



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**COMBINED SCIENCE**

**0653/12**

Paper 1 Multiple Choice

**May/June 2012**

**45 minutes**

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

\* 7 4 6 5 5 7 1 3 4 6 \*

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

Do not use staples, paper clips, highlighters, 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.

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.

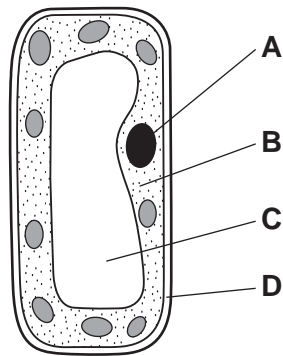
A copy of the Periodic Table is printed on page 20.

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



1 The diagram shows a cell from the mesophyll of a leaf.

Which part contains DNA?

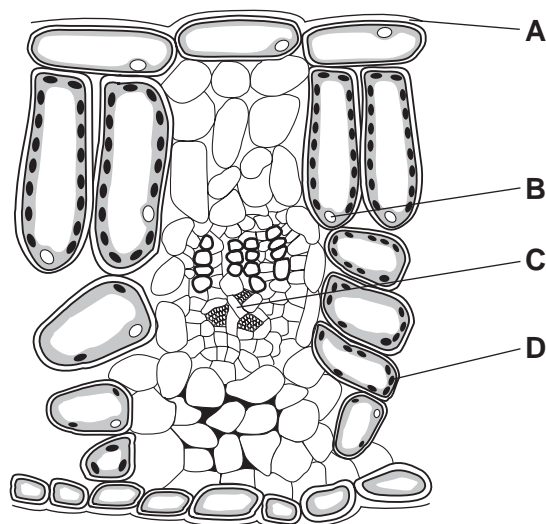


2 Which of these structures does an animal cell have?

	cell surface membrane	cell wall
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

3 The diagram shows part of a cross-section of a leaf.

Where is light energy used?



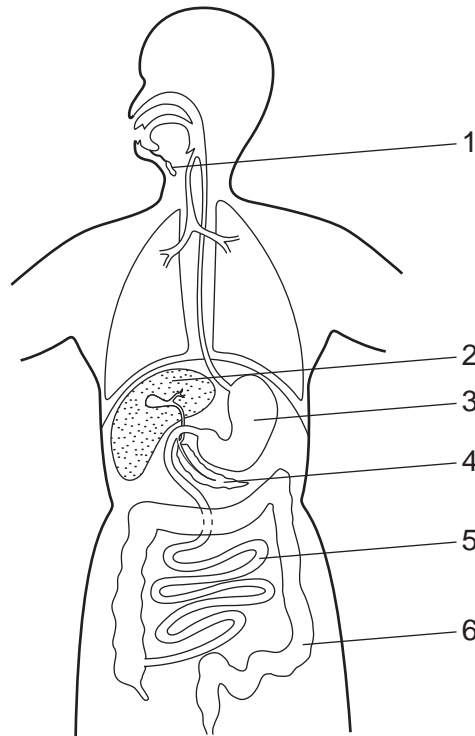
4 The statements are about enzymes.

- 1 act as catalysts
- 2 can be denatured by heat
- 3 composed of complex carbohydrates
- 4 not affected by pH
- 5 produced by cells

Which statements are correct?

- A** 1, 2 and 5      **B** 1, 4 and 5      **C** 2, 3 and 4      **D** 3 and 5 only

