



# Cambridge IGCSE™

## COMBINED SCIENCE

0653/13

Paper 1 Multiple Choice (Core)

October/November 2020

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)

### INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

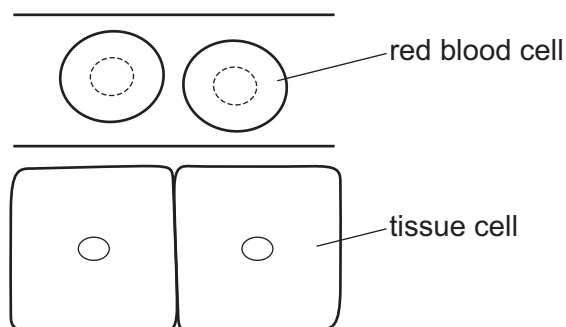
### INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **20** pages. Blank pages are indicated.



- 1 The diagram shows two red blood cells inside a capillary and two tissue cells near this capillary.

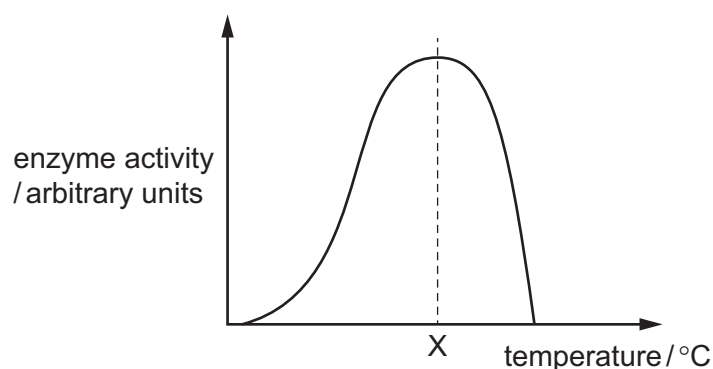


How does the oxygen in the red blood cells reach the tissue cells?

- A by absorption
  - B by diffusion
  - C by respiration
  - D by transpiration
- 2 Which row is correct?

|   | substance     | elements contained in substance |          |          |        |
|---|---------------|---------------------------------|----------|----------|--------|
|   |               | carbon                          | hydrogen | nitrogen | oxygen |
| A | carbohydrates | ✓                               | ✓        | ✓        | x      |
| B | carbohydrates | ✓                               | ✓        | x        | x      |
| C | proteins      | ✓                               | ✓        | ✓        | ✓      |
| D | proteins      | x                               | ✓        | ✓        | ✓      |

- 3 The diagram shows how the activity of an enzyme changes with temperature.

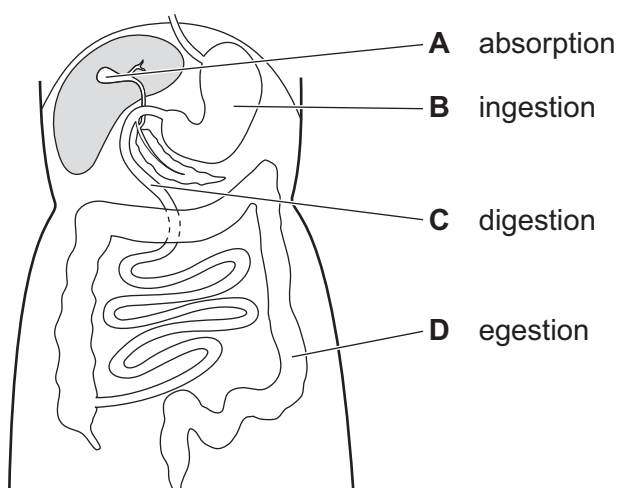


This enzyme works in the human body.

What is the most likely value of temperature X?

- A 10 °C
- B 40 °C
- C 70 °C
- D 100 °C

- 4 Which label gives the correct function of that region of the alimentary canal and its associated organs?



