



CO-ORDINATED SCIENCES

0654/11

Paper 1 Multiple Choice (Core)

May/June 2019

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 **17** printed pages and **3** blank pages.

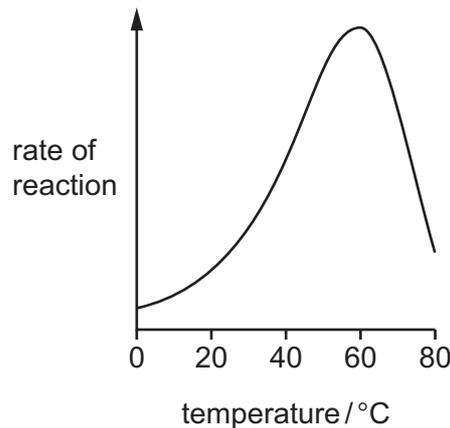
- 1 What is correct for **all** living organisms?
- A** They are sensitive to changes in their environment.
- B** They excrete solid waste from their bodies.
- C** They feed on other living organisms.
- D** They grow larger by increasing their cell number.

- 2 Which row correctly describes the diffusion of molecules from P to Q?

| | P | Q | movement |
|----------|----------------------|----------------------|-------------------------------|
| A | higher concentration | lower concentration | down a concentration gradient |
| B | higher concentration | lower concentration | up a concentration gradient |
| C | lower concentration | higher concentration | down a concentration gradient |
| D | lower concentration | higher concentration | up a concentration gradient |

- 3 Which chemical element is found in proteins, but **not** in carbohydrates or fats?
- A** carbon
- B** hydrogen
- C** oxygen
- D** nitrogen

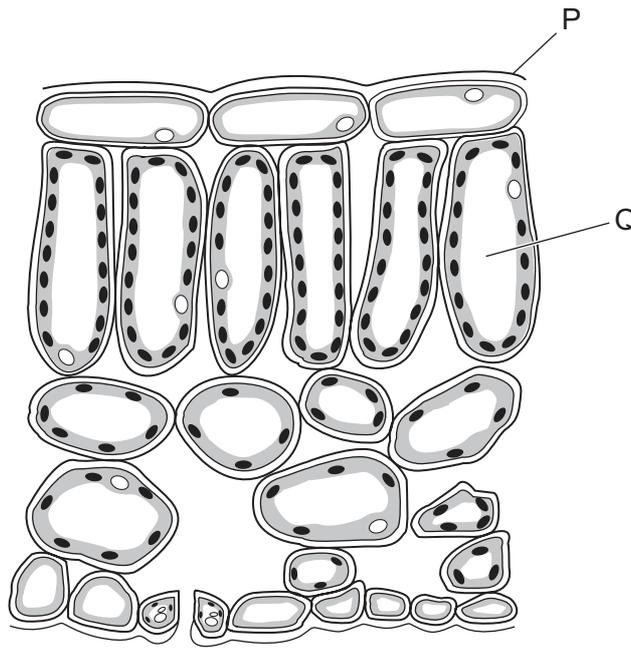
- 4 The graph shows the activity of an enzyme at different temperatures.



What is the optimum temperature for this enzyme?

- A** 20 °C **B** 40 °C **C** 60 °C **D** 80 °C

5 The diagram shows a cross-section through a plant leaf.



Which row identifies P and Q?

| | P | Q |
|----------|-----------|--------------------|
| A | cuticle | palisade mesophyll |
| B | cuticle | spongy mesophyll |
| C | epidermis | palisade mesophyll |
| D | epidermis | spongy mesophyll |

6 Where does most absorption of digested food take place?

- A** the large intestine
- B** the liver
- C** the small intestine
- D** the stomach

