



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**COMBINED SCIENCE**

**0653/11**

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)

\* 4 7 7 8 3 1 2 2 0 1 \*

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**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.

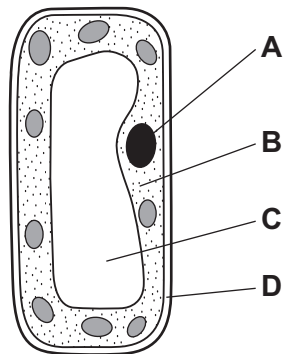
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This document consists of **17** printed pages and **3** blank pages.

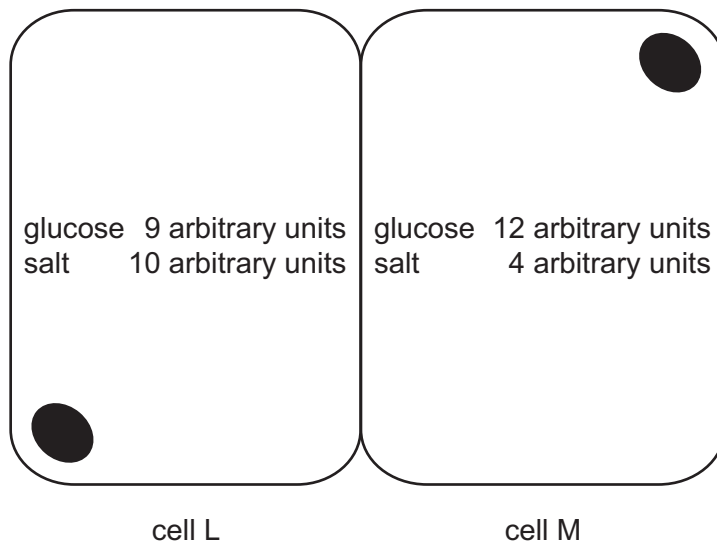


- 1 The diagram shows a cell from the mesophyll of a leaf.

Which part contains DNA?



- 2 The diagram shows two cells in contact with one another, and the concentrations of glucose and salt in each of the cells.



Which movements would occur by diffusion?

- A glucose from cell L to cell M, salt from M to L
- B glucose and salt from L to M
- C glucose from cell M to cell L, salt from L to M
- D glucose and salt from M to L

3 The statements are about enzymes.

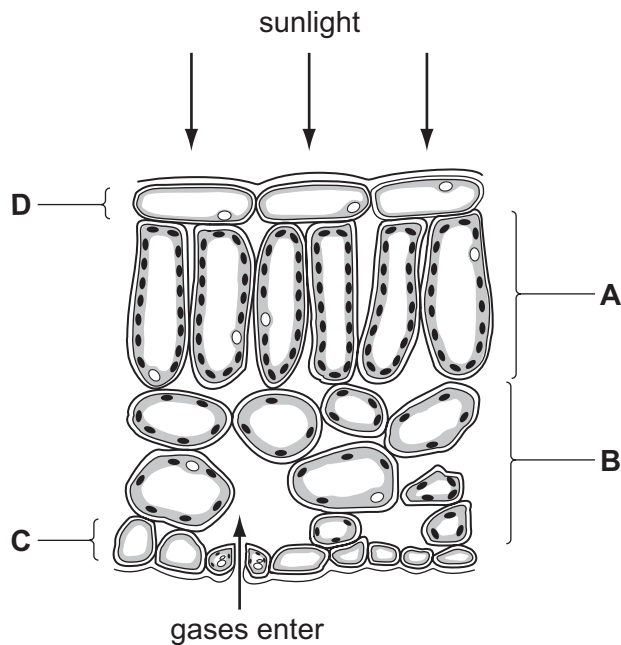
- 1 act as catalysts
- 2 can be denatured by heat
- 3 composed of complex carbohydrates
- 4 not affected by pH
- 5 produced by cells

Which statements are correct?