- 5 Which breakdown processes occur inside cells, and which occur outside cells?

|          | large molecules to small molecules for absorption | breakdown of glucose to release energy |
|----------|---------------------------------------------------|----------------------------------------|
| <b>A</b> | inside                                            | inside                                 |
| <b>B</b> | inside                                            | outside                                |
| <b>C</b> | outside                                           | inside                                 |
| <b>D</b> | outside                                           | outside                                |

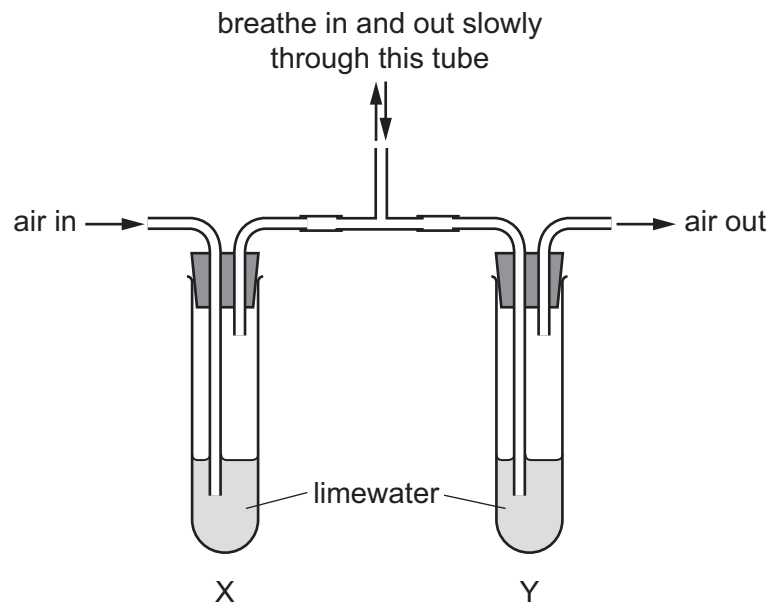
- 6 The table shows two plant tissues with their possible functions.

|   | tissue | functions |           |
|---|--------|-----------|-----------|
|   |        | support   | transport |
| 1 | phloem | ✓         | ✓         |
| 2 | phloem | ✗         | ✓         |
| 3 | xylem  | ✓         | ✓         |
| 4 | xylem  | ✓         | ✗         |

Which rows show the correct functions for phloem and xylem?

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

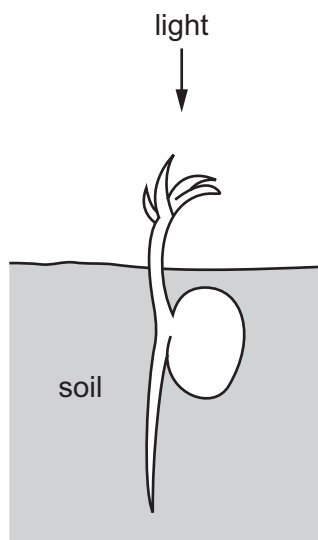
- 7 A student uses the apparatus shown to investigate the composition of inspired and expired air.



What is the appearance of the limewater after one minute of breathing in and out?

|          | tube X | tube Y |
|----------|--------|--------|
| <b>A</b> | clear  | clear  |
| <b>B</b> | clear  | cloudy |
| <b>C</b> | cloudy | clear  |
| <b>D</b> | cloudy | cloudy |

- 8 The diagram shows a germinating seed.



What does the germinating seed show?

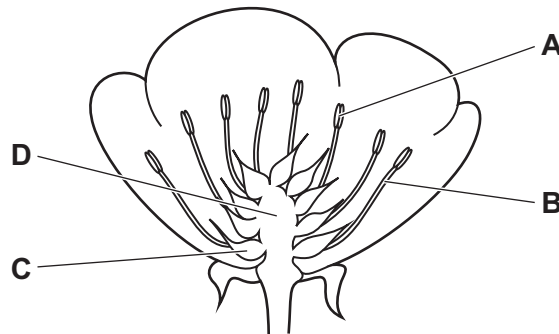
|          | shoot                 | root                  |
|----------|-----------------------|-----------------------|
| <b>A</b> | negative phototropism | negative gravitropism |
| <b>B</b> | negative phototropism | positive gravitropism |
| <b>C</b> | positive phototropism | negative gravitropism |
| <b>D</b> | positive phototropism | positive gravitropism |

- 9 Which row describes asexual reproduction?

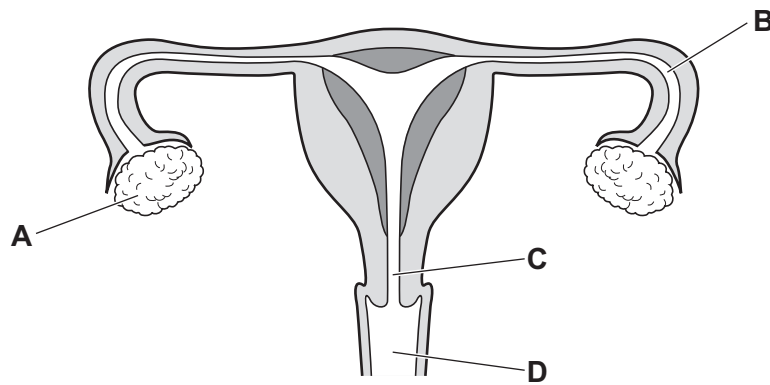
|          | number of parents | a zygote is produced | offspring identical to the parent |
|----------|-------------------|----------------------|-----------------------------------|
| <b>A</b> | 1                 | no                   | yes                               |
| <b>B</b> | 1                 | yes                  | no                                |
| <b>C</b> | 2                 | no                   | yes                               |
| <b>D</b> | 2                 | yes                  | no                                |

