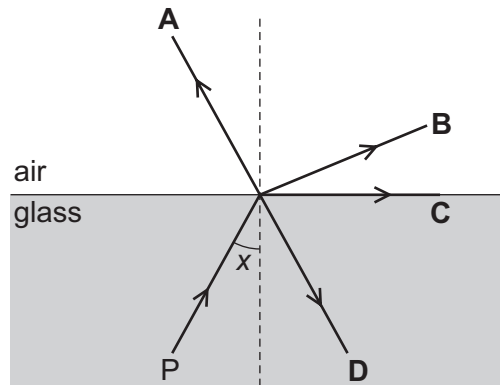
What does she see?

A                      B                      C                      D

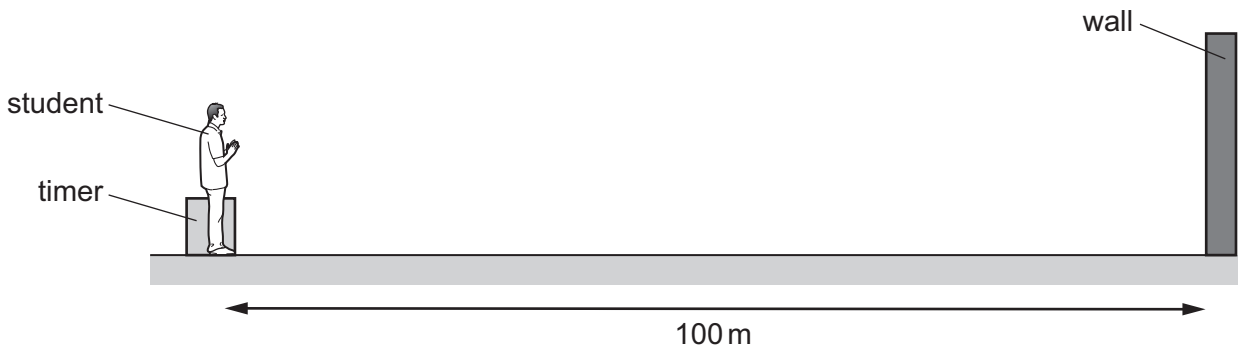
<b>LEEF</b>	<b>TƆ3J</b>	<b>LƆ37</b>	<b>TFEL</b>
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- 36 The diagram shows a ray of light travelling in glass from point P. Angle  $x$  is greater than the critical angle.

In which labelled direction does the ray continue?



- 37 A student measures the speed of sound. He claps his hands and the sound reflects from a wall which is 100 m away from him.

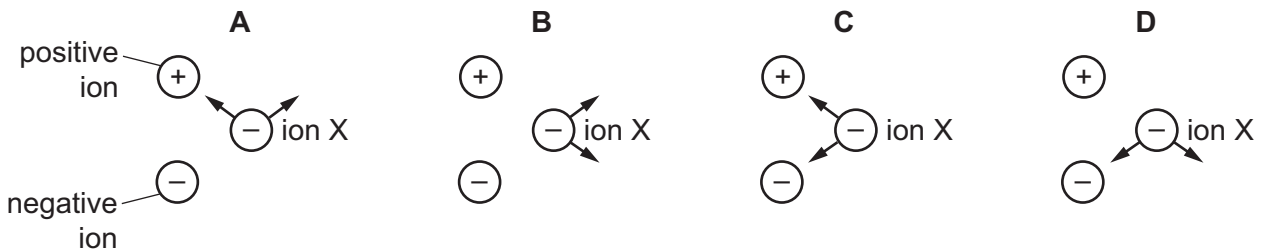


An electronic timer detects the echo of the sound 0.60 s after it is made.

Which calculation should the student use to determine the speed of sound?

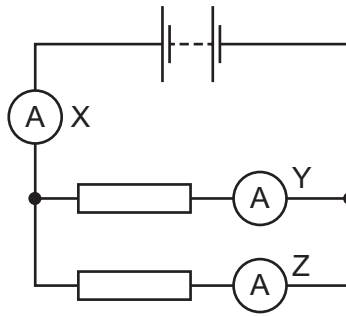
- A  $\frac{100}{0.60}$  m/s    B  $\frac{100}{1.2}$  m/s    C  $\frac{200}{0.30}$  m/s    D  $\frac{200}{0.60}$  m/s
- 38 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

Which diagram shows the directions of the two forces acting on ion X?