7 Which component is needed for blood to clot?

- A** hormones
- B** platelets
- C** red blood cells
- D** white blood cells

8 Which substances are used and produced in aerobic respiration?

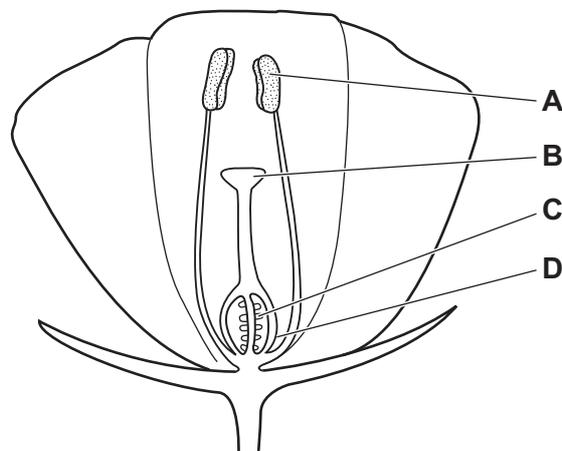
| | carbon dioxide | oxygen | glucose | water |
|----------|----------------|----------|----------|----------|
| A | produced | used | produced | used |
| B | produced | used | used | produced |
| C | used | produced | produced | used |
| D | used | produced | used | produced |

9 In a reflex arc, which structure carries nerve impulses towards the central nervous system?

- A** effector
- B** motor neurone
- C** sensory neurone
- D** spinal cord

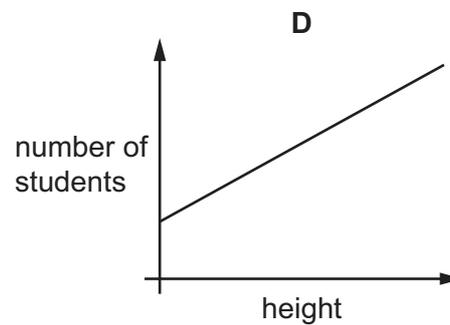
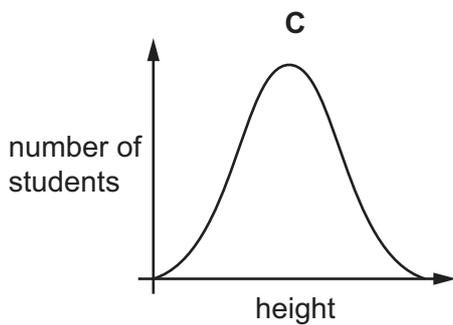
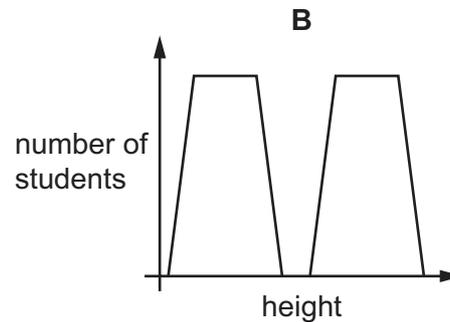
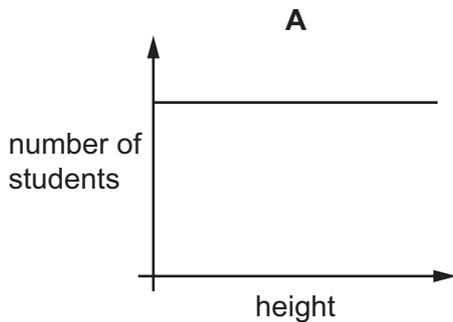
10 The diagram shows a section through an insect-pollinated flower.

When pollination occurs, where must the pollen grains reach?



- 11 A teacher measures the heights of each student in a class. All the students were born in the same year. She presents the results as a graph.

Which graph is most likely to be correct?



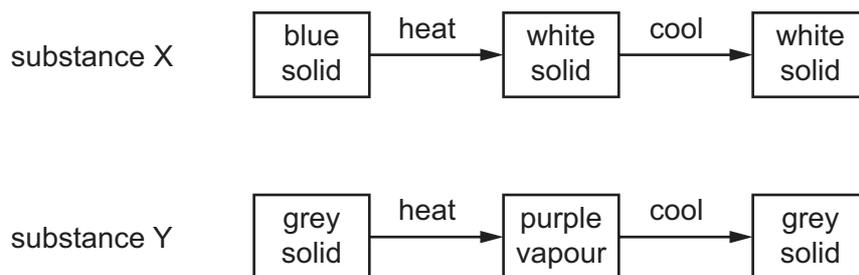
- 12 In a food chain, what do all living organisms get from their food?