10 The diagram shows a section through a buttercup flower.

Which structure produces pollen grains?



11 Where does fertilisation take place?

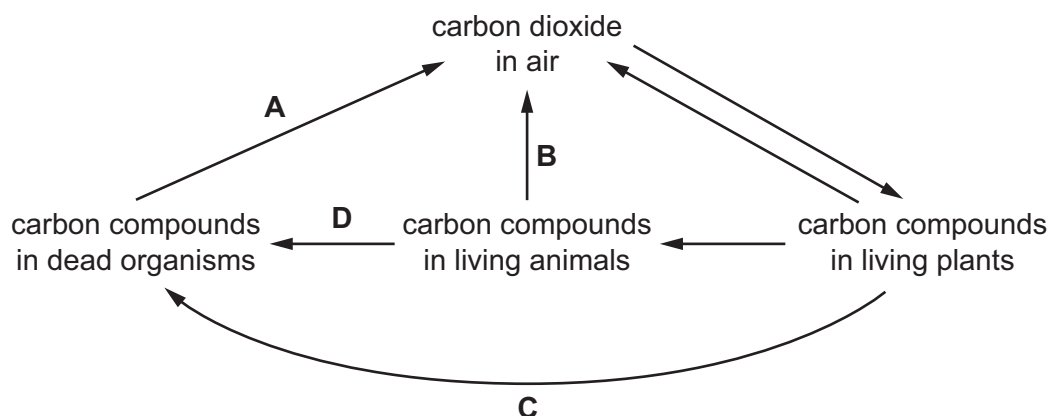


12 Which organism makes its own organic nutrients?

- A** carnivore
- B** decomposer
- C** herbivore
- D** producer

13 The diagram shows part of the carbon cycle.

Which arrow represents respiration by decomposers?



14 The temperature and pressure of oxygen in two different containers are shown.

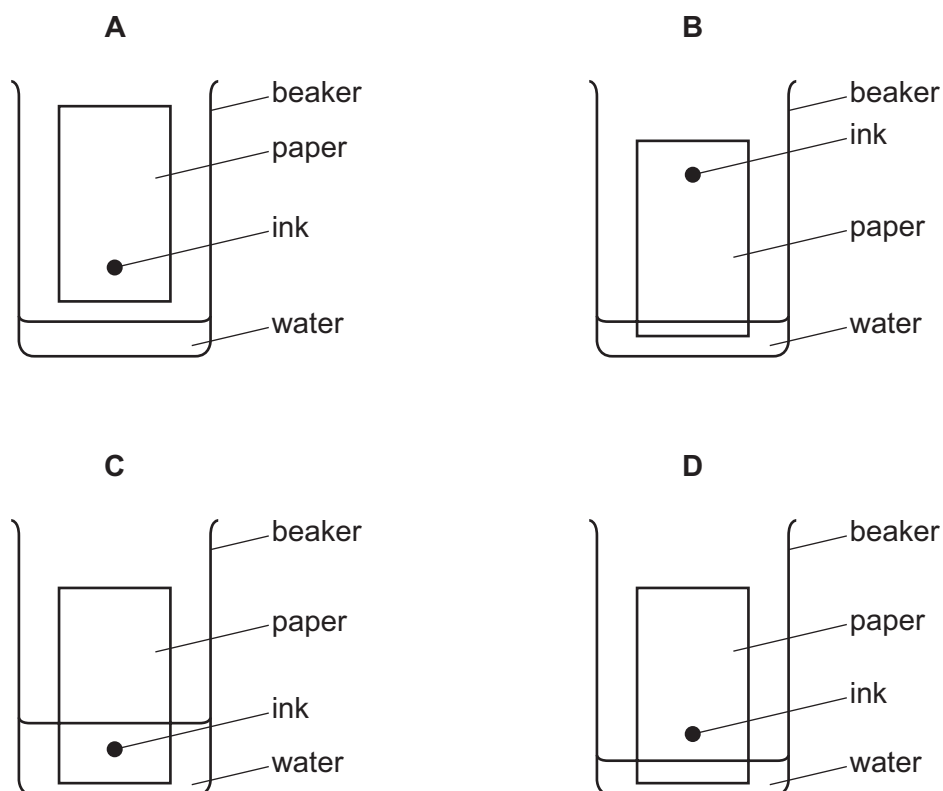
|             | temperature<br>/°C | pressure<br>kN/m <sup>2</sup> |
|-------------|--------------------|-------------------------------|
| container 1 | 20                 | 200                           |
| container 2 | 50                 | 150                           |