5 The diagram shows the human alimentary canal.



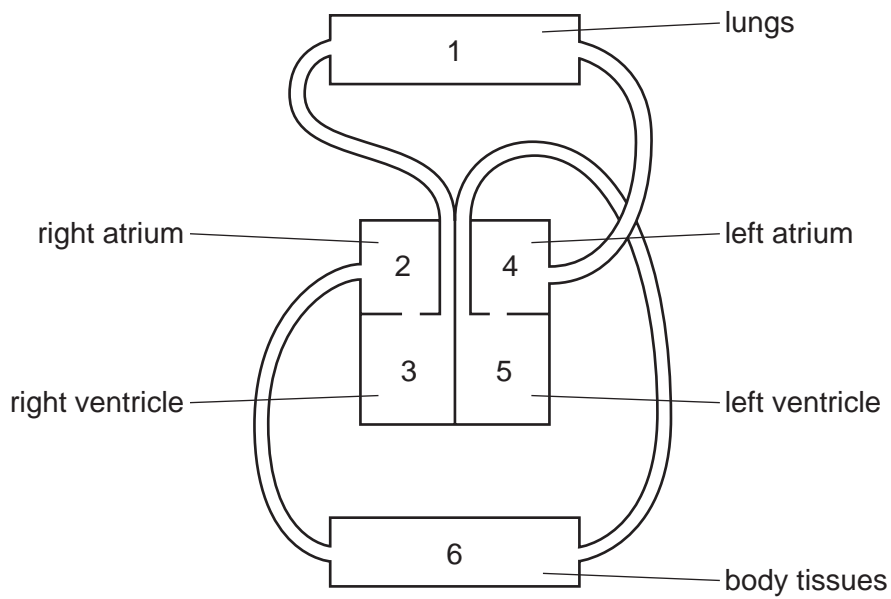
Which numbered structures secrete chemicals that are involved in fat digestion?

- A** 1 and 3      **B** 2 and 4      **C** 3 and 5      **D** 5 and 6

6 In which organisms does respiration take place?

- A** animals and plants, in both the dark and light
- B** animals in both the dark and light, but never in plants
- C** animals in the dark and light, plants only in the dark
- D** animals in the dark and light, plants only in the light

7 Which sequence of numbers represents the path taken by a deoxygenated red blood cell?



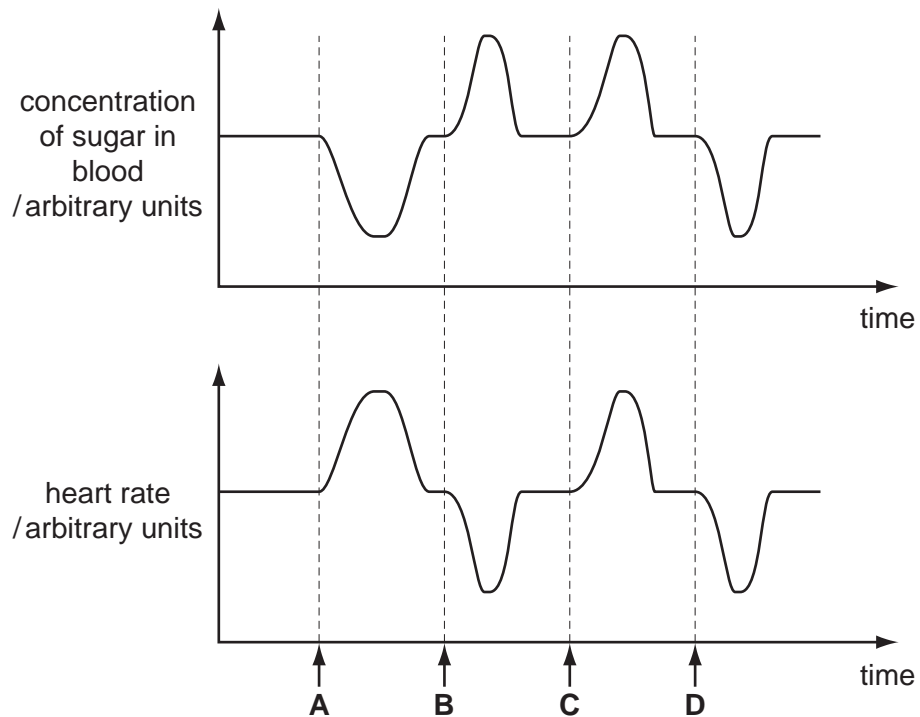
- A 1 → 3 → 2 → 6
- B 1 → 4 → 5 → 6
- C 6 → 2 → 3 → 1
- D 6 → 5 → 4 → 1