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

4 The diagram shows some cells in a leaf of a green plant.

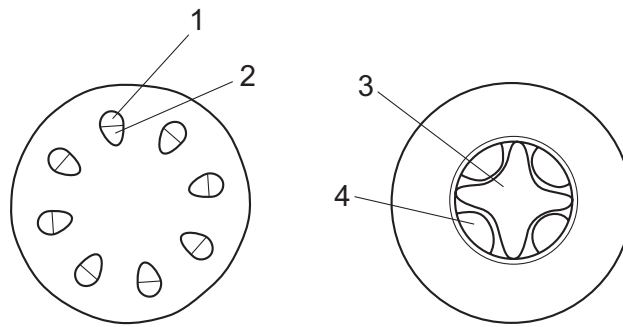
In which layer of cells does most photosynthesis occur?



5 Which substance must be present in the diet to prevent scurvy?

- A** calcium
- B** iron
- C** vitamin C
- D** vitamin D

- 6 Which process in the human body does **not** depend on energy from respiration?
- A cell division  
 B diffusion  
 C muscle contraction  
 D passage of a nerve impulse
- 7 Through which vessel does oxygenated blood enter the heart?
- A aorta  
 B pulmonary artery  
 C pulmonary vein  
 D vena cava
- 8 The diagram shows a cross-section of a stem and a cross-section of a root.

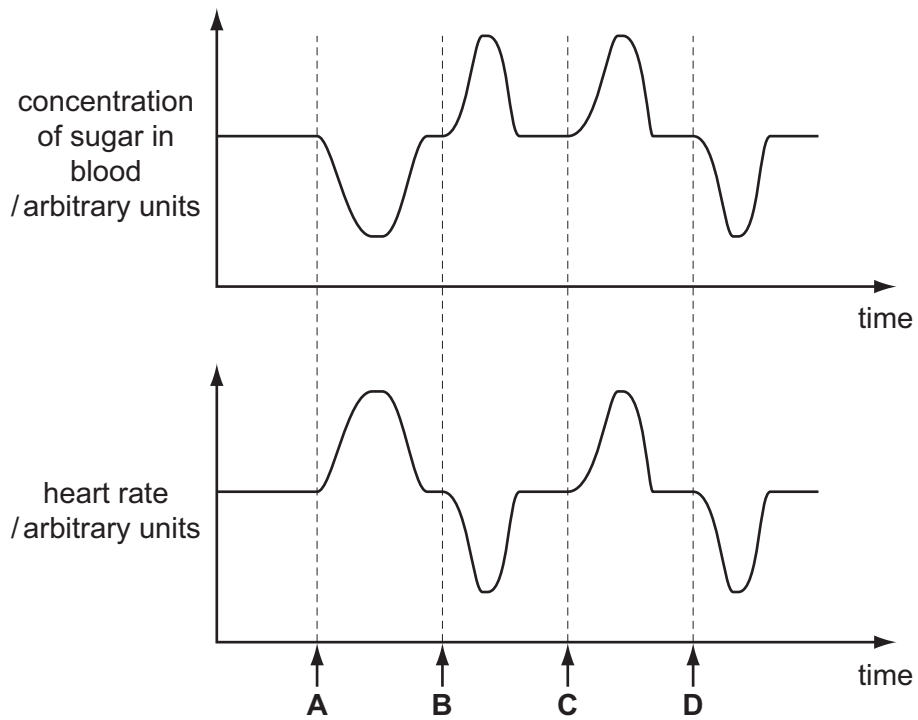


Which row identifies the tissues in the stem and root?

	tissues			
	1	2	3	4
<b>A</b>	phloem	xylem	phloem	xylem
<b>B</b>	phloem	xylem	xylem	phloem
<b>C</b>	xylem	phloem	phloem	xylem
<b>D</b>	xylem	phloem	xylem	phloem

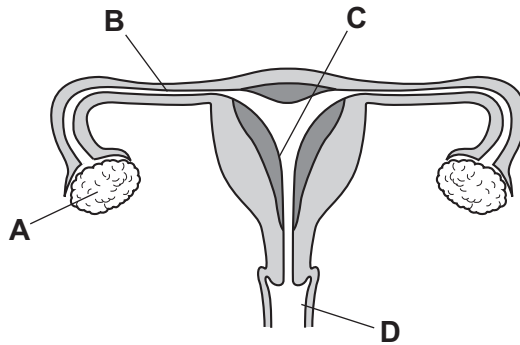
- 9 The graphs show changes in the rate of heartbeat and in the concentration of sugar in the blood over the same period of time.