Which statement about the oxygen molecules in container 1 compared to container 2 is correct?

- A** In container 1 they are closer together and moving faster.
- B** In container 1 they are closer together and moving slower.
- C** In container 1 they are further apart and moving faster.
- D** In container 1 they are further apart and moving slower.

**15** Chromatography separates ink into different colours.

Which diagram shows how the apparatus is set up?



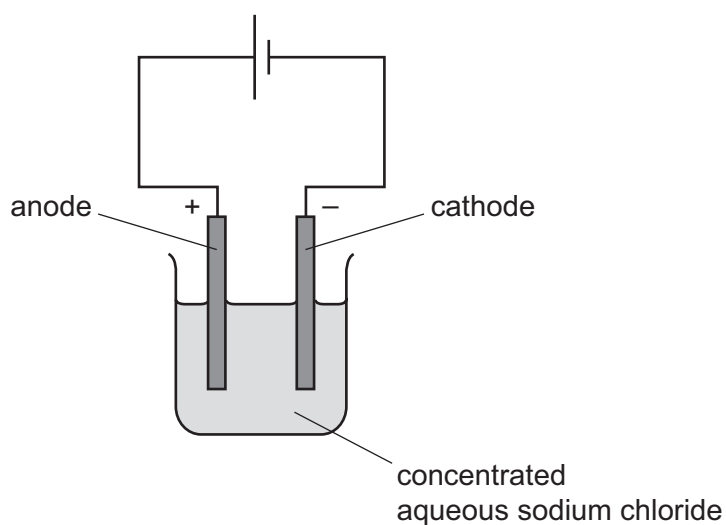
**16** Which statement about non-metals is correct?

- A** They are in Group I of the Periodic Table.
- B** They are malleable and have high melting points.
- C** They react with acids to form hydrogen gas.
- D** They react with other non-metals to form covalent compounds.

**17** Which row correctly identifies formulae for acids and for alkalis?

|          | acids                                      | alkalis                                    |
|----------|--------------------------------------------|--------------------------------------------|
| <b>A</b> | $\text{HNO}_3$ and $\text{H}_2\text{SO}_4$ | $\text{NaOH}$ and $\text{KOH}$             |
| <b>B</b> | $\text{HNO}_3$ and $\text{H}_2\text{SO}_4$ | $\text{HCl}$ and $\text{KOH}$              |
| <b>C</b> | $\text{HCl}$ and $\text{KOH}$              | $\text{H}_2\text{SO}_4$ and $\text{HNO}_3$ |
| <b>D</b> | $\text{NaOH}$ and $\text{KOH}$             | $\text{HNO}_3$ and $\text{H}_2\text{SO}_4$ |

- 18 The apparatus for the electrolysis of concentrated aqueous sodium chloride using inert electrodes is shown.