8 In which state does water enter and which state does water leave a plant?

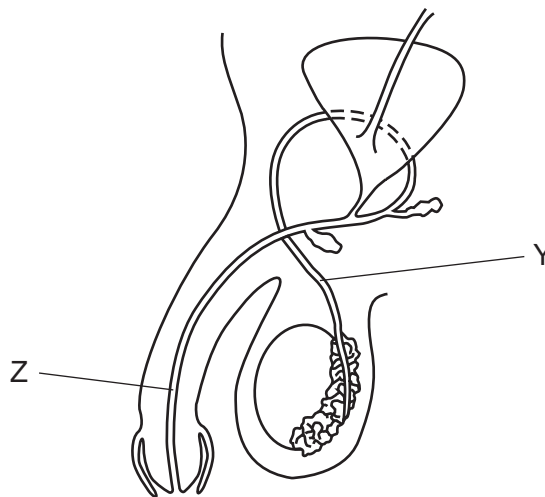
	enters	leaves
<b>A</b>	liquid	liquid
<b>B</b>	liquid	vapour
<b>C</b>	vapour	liquid
<b>D</b>	vapour	vapour

- 9 The graphs show changes in the rate of heartbeat and in the concentration of sugar over the same period of time.

When was adrenaline secreted?



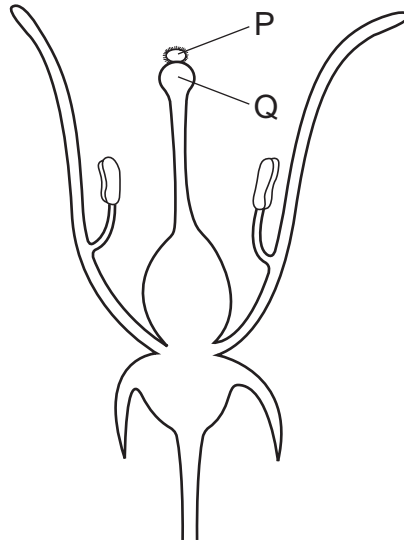
- 10 The diagram shows the male reproductive system.



What are Y and Z?

	Y	Z
<b>A</b>	prostate gland	urethra
<b>B</b>	urethra	prostate gland
<b>C</b>	sperm duct	prostate gland
<b>D</b>	sperm duct	urethra

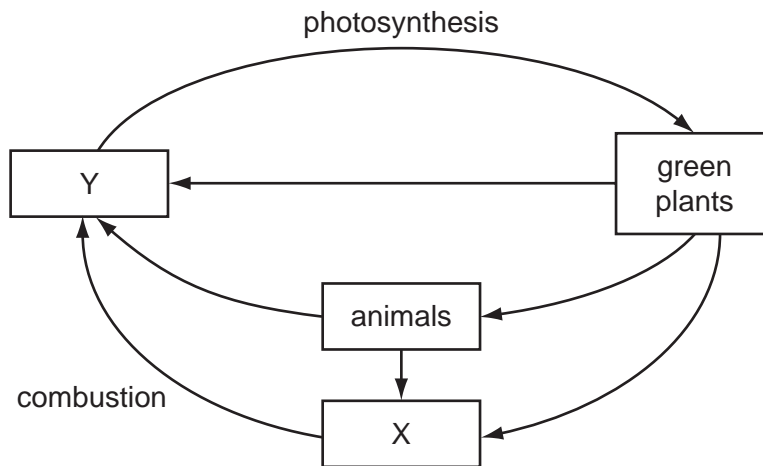
11 The diagram shows a section through a flower immediately after pollination.



Which row identifies structures P and Q?

	P	Q
<b>A</b>	pollen grain	anther
<b>B</b>	pollen grain	stigma
<b>C</b>	zygote	anther
<b>D</b>	zygote	stigma

12 The diagram shows part of the carbon cycle.



What are X and Y?

	X	Y
<b>A</b>	carbon dioxide	oxygen
<b>B</b>	fossil fuel	carbon dioxide
<b>C</b>	fossil fuel	oxygen
<b>D</b>	oxygen	carbon dioxide

13 Which are possible harmful effects of deforestation?

	global warming	species extinction
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

14 The melting points of three substances are given in the table.

	melting point / °C
W	-219
X	0
Z	3500

What could the substances be?

	W	X	Z
<b>A</b>	oxygen	graphite	water
<b>B</b>	oxygen	water	graphite
<b>C</b>	graphite	water	oxygen
<b>D</b>	water	graphite	oxygen

15 Which statement correctly describes the bonding in compounds?

- A** An ionic compound contains two metallic elements.
- B** In a compound formed between a metal and a non-metal, the metal has a negative charge.
- C** When a metal combines with a non-metal, electrons are shared between the elements.
- D** When two non-metals combine, molecules are formed.