- A a supply of water
- B oxygen for respiration
- C protection from disease
- D the energy they need

- 13 In the carbon cycle, which process decreases the level of carbon dioxide in the atmosphere?

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

14 Two substances, X and Y, are heated and then cooled. The observations are shown.



Which type of change occurs when X and Y are heated?

| | X | Y |
|----------|----------|----------|
| A | chemical | chemical |
| B | chemical | physical |
| C | physical | chemical |
| D | physical | physical |

15 A hydrocarbon contains twice as many hydrogen atoms as carbon atoms.

What is the formula of this compound?

- A** C_3H_6 **B** C_4H_{10} **C** C_2H_6O **D** C_3H_6O

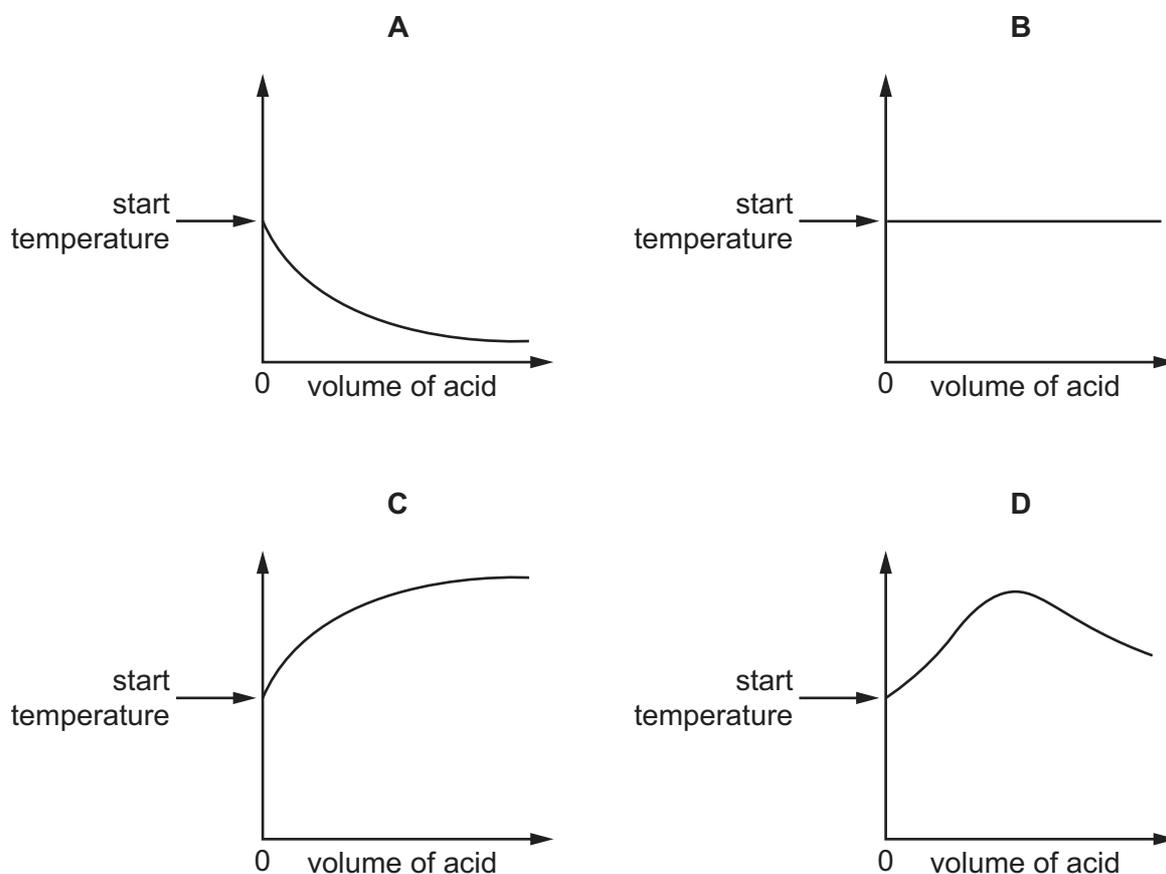
16 What is the electrolyte that is used when a nickel spoon is electroplated with copper?