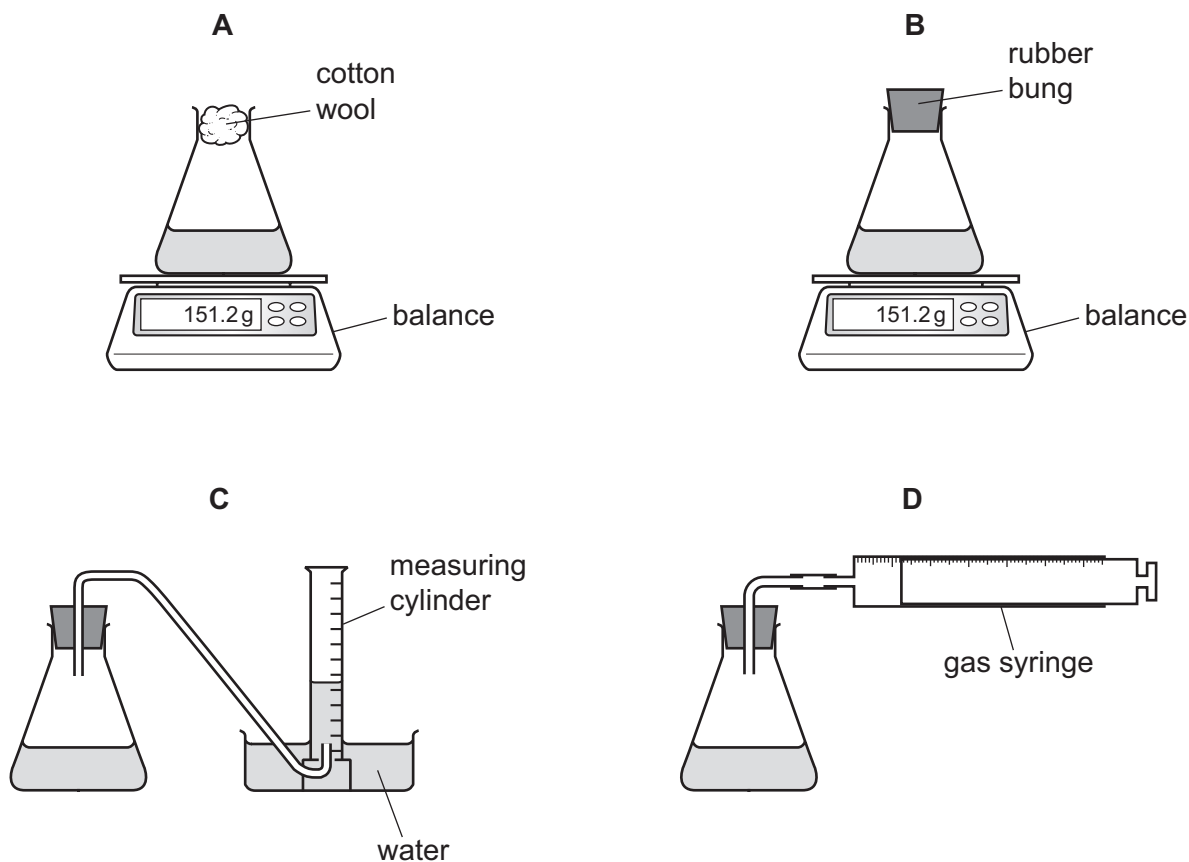
Which statement about this electrolysis is correct?

- A A gas, which turns red litmus blue, is produced at the anode.
  - B Hydrogen is produced at the cathode.
  - C Oxygen is produced at the anode.
  - D Sodium can be used for the inert electrodes.
- 19 Which temperature changes occur during exothermic and endothermic reactions?

|   | exothermic | endothermic |
|---|------------|-------------|
| A | decreases  | increases   |
| B | decreases  | no change   |
| C | increases  | decreases   |
| D | increases  | no change   |

20 Dilute hydrochloric acid reacts with magnesium to form magnesium chloride and hydrogen.

Which apparatus is **not** suitable for use in investigating the rate of this reaction?



21 Which two substances both react with dilute sulfuric acid to make the salt magnesium sulfate?

- A magnesium carbonate and magnesium chloride
- B magnesium chloride and magnesium nitrate
- C magnesium oxide and magnesium carbonate
- D magnesium oxide and magnesium nitrate

**22** 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  |

**23** The diagram shows Period 3 of the Periodic Table.

| I | II | III | IV | V | VI | VII | VIII |
|---|----|-----|----|---|----|-----|------|
| V |    | W   | X  |   |    | Y   |      |

Which two elements are metals?

- A** V and W      **B** V and X      **C** W and X      **D** X and Y

**24** Some physical properties of four elements are shown.

Which element can act as a catalyst?

|          | melting point<br>/ °C | conductivity<br>as a solid | density<br>g/cm <sup>3</sup> |
|----------|-----------------------|----------------------------|------------------------------|
| <b>A</b> | 98                    | good                       | 0.97                         |
| <b>B</b> | 113                   | poor                       | 2.07                         |
| <b>C</b> | 1455                  | good                       | 8.9                          |
| <b>D</b> | 1683                  | poor                       | 2.32                         |

**25** Which method is used to extract copper from copper(II) oxide?

- A** dissolving copper(II) oxide in hydrochloric acid and then filtering
- B** dissolving copper(II) oxide in water and then filtering
- C** heating the copper(II) oxide
- D** heating the copper(II) oxide mixed with carbon