16 Four minerals containing calcium are listed.

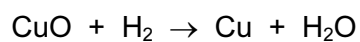
mineral	chemical formula
calcite	$\text{CaCO}_3$
dolomite	$\text{CaCO}_3 \cdot \text{MgCO}_3$
fluorite	$\text{CaF}_2$
gypsum	$\text{CaSO}_4$

What is the **total** number of different elements contained in these minerals?

- A** 4
- B** 5
- C** 6
- D** 7



17 Copper(II) oxide reacts as shown.



Which statement about the reaction is correct?

- A Both oxidation and reduction take place.
  - B Copper(II) oxide is a reducing agent.
  - C Copper(II) oxide is oxidised to copper.
  - D Hydrogen is reduced to water.
- 18 Which change does **not** alter the rate of reaction between zinc and dilute sulfuric acid?
- A addition of a catalyst
  - B change in concentration of the acid
  - C change in atmospheric pressure
  - D change in temperature
- 19 Barium oxide is a metallic oxide.

A solution of barium oxide is .....1..... with a pH .....2..... than seven.

Which words correctly complete gaps 1 and 2?

	1	2
A	acidic	greater
B	acidic	less
C	alkaline	greater
D	alkaline	less

20 Acid X reacts with metal Y.

A colourless gas is given off and a pale green solution is produced.

Two tests are carried out on the solution.

test	reagent(s) added	result
1	aqueous silver nitrate and nitric acid	white precipitate
2	aqueous sodium hydroxide	green precipitate

What are acid X and metal Y?

	acid	metal
<b>A</b>	hydrochloric	iron
<b>B</b>	hydrochloric	zinc
<b>C</b>	sulfuric	iron
<b>D</b>	sulfuric	zinc

21 The properties of the elements in Groups I and VII of the Periodic Table change down the group.

Which row shows how the melting points change down these groups?

	Group I	Group VII
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

22 The diagram shows elements in part of the Periodic Table.

The letters are **not** the actual symbols of the elements.

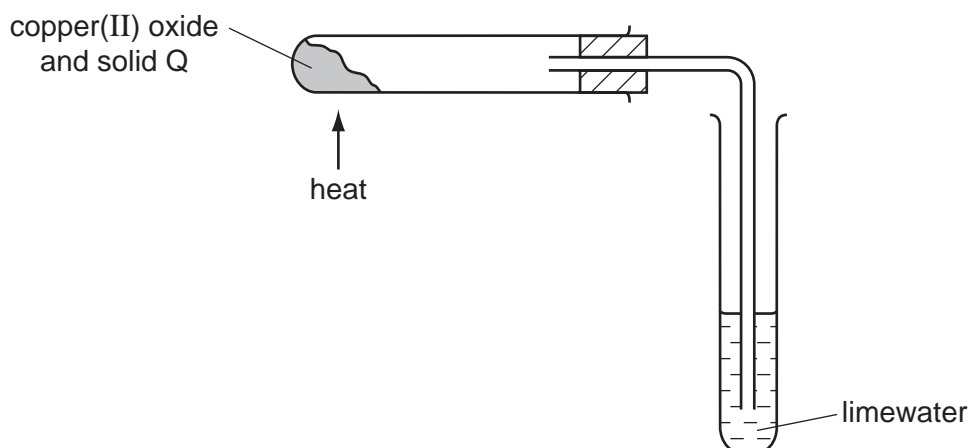
I		II												III	IV	V	VI	VII	0
	P																S	T	
	Q																	U	
			R																

Which statement about the elements shown is correct?

- A P and S are in the same group of the Periodic Table.
  - B P is more reactive than Q.
  - C R is likely to form coloured compounds.
  - D T and U are halogens.
- 23 Which property of a metal determines the method used to extract the metal from its ore?
- A the melting point of the metal
  - B the position of the metal in the Periodic Table
  - C the reactivity of the metal
  - D the relative atomic mass,  $A_r$ , of the metal

24 Copper(II) oxide is mixed with a solid Q.

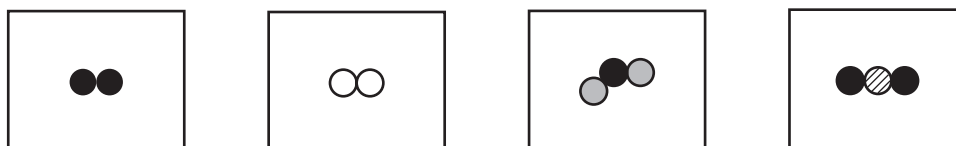
On heating the mixture, a reaction occurs and the limewater turns milky.