When was adrenaline secreted?

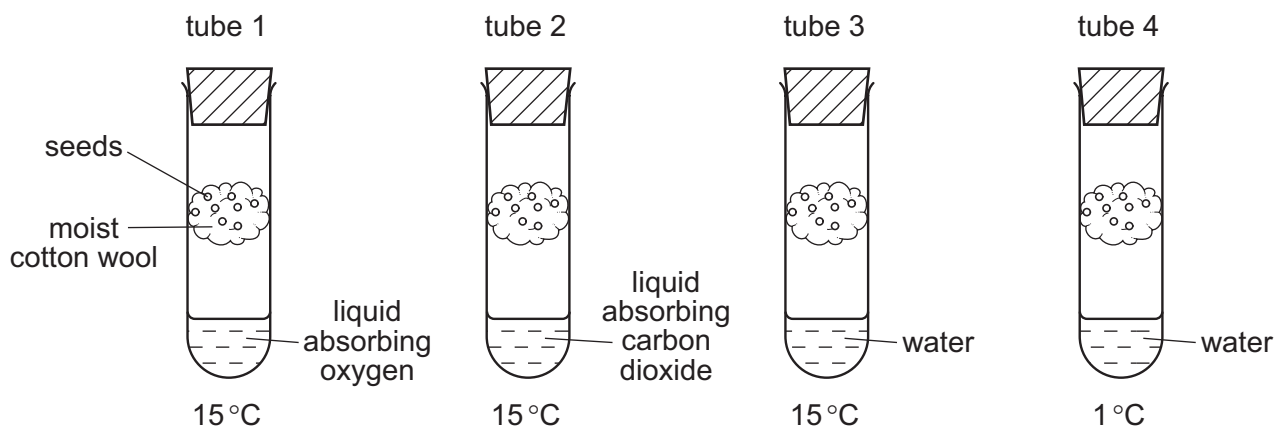


- 10 The diagram shows the female reproductive system.

Where does successful implantation normally occur?



11 The diagram shows four test-tubes set up to investigate the conditions needed for germination.



In which test-tubes will the seeds germinate?

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

12 Which process takes carbon dioxide out of the air?

- A** combustion  
**B** decomposition  
**C** photosynthesis  
**D** plant respiration

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 Which substance is liquid at 25°C?

	melting point /°C	boiling point /°C
<b>A</b>	-182	-161
<b>B</b>	-100	80
<b>C</b>	-77	-34
<b>D</b>	44	280

- 15 Two oxides have the formulae CaO and NO.

Which statement about the bonding in these oxides is correct?

- A Both CaO and NO are covalent.
- B Both CaO and NO are ionic.
- C CaO is covalent and NO is ionic.
- D CaO is ionic and NO is covalent.

- 16 Information about two minerals is given below.

name of mineral	formula
anorthite	$\text{CaAl}_2\text{Si}_2\text{O}_8$
orthoclase	$\text{KAlSi}_3\text{O}_8$

Which information about anorthite and orthoclase is correct?

- A Both of them contain the same number of atoms of aluminium.
- B Both of them contain the same number of atoms of oxygen.
- C Orthoclase contains the same number of atoms of both aluminium and silicon.
- D Orthoclase contains twice as many atoms of aluminium as anorthite.

- 17 The equations show some chemical reactions.

- 1 copper + oxygen → copper oxide
- 2 copper carbonate → copper oxide + carbon dioxide
- 3 copper oxide + carbon → copper dioxide + water

In which equations has the underlined substance been reduced?

- A 1 only
- B 1 and 2
- C 2 and 3
- D 3 only

- 18 Which would decrease the speed of a reaction?

- A adding a suitable catalyst
- B decreasing the concentration
- C decreasing the particle size
- D raising the temperature

19 Four pairs of oxides are listed.

- W calcium oxide and sodium oxide  
 X calcium oxide and sulfur dioxide  
 Y nitrogen dioxide and sodium oxide  
 Z sulfur dioxide and nitrogen dioxide

Which pairs of oxides would neutralise each other?

- A pair W and pair X  
 B pair W and pair Z  
 C pair X and pair Y  
 D pair Y and pair Z
- 20 Aqueous sodium hydroxide and aqueous ammonia are added separately to aqueous solutions X and Y.