**26** Decane is a hydrocarbon.

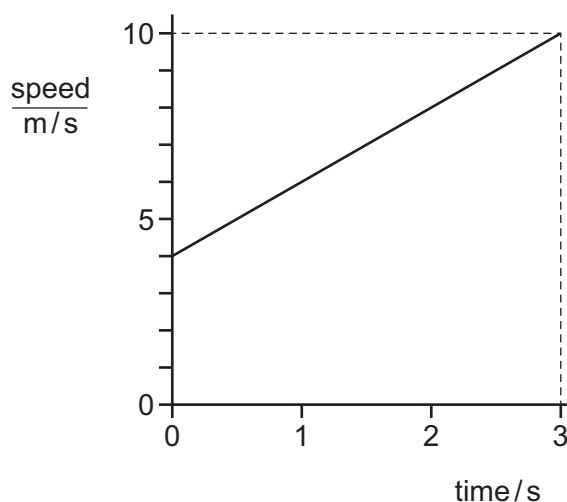
Which greenhouse gas is made during the complete combustion of decane?

- A** carbon dioxide
- B** carbon monoxide
- C** hydrogen
- D** methane

**27** Which statement describes a hydrocarbon?

- A** a compound that burns to form carbon dioxide and hydrogen
- B** a compound that contains carbon and hydrogen only
- C** a compound that only contains ionic bonds
- D** a compound that reacts easily with metals

**28** The diagram shows a speed–time graph for an object.



What is the average speed of the object?

- A** 2.0 m/s
- B** 4.0 m/s
- C** 7.0 m/s
- D** 10 m/s

29 The gravitational field strength is  $10 \text{ N/kg}$ .

What is the mass of an object that has a weight of  $5.0 \text{ N}$ ?

- A**  $0.50 \text{ kg}$       **B**  $2.0 \text{ kg}$       **C**  $5.0 \text{ kg}$       **D**  $50 \text{ kg}$

30 A solid metal cube of side  $5.0 \text{ cm}$  has a mass of  $250 \text{ g}$ .

What is the density of the metal?

- A**  $0.50 \text{ g/cm}^3$       **B**  $2.0 \text{ g/cm}^3$       **C**  $10 \text{ g/cm}^3$       **D**  $50 \text{ g/cm}^3$

31 A student carrying a bag walks up some stairs at a constant speed.

Which change does **not** affect the power developed by the student?

- A** carrying a heavier bag  
**B** walking at a higher constant speed  
**C** walking at a lower constant speed  
**D** walking half-way up the stairs

32 Which energy source is non-renewable?

- A** geothermal  
**B** hydroelectric  
**C** nuclear fission  
**D** wind

33 Which row shows how molecules in a solid and a liquid are arranged?

|          | solid         | liquid        |
|----------|---------------|---------------|
| <b>A</b> | regularly     | regularly     |
| <b>B</b> | regularly     | not regularly |
| <b>C</b> | not regularly | regularly     |
| <b>D</b> | not regularly | not regularly |

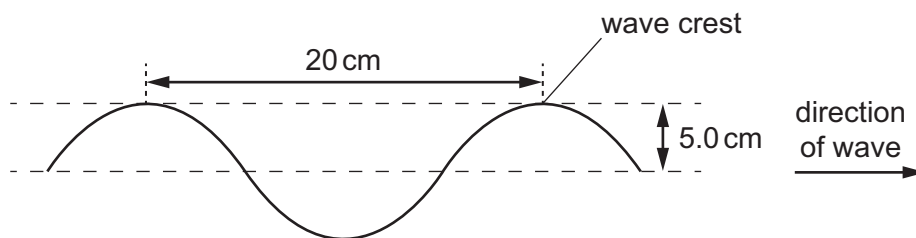
34 In which states of matter can convection occur?

|          | 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       |

35 The diagram shows a section of a rope.

Four wave crests pass a point on the rope every second.

Each wave crest travels 80 cm in one second.

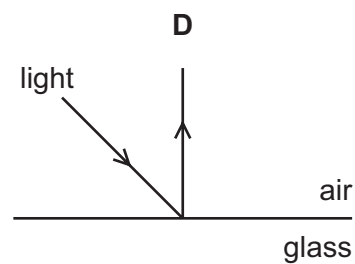
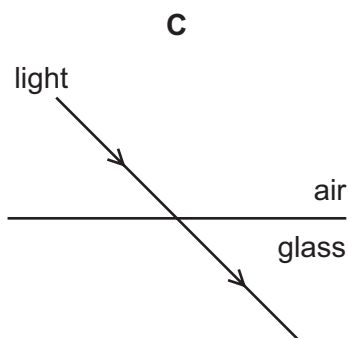
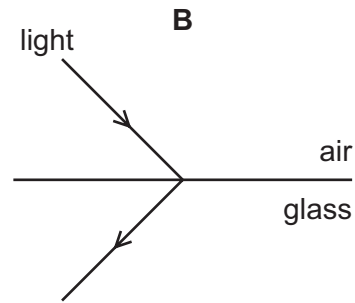
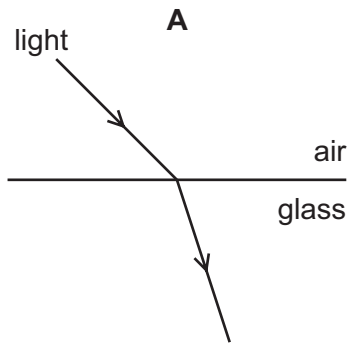