What is solid Q?

- A carbon
- B iron
- C sulfur
- D zinc

25 The diagrams show molecules of four gases present in clean air. Different circles represent atoms of different elements.



Which elements are shown as ● and ○?

	●	○
<b>A</b>	hydrogen	nitrogen
<b>B</b>	hydrogen	oxygen
<b>C</b>	oxygen	hydrogen
<b>D</b>	oxygen	nitrogen

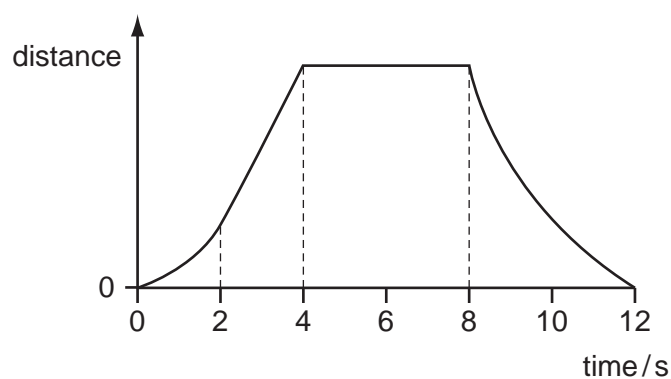
26 Which property of the compounds in petroleum is used to separate it into useful fractions?

- A boiling point
- B density
- C melting point
- D solubility

27 Which equation shows the complete combustion of a hydrocarbon?

- A  $\text{C}_2\text{H}_4 + 2\text{O}_2 \rightarrow 2\text{CO} + 2\text{H}_2\text{O}$
- B  $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$
- C  $\text{C}_2\text{H}_6\text{O} + 2\text{O}_2 \rightarrow 2\text{CO} + 3\text{H}_2\text{O}$
- D  $\text{C}_2\text{H}_6\text{O} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$

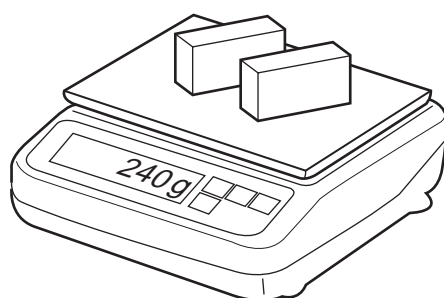
28 The graph shows how the distance of an object changes with time.



Between which two times is the object moving with a non-zero constant speed?

- A between 0 s and 2 s
- B between 2 s and 4 s
- C between 4 s and 8 s
- D between 8 s and 12 s

- 29 A shop-keeper places two identical blocks of cheese on a set of scales and notices that the combined mass is 240g. Each block measures 2.0 cm × 5.0cm × 10.0 cm.



What is the density of the cheese?

- A 0.42g/cm<sup>3</sup>    B 0.83g/cm<sup>3</sup>    C 1.2g/cm<sup>3</sup>    D 2.4g/cm<sup>3</sup>
- 30 Which row shows the unit of energy, the unit of power and the unit of work?

	unit of energy	unit of power	unit of work
<b>A</b>	joule	joule	watt
<b>B</b>	joule	watt	joule
<b>C</b>	watt	joule	watt
<b>D</b>	watt	watt	joule

- 31 Warm water in a bowl evaporates.

Which row shows where the evaporation occurs and what effect the evaporation has on the temperature of the remaining water?