- A** copper
B copper sulfate solution
C nickel sulfate solution
D nickel

17 An acid is added to an alkali until the final solution is **just** neutral.

The reaction is exothermic.

Which graph shows how the temperature changes as the acid is being added to the alkali?



18 Iron increases the rate of a reaction.

What is the role of iron in this reaction?

- A catalyst
- B electrolyte
- C element
- D isotope

19 Which row identifies the types of oxides?

| | acidic oxides | basic oxides |
|----------|-------------------------------------|-------------------------------------|
| A | CaO, Na ₂ O | CO ₂ , SO ₂ |
| B | CaO, SO ₂ | CO ₂ , Na ₂ O |
| C | CO ₂ , Na ₂ O | CaO, SO ₂ |
| D | CO ₂ , SO ₂ | CaO, Na ₂ O |

20 Hydrochloric acid and sodium hydroxide neutralise each other to form water and sodium chloride.

Which method is used to make the solution crystallise?

- A chromatography
- B evaporation
- C filtration
- D fractional distillation

21 Which statement about the trends in the Periodic Table is correct?

- A Elements are arranged in order of nucleon number.
- B Elements on the left hand side form acidic oxides.
- C The melting point of the Group I elements increases down the group.
- D The proton number increases from left to right across the table.

22 Some properties of aluminium are listed.

- 1 conducts electricity
- 2 malleable
- 3 resistant to corrosion

Which properties make aluminium suitable for use as food containers?

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

23 Which row describes the colour changes when water is added to anhydrous copper(II) sulfate and to cobalt(II) chloride?

| | copper(II) sulfate | cobalt(II) chloride |
|----------|--------------------|---------------------|
| A | blue → white | blue → pink |
| B | blue → white | pink → blue |
| C | white → blue | blue → pink |
| D | white → blue | pink → blue |

24 Which processes lead to the formation of a greenhouse gas?

- 1 reaction of sodium with water
- 2 respiration
- 3 combustion of fossil fuels

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

25 Which two statements about calcium carbonate are correct?

- 1 It neutralises acidic industrial waste.
- 2 It lowers the pH of soil.
- 3 It undergoes thermal decomposition to calcium hydroxide.
- 4 It reacts with dilute hydrochloric acid to form carbon dioxide.