The results are shown below.

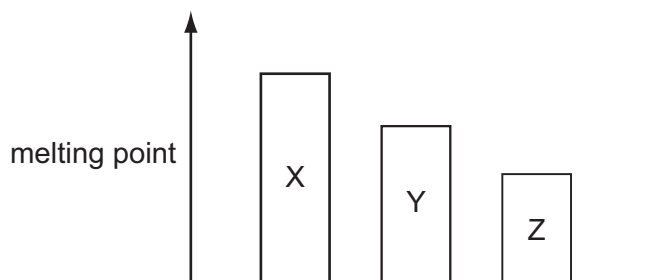
	aqueous sodium hydroxide added	aqueous ammonia added
solution X	light blue precipitate, insoluble in excess	light blue precipitate, soluble in excess to form a dark blue solution
solution Y	green precipitate, insoluble in excess	green precipitate, insoluble in excess

Which metals ions are present in solution X and solution Y?

	solution X	solution Y
A	Cu(II)	Fe(III)
B	Cu(II)	Fe(II)
C	Fe(II)	Cu(II)
D	Fe(III)	Cu(II)



21 The diagram shows the trend in melting point for three elements X, Y and Z.



What could X, Y and Z be?

	X	Y	Z
<b>A</b>	Cl	Ar	K
<b>B</b>	Cl	Br	I
<b>C</b>	H	Li	C
<b>D</b>	Li	Na	K

22 The table gives information about four elements.

Which element is most likely to be a transition metal?

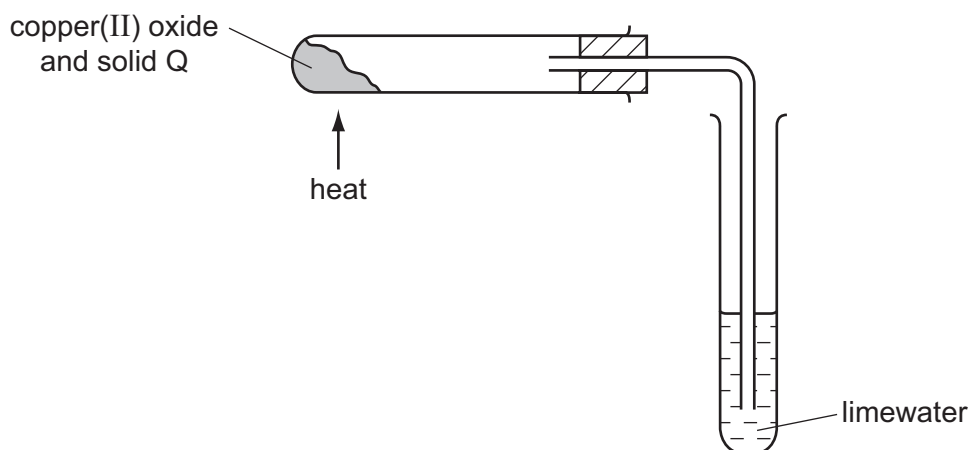
	appearance of its compound	density ( $\text{g}/\text{cm}^3$ )
<b>A</b>	coloured	0.97
<b>B</b>	coloured	7.2
<b>C</b>	white	0.97
<b>D</b>	white	7.2

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.

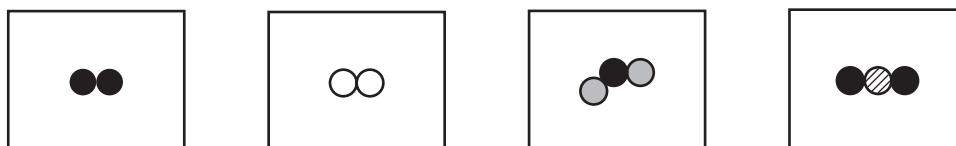
On heating the mixture, a reaction occurs and the limewater turns milky.