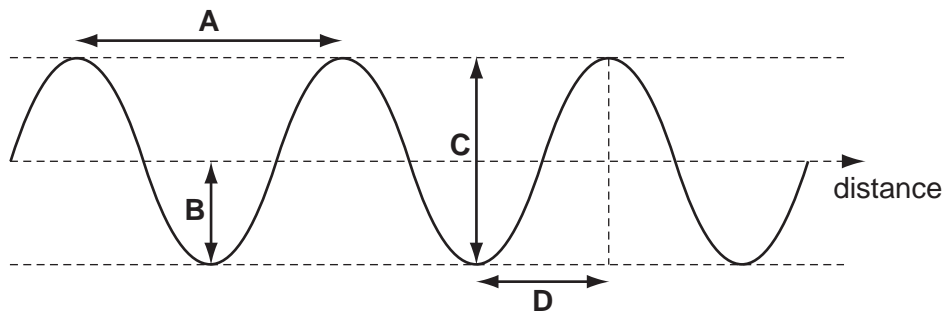
	where evaporation occurs	effect on water temperature
<b>A</b>	only on the surface	decreases
<b>B</b>	only on the surface	no change
<b>C</b>	throughout the water	decreases
<b>D</b>	throughout the water	no change

- 32 In which state(s) of matter can convection occur?

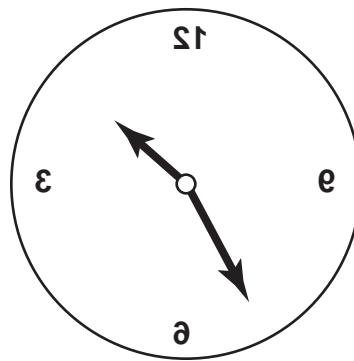
	in a solid	in a liquid	in a gas
<b>A</b>	no	no	yes
<b>B</b>	no	yes	yes
<b>C</b>	yes	no	no
<b>D</b>	yes	yes	no

33 The diagram represents a wave.

Which arrow represents the amplitude of the wave?



34 The image of a clock face as seen in a plane mirror is shown.

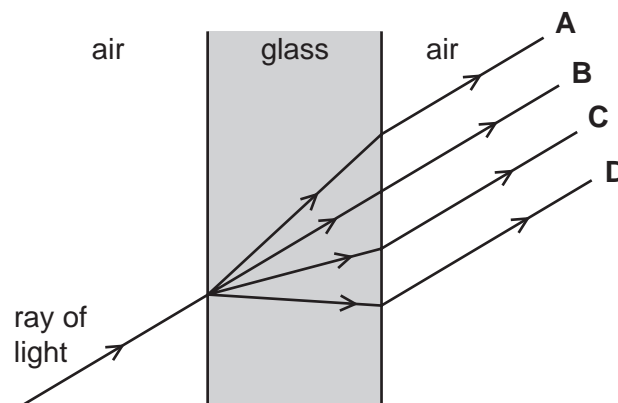


What is the time on the clock?

- A 1.25      B 1.35      C 10.25      D 10.35

35 A ray of light passes through a glass window.

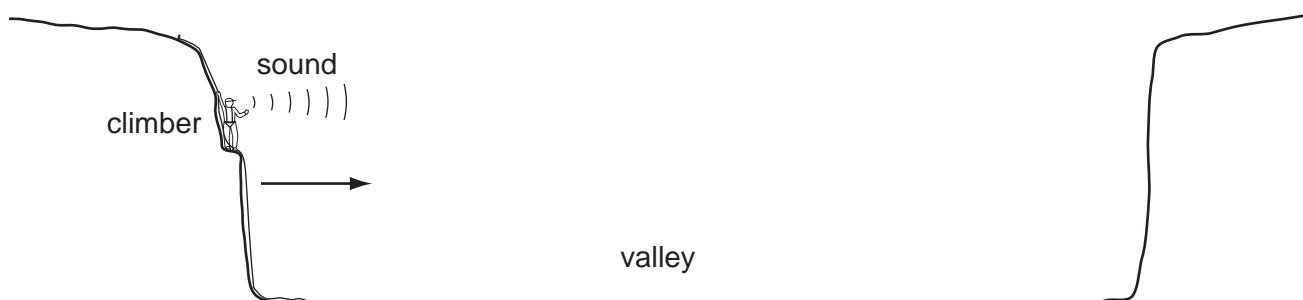
Which path does it take?



36 Which statement about the electromagnetic spectrum is correct?

- A Gamma rays have the highest frequency.
- B Microwaves have the smallest wavelength.
- C Ultraviolet waves have the largest wavelength.
- D Visible light waves have the lowest frequency.