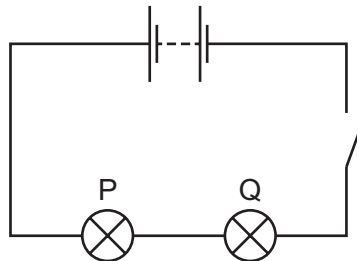
39 The diagram shows a circuit with three ammeters X, Y and Z.



Which set of readings on the ammeters is possible?

	X	Y	Z
<b>A</b>	2A	3A	5A
<b>B</b>	3A	2A	5A
<b>C</b>	3A	3A	3A
<b>D</b>	5A	2A	3A

40 Two identical lamps P and Q are connected in a circuit as shown in the diagram.



The circuit is now switched on.

Which statement is correct?

- A** Each lamp can be switched off independently.
- B** If lamp Q breaks, lamp P stays alight.
- C** Lamp P is brighter than lamp Q.
- D** The current is the same in both lamps.





**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																																																																																																																																					
I	II	III	IV	V	VI	VII	0																																																																																																																																
		1 <b>H</b> Hydrogen 1							4 <b>He</b> Helium 2																																																																																																																														
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4							20 <b>Ne</b> Neon 10																																																																																																																															
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18																																																																																																																																
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36																																																																																																																																
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	101 <b>Ru</b> Ruthenium 44	106 <b>Pd</b> Palladium 46	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	122 <b>Sb</b> Antimony 51	131 <b>Xe</b> Xenon 54																																																																																																																																
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	190 <b>Os</b> Osmium 76	195 <b>Pt</b> Platinum 78	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	209 <b>Pb</b> Lead 82	222 <b>Rn</b> Radon 86																																																																																																																																
223 <b>Fr</b> Francium 87	226 <b>Ra</b> Radium 88																																																																																																																																						
*58-71 Lanthanoid series												†90-103 Actinoid series																																																																																																																											
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">a</td> <td style="width: 5%; text-align: center;"><b>X</b></td> <td style="width: 90%;"></td> </tr> <tr> <td style="text-align: center;">Key</td> <td style="text-align: center;"><b>X</b></td> <td style="text-align: center;">b</td> </tr> </table>												a	<b>X</b>		Key	<b>X</b>	b	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">140</td> <td style="width: 5%; text-align: center;"><b>Ce</b></td> <td style="width: 5%; text-align: center;">141</td> <td style="width: 5%; text-align: center;"><b>Pr</b></td> <td style="width: 5%; text-align: center;">144</td> <td style="width: 5%; text-align: center;"><b>Nd</b></td> <td style="width: 5%; text-align: center;">147</td> <td style="width: 5%; text-align: center;"><b>Pm</b></td> <td style="width: 5%; text-align: center;">150</td> <td style="width: 5%; text-align: center;"><b>Sm</b></td> <td style="width: 5%; text-align: center;">152</td> <td style="width: 5%; text-align: center;"><b>Eu</b></td> <td style="width: 5%; text-align: center;">157</td> <td style="width: 5%; text-align: center;"><b>Gd</b></td> <td style="width: 5%; text-align: center;">159</td> <td style="width: 5%; text-align: center;"><b>Tb</b></td> <td style="width: 5%; text-align: center;">162</td> <td style="width: 5%; text-align: center;"><b>Dy</b></td> <td style="width: 5%; text-align: center;">165</td> <td style="width: 5%; text-align: center;"><b>Ho</b></td> <td style="width: 5%; text-align: center;">167</td> <td style="width: 5%; text-align: center;"><b>Er</b></td> <td style="width: 5%; text-align: center;">169</td> <td style="width: 5%; text-align: center;"><b>Tm</b></td> <td style="width: 5%; text-align: center;">173</td> <td style="width: 5%; text-align: center;"><b>Yb</b></td> <td style="width: 5%; text-align: center;">175</td> <td style="width: 5%; text-align: center;"><b>Lu</b></td> </tr> <tr> <td style="text-align: center;">58</td> <td style="text-align: center;">Cerium</td> <td style="text-align: center;">59</td> <td style="text-align: center;">Praseodymium</td> <td style="text-align: center;">60</td> <td style="text-align: center;">Neodymium</td> <td style="text-align: center;">61</td> <td style="text-align: center;">Promethium</td> <td style="text-align: center;">62</td> <td style="text-align: center;">Samarium</td> <td style="text-align: center;">63</td> <td style="text-align: center;">Europium</td> <td style="text-align: center;">64</td> <td style="text-align: center;">Gadolinium</td> <td style="text-align: center;">65</td> <td style="text-align: center;">Terbium</td> <td style="text-align: center;">66</td> <td style="text-align: center;">Dysprosium</td> <td style="text-align: center;">67</td> <td style="text-align: center;">Holmium</td> <td style="text-align: center;">68</td> <td style="text-align: center;">Erbium</td> <td style="text-align: center;">69</td> <td style="text-align: center;">Thulium</td> <td style="text-align: center;">70</td> <td style="text-align: center;">Ytterbium</td> <td style="text-align: center;">71</td> <td style="text-align: center;">Lutetium</td> </tr> <tr> <td style="text-align: center;">232</td> <td style="text-align: center;"><b>Th</b></td> <td style="text-align: center;">231</td> <td style="text-align: center;"><b>Pa</b></td> <td style="text-align: center;">238</td> <td style="text-align: center;"><b>U</b></td> <td style="text-align: center;">237</td> <td style="text-align: center;"><b>Np</b></td> <td style="text-align: center;">244</td> <td style="text-align: center;"><b>Pu</b></td> <td style="text-align: center;">243</td> <td style="text-align: center;"><b>Am</b></td> <td style="text-align: center;">247</td> <td style="text-align: center;"><b>Cm</b></td> <td style="text-align: center;">247</td> <td style="text-align: center;"><b>Bk</b></td> <td style="text-align: center;">251</td> <td style="text-align: center;"><b>Cf</b></td> <td style="text-align: center;">252</td> <td style="text-align: center;"><b>Es</b></td> <td style="text-align: center;">257</td> <td style="text-align: center;"><b>Fm</b></td> <td style="text-align: center;">258</td> <td style="text-align: center;"><b>Md</b></td> <td style="text-align: center;">260</td> <td style="text-align: center;"><b>Lr</b></td> <td style="text-align: center;">260</td> <td style="text-align: center;"><b>No</b></td> <td style="text-align: center;">260</td> <td style="text-align: center;"><b>Lr</b></td> </tr> <tr> <td style="text-align: center;">90</td> <td style="text-align: center;">Thorium</td> <td style="text-align: center;">91</td> <td style="text-align: center;">Protactinium</td> <td style="text-align: center;">92</td> <td style="text-align: center;">Uranium</td> <td style="text-align: center;">93</td> <td style="text-align: center;">Neptunium</td> <td style="text-align: center;">94</td> <td 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</table>		140	<b>Ce</b>	141	<b>Pr</b>	144	<b>Nd</b>	147	<b>Pm</b>	150	<b>Sm</b>	152	<b>Eu</b>	157	<b>Gd</b>	159	<b>Tb</b>	162	<b>Dy</b>	165	<b>Ho</b>	167	<b>Er</b>	169	<b>Tm</b>	173	<b>Yb</b>	175	<b>Lu</b>	58	Cerium	59	Praseodymium	60	Neodymium	61	Promethium	62	Samarium	63	Europium	64	Gadolinium	65	Terbium	66	Dysprosium	67	Holmium	68	Erbium	69	Thulium	70	Ytterbium	71	Lutetium	232	<b>Th</b>	231	<b>Pa</b>	238	<b>U</b>	237	<b>Np</b>	244	<b>Pu</b>	243	<b>Am</b>	247	<b>Cm</b>	247	<b>Bk</b>	251	<b>Cf</b>	252	<b>Es</b>	257	<b>Fm</b>	258	<b>Md</b>	260	<b>Lr</b>	260	<b>No</b>	260	<b>Lr</b>	90	Thorium	91	Protactinium	92	Uranium	93	Neptunium	94	Plutonium	95	Americium	96	Curium	97	Berkelium	98	Californium	99	Einsteinium	100	Fermium	101	Mendelevium	102	Nobelium	102	Lawrencium	103	Lawrencium
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The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).