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

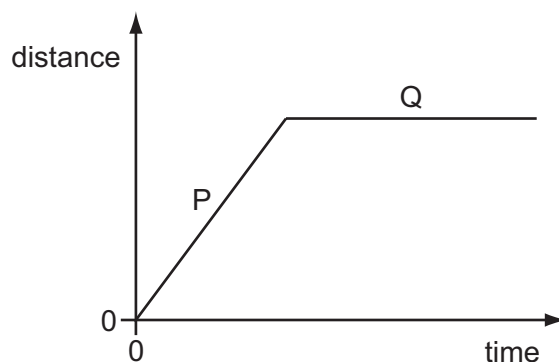
26 Which property of the compounds in petroleum is used to separate it into useful fractions?

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

27 Which equation shows the complete combustion of a hydrocarbon?

- A  $C_2H_4 + 2O_2 \rightarrow 2CO + 2H_2O$
- B  $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$
- C  $C_2H_6O + 2O_2 \rightarrow 2CO + 3H_2O$
- D  $C_2H_6O + 3O_2 \rightarrow 2CO_2 + 3H_2O$

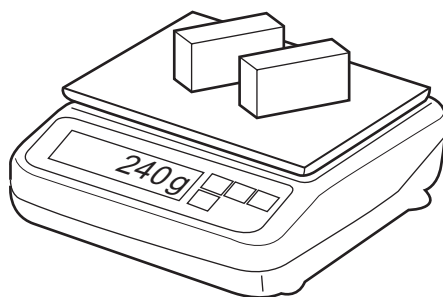
28 The graph is the distance/time graph for a bicycle journey.



Which row describes the behaviour of the bicycle in part P and the behaviour of the bicycle in part Q of the graph?

	part P	part Q
<b>A</b>	moving at constant speed	moving at constant speed
<b>B</b>	moving at constant speed	not moving
<b>C</b>	moving at increasing speed	moving at constant speed
<b>D</b>	moving at increasing speed	not moving

- 29 A shop-keeper places two identical blocks of cheese on a set of scales and notices that their 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 In which situation is gravitational energy converted into kinetic energy?
- A diving from a high platform  
 B kicking a football along the ground  
 C lifting a book on to a high shelf  
 D pumping water up to a storage tank
- 31 The temperature of a liquid is below its boiling point. The liquid evaporates. Which row is correct about where the evaporation occurs and what effect this has on the temperature of the liquid?

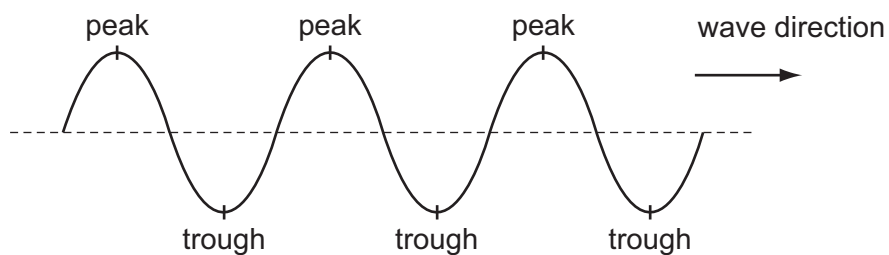
	where evaporation occurs	effect on the temperature of the liquid
A	in all parts of the liquid	temperature falls
B	in all parts of the liquid	temperature rises
C	only on the surface of the liquid	temperature falls
D	only on the surface of the liquid	temperature rises

- 32 Hot drinks may be bought in cups with a plastic lid.

What is the effect of the lid on heat transfer?

- A It mainly reduces conduction.  
 B It mainly reduces convection.  
 C It mainly reduces radiation.  
 D It reduces conduction, convection and radiation equally.

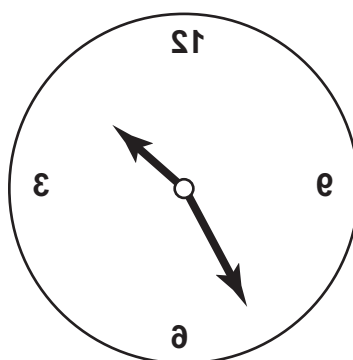
33 The diagram shows the peaks and troughs of a water wave.



What is the wavelength of the water wave?