37 A climber stands on a ledge on one side of a valley. He claps his hands and hears an echo from the opposite side of the valley 1.6 s later.

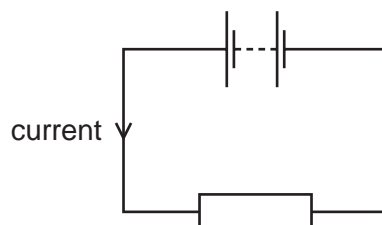


The speed of sound is 330 m/s.

How wide is the valley, to the nearest metre?

- A 103 m
- B 206 m
- C 264 m
- D 528 m

38 A battery is connected to a resistor.



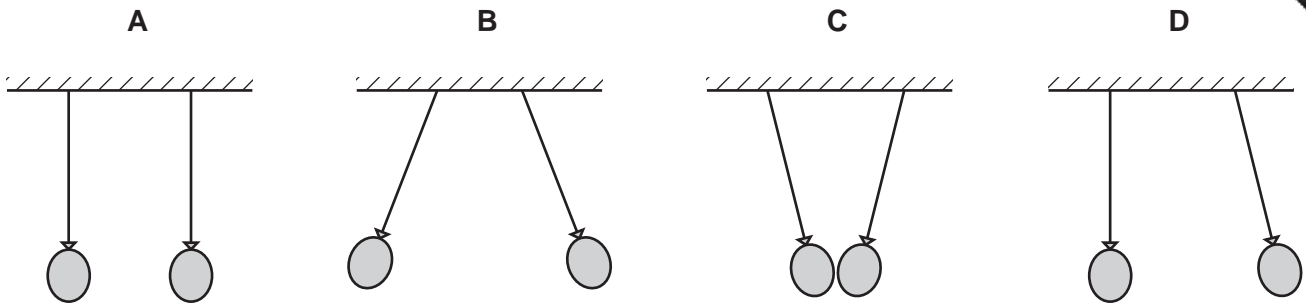
Which changes to potential difference across the resistor, and to the resistance of the resistor, will produce the smallest current?

	potential difference	resistance
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase



- 39 Two balloons hang near each other on insulating threads. One balloon is positively charged, the other is negatively charged.

Which diagram shows how they hang?



- 40 How are lamps usually connected in a lighting circuit, and what is one advantage of this?

	how lamps are connected	advantage
<b>A</b>	in parallel	they each receive the full supply voltage
<b>B</b>	in parallel	they share the supply voltage equally
<b>C</b>	in series	they each receive the full supply voltage
<b>D</b>	in series	they share the supply voltage equally





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

		Group																											
		I	II	III	IV	V	VI	VII	VIII	IX	X																		
		1 <b>H</b> Hydrogen 1																											
7	9	<b>Li</b> Lithium 3	<b>Be</b> Beryllium 4																										
23	24	<b>Na</b> Sodium 11	<b>Mg</b> Magnesium 12																										
39	40	<b>K</b> Potassium 19	<b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	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	88	<b>Rb</b> Rubidium 37	<b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	101 <b>Rh</b> Rhodium 45	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54										
133	137	<b>Cs</b> Caesium 55	<b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	222 <b>Rn</b> Radon 86											
		226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89																										
		*58-71 Lanthanoid series †90-103 Actinoid series																											
Key	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">a</td> <td style="padding: 2px;"><b>X</b></td> </tr> <tr> <td style="padding: 2px;">b</td> <td style="padding: 2px;"></td> </tr> </table>	a	<b>X</b>	b																									
a	<b>X</b>																												
b																													
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	144 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	232 <b>Th</b> Thorium 90	238 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	241 <b>Pu</b> Plutonium 94	244 <b>Am</b> Americium 95	247 <b>Cm</b> Curium 96	251 <b>Bk</b> Berkelium 97	252 <b>Cf</b> Californium 98	257 <b>Es</b> Einsteinium 99	261 <b>Fm</b> Fermium 100	265 <b>Md</b> Mendelevium 101	269 <b>No</b> Nobelium 102	273 <b>Lr</b> Lawrencium 103

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

a = relative atomic mass  
X = atomic symbol  
b = proton (atomic) number