What is the speed of the wave?

- A** 4.0 cm/s      **B** 5.0 cm/s      **C** 20 cm/s      **D** 80 cm/s

**36** Light travelling in air strikes a glass block.

Which diagram shows what happens to the light?



**37** Two sounds with the same frequency are produced by a loudspeaker.

The first sound has a large amplitude.

The second sound has a smaller amplitude.

How do the two sounds compare?

- A** The second sound is higher pitched.
- B** The second sound is lower pitched.
- C** The second sound is louder.
- D** The second sound is quieter.

**38** A plastic rod can be charged by friction. This happens when some particles are added to or removed from the rod.

Which particles are added or removed?

- A** electrons
- B** ions
- C** neutrons
- D** protons

**39** A power supply causes a current in a circuit.

The electromotive force (e.m.f.) of the power supply and the resistance of the circuit are both changed.

Which pair of changes **must** result in a smaller current in the circuit?

|          | e.m.f.    | resistance |
|----------|-----------|------------|
| <b>A</b> | decreased | decreased  |
| <b>B</b> | decreased | increased  |
| <b>C</b> | increased | decreased  |
| <b>D</b> | increased | increased  |

**40** What is the purpose of a fuse in an electrical appliance?

- A** to maintain the correct current in the appliance
- B** to maintain the correct voltage across the appliance
- C** to prevent the insulation around the cables from becoming too thin
- D** to protect the wires from overheating when the current is too large

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The Periodic Table of Elements