- A the depth of one wave trough
- B the distance between one wave trough and the next
- C the distance travelled by one wave trough in one second
- D the number of wave troughs passing a point in one second

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

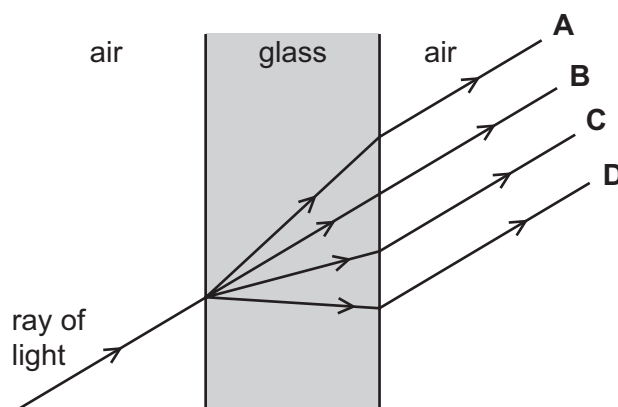


What is the time on the clock?

- 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?

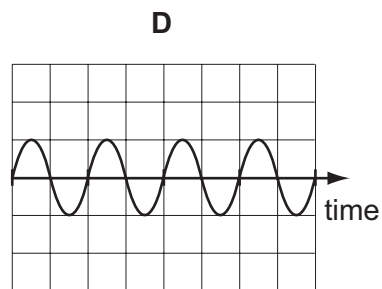
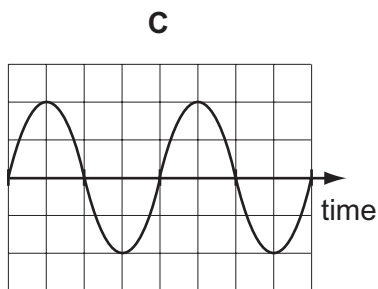
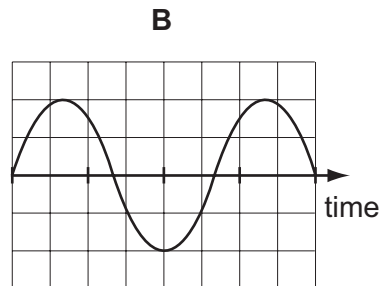
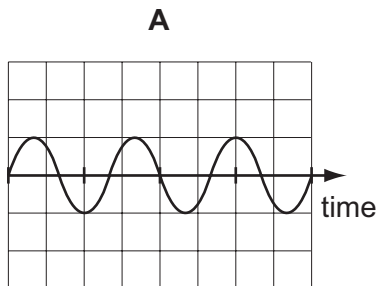


36 Which statement about the electromagnetic spectrum is correct?

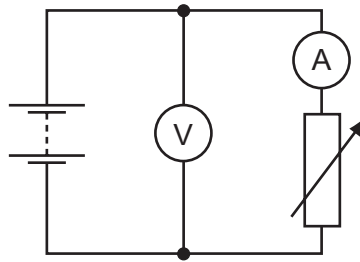
- A Gamma rays have the highest frequency.
- B Microwaves have the smallest wavelength.
- C Ultraviolet waves have the largest wavelength.
- D Visible light waves have the lowest frequency.

37 The diagrams represent four different sound waves. The scales are the same in all the diagrams.

Which sound has the lowest pitch?



- 38 The diagram represents a circuit which includes a battery, an ammeter, a voltmeter and a variable resistor.



What happens to the readings on the meters as the resistance of the variable resistor is increased?

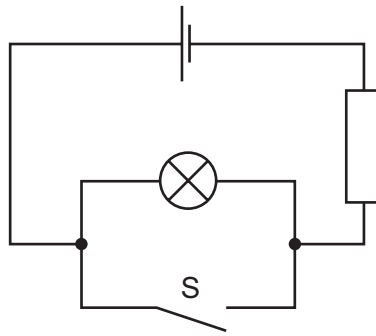
	ammeter reading	voltmeter reading
<b>A</b>	decreases	decreases
<b>B</b>	decreases	stays constant
<b>C</b>	increases	decreases
<b>D</b>	increases	stays constant

- 39 An electric fire draws a current of 10 A. Fuses are available rated at 5 A and 13 A.

Which fuse rating should be used with this electric fire, and where should it be fitted in the circuit?

	fuse rating	where in circuit
<b>A</b>	5 A	live wire
<b>B</b>	5 A	neutral wire
<b>C</b>	13 A	live wire
<b>D</b>	13 A	neutral wire

40 The diagram shows a circuit.



What happens to the lamp when switch S is closed?