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

26 What is the main constituent of natural gas?

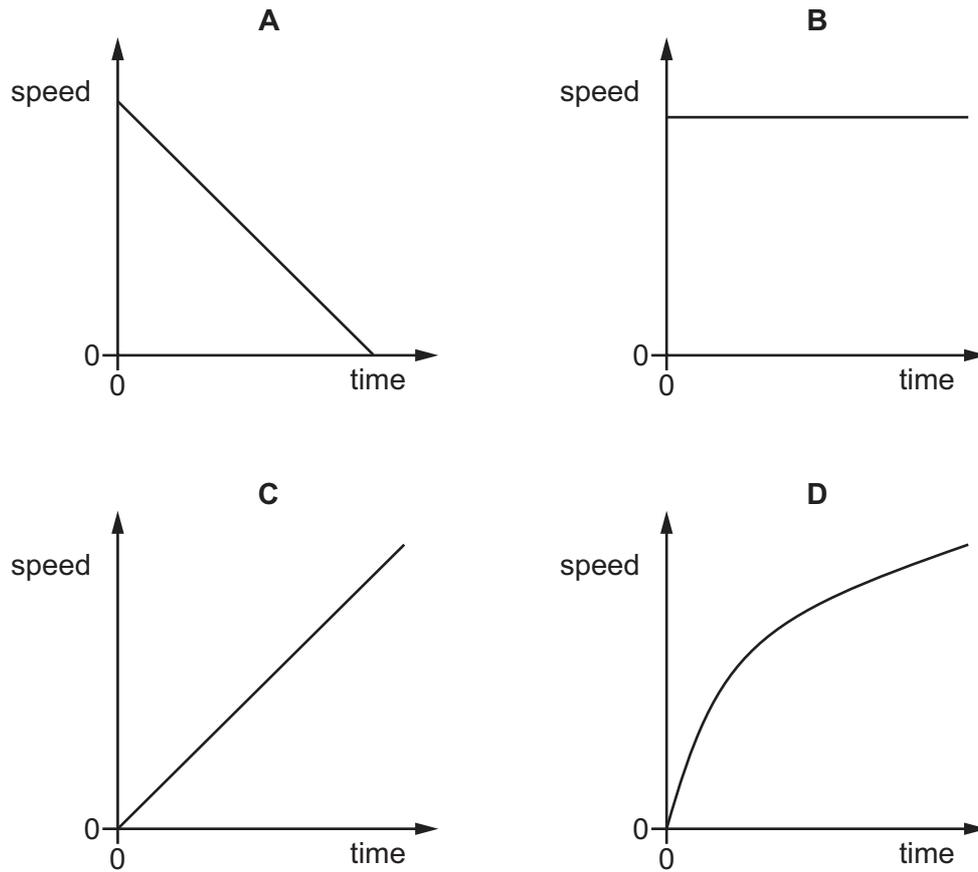
- A** ethane
- B** ethene
- C** methane
- D** nitrogen

27 Which statements about poly(ethene) molecules are correct?

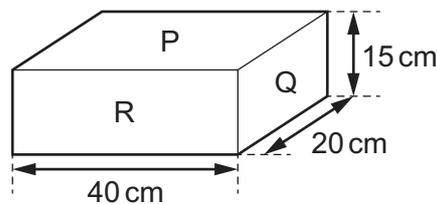
- 1 They are long chains formed from many monomer units.
- 2 They are made by addition polymerisation.
- 3 They contain many double bonds.

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

28 Which speed-time graph represents an object travelling at constant speed?



29 The diagram shows a rectangular block with three faces labelled P, Q and R. The dimensions of the block are also shown.



Each face of the block is placed in turn on a flat, horizontal surface.

Which statement is correct?

- A** The smallest pressure is produced with the block resting on face P.
- B** The smallest pressure is produced with the block resting on face Q.
- C** The smallest pressure is produced with the block resting on face R.
- D** The pressure is the same whether the block is resting on face P, face Q or face R.

30 When evaporation occurs, molecules escape from the surface of a liquid.

Which molecules escape, and what happens to the average speed of the molecules remaining in the liquid?

| | escaping molecules | average speed of remaining molecules |
|----------|--------------------|--------------------------------------|
| A | less energetic | decreases |
| B | less energetic | increases |
| C | more energetic | decreases |
| D | more energetic | increases |