| Group                      |                             |                                                                                             |                                 |                             |                              |                             |                              |                              |                                |                               |                               |                             |                               |                              |                              |                            |                             |
|----------------------------|-----------------------------|---------------------------------------------------------------------------------------------|---------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|--------------------------------|-------------------------------|-------------------------------|-----------------------------|-------------------------------|------------------------------|------------------------------|----------------------------|-----------------------------|
| I                          | II                          | 1<br>H<br>hydrogen<br>1                                                                     |                                 |                             |                              |                             |                              |                              |                                |                               |                               | III                         | IV                            | V                            | VI                           | VII                        | VIII                        |
| 3<br>Li<br>lithium<br>7    | 4<br>Be<br>beryllium<br>9   | <div>Key</div> <div>atomic number<br/>atomic symbol<br/>name<br/>relative atomic mass</div> |                                 |                             |                              |                             |                              |                              |                                |                               |                               | 5<br>B<br>boron<br>11       | 6<br>C<br>carbon<br>12        | 7<br>N<br>nitrogen<br>14     | 8<br>O<br>oxygen<br>16       | 9<br>F<br>fluorine<br>19   | 10<br>Ne<br>neon<br>20      |
|                            | 11<br>Na<br>sodium<br>23    |                                                                                             |                                 |                             |                              |                             |                              |                              |                                |                               |                               |                             |                               |                              |                              |                            |                             |
| 19<br>K<br>potassium<br>39 | 20<br>Ca<br>calcium<br>40   | 21<br>Sc<br>scandium<br>45                                                                  | 22<br>Ti<br>titanium<br>48      | 23<br>V<br>vanadium<br>51   | 24<br>Cr<br>chromium<br>52   | 25<br>Mn<br>manganese<br>55 | 26<br>Fe<br>iron<br>56       | 27<br>Co<br>cobalt<br>59     | 28<br>Ni<br>nickel<br>59       | 29<br>Cu<br>copper<br>64      | 30<br>Zn<br>zinc<br>65        | 31<br>Ga<br>gallium<br>70   | 32<br>Ge<br>germanium<br>73   | 33<br>As<br>arsenic<br>75    | 34<br>Se<br>selenium<br>79   | 35<br>Br<br>bromine<br>80  | 36<br>Kr<br>krypton<br>84   |
| 37<br>Rb<br>rubidium<br>85 | 38<br>Sr<br>strontium<br>88 | 39<br>Y<br>yttrium<br>89                                                                    | 40<br>Zr<br>zirconium<br>91     | 41<br>Nb<br>niobium<br>93   | 42<br>Mo<br>molybdenum<br>96 | 43<br>Tc<br>technetium<br>— | 44<br>Ru<br>ruthenium<br>101 | 45<br>Rh<br>rhodium<br>103   | 46<br>Pd<br>palladium<br>106   | 47<br>Ag<br>silver<br>108     | 48<br>Cd<br>cadmium<br>112    | 49<br>In<br>indium<br>115   | 50<br>Sn<br>tin<br>119        | 51<br>Sb<br>antimony<br>122  | 52<br>Te<br>tellurium<br>128 | 53<br>I<br>iodine<br>127   | 54<br>Xe<br>xenon<br>131    |
| 55<br>Cs<br>caesium<br>133 | 56<br>Ba<br>barium<br>137   | 57–71<br>lanthanoids                                                                        | 72<br>Hf<br>hafnium<br>178      | 73<br>Ta<br>tantalum<br>181 | 74<br>W<br>tungsten<br>184   | 75<br>Re<br>rhenium<br>186  | 76<br>Os<br>osmium<br>190    | 77<br>Ir<br>iridium<br>192   | 78<br>Pt<br>platinum<br>195    | 79<br>Au<br>gold<br>197       | 80<br>Hg<br>mercury<br>201    | 81<br>Tl<br>thallium<br>204 | 82<br>Pb<br>lead<br>207       | 83<br>Bi<br>bismuth<br>209   | 84<br>Po<br>polonium<br>—    | 85<br>At<br>astatine<br>—  | 86<br>Rn<br>radon<br>—      |
| 87<br>Fr<br>francium<br>—  | 88<br>Ra<br>radium<br>—     | 89–103<br>actinoids                                                                         | 104<br>Rf<br>rutherfordium<br>— | 105<br>Db<br>dubnium<br>—   | 106<br>Sg<br>seaborgium<br>— | 107<br>Bh<br>bohrium<br>—   | 108<br>Hs<br>hassium<br>—    | 109<br>Mt<br>meitnerium<br>— | 110<br>Ds<br>darmstadtium<br>— | 111<br>Rg<br>roentgenium<br>— | 112<br>Cn<br>copernicium<br>— | 114<br>Fl<br>flerovium<br>— | 116<br>Lv<br>livermorium<br>— | 117<br>Ts<br>tennessine<br>— | 118<br>Og<br>oganesson<br>—  | 119<br>Nh<br>nihonium<br>— | 120<br>Fl<br>flerovium<br>— |

lanthanoids

actinoids

|                              |                            |                                 |                              |                             |                             |                             |                               |                            |                               |                              |                           |                               |                              |                              |
|------------------------------|----------------------------|---------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|-------------------------------|------------------------------|---------------------------|-------------------------------|------------------------------|------------------------------|
| 57<br>La<br>lanthanum<br>139 | 58<br>Ce<br>cerium<br>140  | 59<br>Pr<br>praseodymium<br>141 | 60<br>Nd<br>neodymium<br>144 | 61<br>Pm<br>promethium<br>— | 62<br>Sm<br>samarium<br>150 | 63<br>Eu<br>europium<br>152 | 64<br>Gd<br>gadolinium<br>157 | 65<br>Tb<br>terbium<br>159 | 66<br>Dy<br>dysprosium<br>163 | 67<br>Ho<br>holmium<br>165   | 68<br>Er<br>erbium<br>167 | 69<br>Tm<br>thulium<br>169    | 70<br>Yb<br>ytterbium<br>173 | 71<br>Lu<br>lutetium<br>175  |
| 89<br>Ac<br>actinium<br>—    | 90<br>Th<br>thorium<br>232 | 91<br>Pa<br>protactinium<br>231 | 92<br>U<br>uranium<br>238    | 93<br>Np<br>neptunium<br>—  | 94<br>Pu<br>plutonium<br>—  | 95<br>Am<br>americium<br>—  | 96<br>Cm<br>curium<br>—       | 97<br>Bk<br>berkelium<br>— | 98<br>Cf<br>californium<br>—  | 99<br>Es<br>einsteinium<br>— | 100<br>Fm<br>fermium<br>— | 101<br>Md<br>mendelevium<br>— | 102<br>No<br>nobelium<br>—   | 103<br>Lr<br>lawrencium<br>— |

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).