- A It does not light at all.
- B It lights and then blows.
- C It lights more brightly.
- D It lights more dimly.









**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										
		4 <b>He</b> Helium 2										
7	9	3	4	5	6	7	8	9	10	11	12	13
<b>Li</b> Lithium	<b>Be</b> Beryllium	<b>B</b> Boron	<b>C</b> Carbon	<b>N</b> Nitrogen	<b>O</b> Oxygen	<b>F</b> Fluorine	<b>Ne</b> Neon	<b>Na</b> Sodium	<b>Mg</b> Magnesium	<b>Al</b> Aluminium	<b>Si</b> Silicon	<b>P</b> Phosphorus
11	12	13	14	15	16	17	18	19	20	21	22	23
<b>Na</b> Sodium	<b>Mg</b> Magnesium	<b>Al</b> Aluminium	<b>Si</b> Silicon	<b>P</b> Phosphorus	<b>S</b> Sulfur	<b>Cl</b> Chlorine	<b>Ar</b> Argon	<b>K</b> Potassium	<b>Ca</b> Calcium	<b>Sc</b> Scandium	<b>Ti</b> Titanium	<b>V</b> Vanadium
19	20	21	22	23	24	25	26	27	28	29	30	31
<b>K</b> Potassium	<b>Ca</b> Calcium	<b>Sc</b> Scandium	<b>Ti</b> Titanium	<b>V</b> Vanadium	<b>Cr</b> Chromium	<b>Mn</b> Manganese	<b>Fe</b> Iron	<b>Co</b> Cobalt	<b>Ni</b> Nickel	<b>Cu</b> Copper	<b>Zn</b> Zinc	<b>Ga</b> Gallium
37	38	39	40	41	42	43	44	45	46	47	48	49
<b>Rb</b> Rubidium	<b>Sr</b> Strontium	<b>Y</b> Yttrium	<b>Zr</b> Zirconium	<b>Nb</b> Niobium	<b>Mo</b> Molybdenum	<b>Tc</b> Technetium	<b>Ru</b> Ruthenium	<b>Rh</b> Rhodium	<b>Pd</b> Palladium	<b>Ag</b> Silver	<b>Cd</b> Cadmium	<b>In</b> Indium
55	56	57	72	73	74	75	76	77	78	79	80	81
<b>Cs</b> Caesium	<b>Ba</b> Barium	<b>La</b> Lanthanum	<b>Hf</b> Hafnium	<b>Ta</b> Tantalum	<b>W</b> Tungsten	<b>Re</b> Rhenium	<b>Os</b> Osmium	<b>Ir</b> Iridium	<b>Pt</b> Platinum	<b>Au</b> Gold	<b>Hg</b> Mercury	<b>Tl</b> Thallium
87	88	89	†	†	†	†	†	†	†	†	†	†
<b>Fr</b> Francium	<b>Ra</b> Radium	<b>Ac</b> Actinium										

		140	141	144	150	152	157	159	162	165	167	169	173	175
		<b>Ce</b> Cerium	<b>Pr</b> Praseodymium	<b>Nd</b> Neodymium	<b>Sm</b> Samarium	<b>Eu</b> Europium	<b>Gd</b> Gadolinium	<b>Tb</b> Terbium	<b>Dy</b> Dysprosium	<b>Ho</b> Holmium	<b>Er</b> Erbium	<b>Tm</b> Thulium	<b>Yb</b> Ytterbium	<b>Lu</b> Lutetium
		58	59	60	62	63	64	65	66	67	68	69	70	71
		<b>Th</b> Thorium	<b>Pa</b> Protactinium	<b>U</b> Uranium	<b>Pu</b> Plutonium	<b>Am</b> Americium	<b>Cm</b> Curium	<b>Bk</b> Berkelium	<b>Cf</b> Californium	<b>Es</b> Einsteinium	<b>Fm</b> Fermium	<b>Md</b> Mendelevium	<b>No</b> Nobelium	<b>Lr</b> Lawrencium
		90	91	92	94	95	96	97	98	99	100	101	102	103

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

\*58-71 Lanthanoid series  
†90-103 Actinoid series

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

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