31 Which region of the electromagnetic spectrum is often involved in heat transfer by radiation?

- A** infra-red
- B** radio
- C** ultraviolet
- D** X-ray

32 Diagram 1 represents a wave.

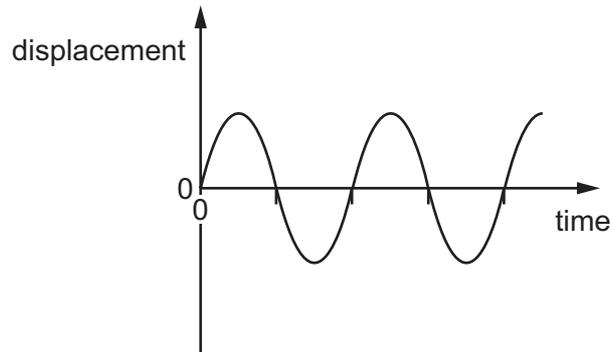
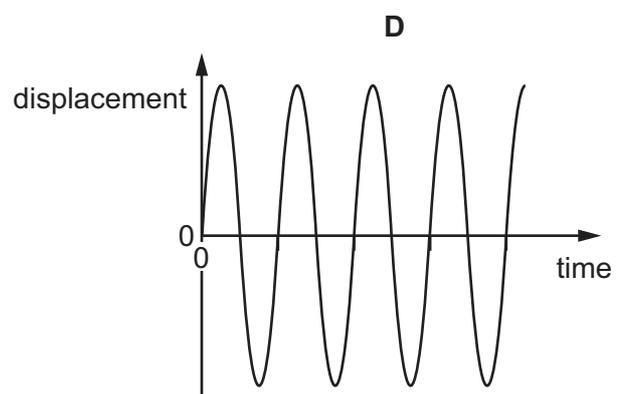
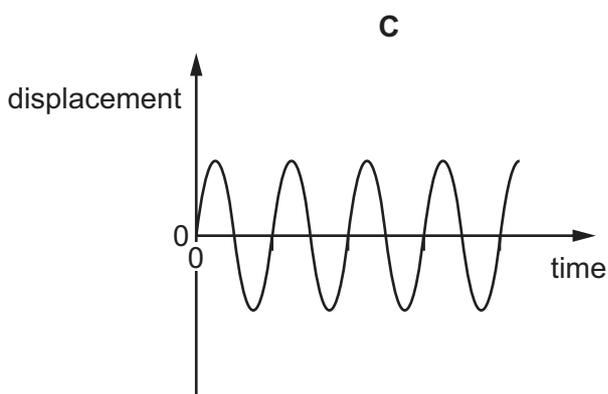
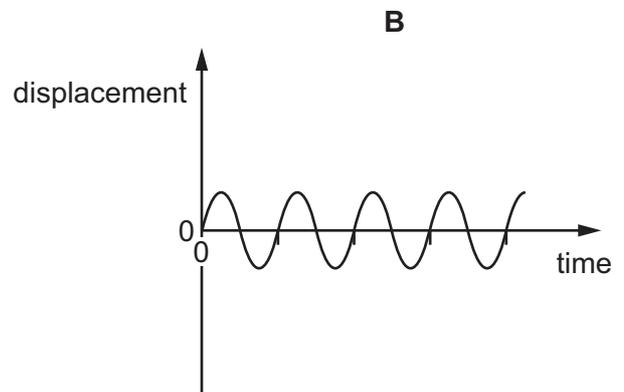
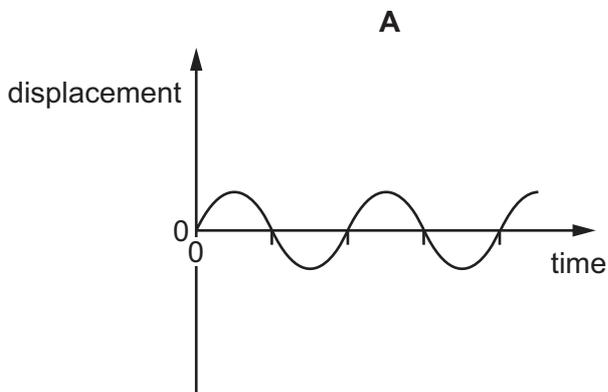


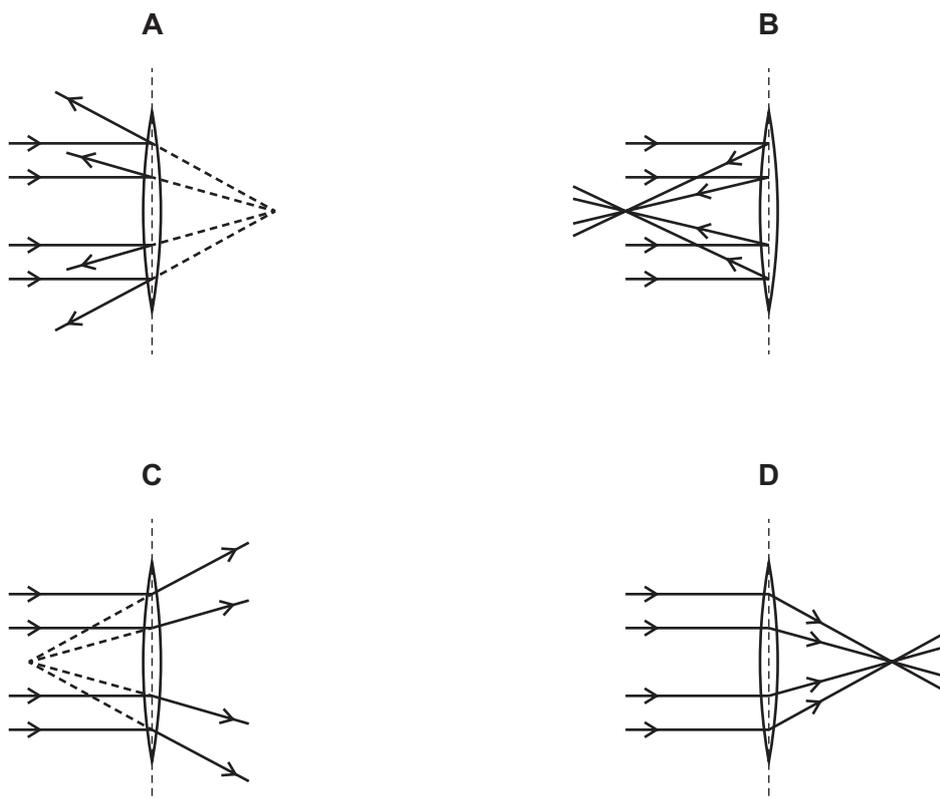
diagram 1

Which diagram represents a wave with twice the frequency and half the amplitude of the wave in diagram 1?

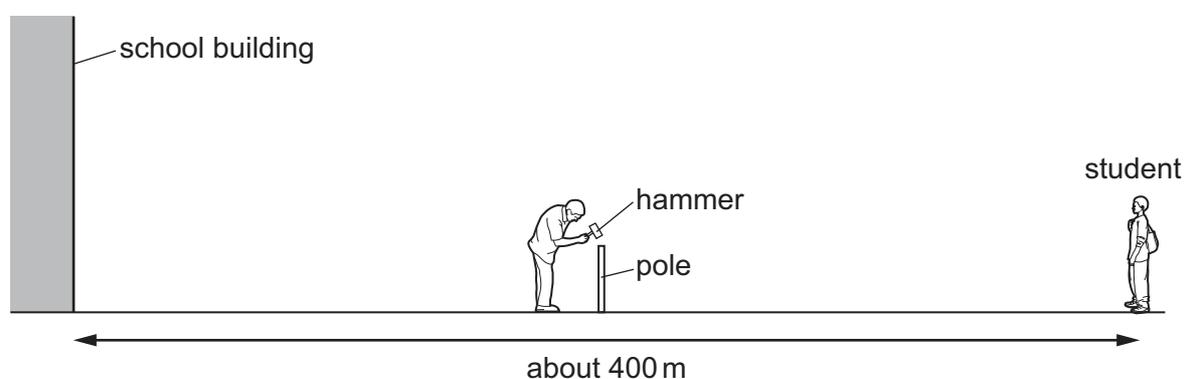
The scales are the same in all the diagrams.



33 Which diagram shows the effect of a converging lens on parallel rays of light?



34 A sports field is next to a large school building. A student at the far side of the sports field sees a groundsman hit a pole with a hammer.

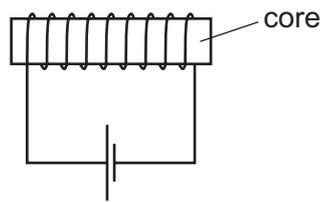


After the hammer hits the pole, the student hears two bangs.

Why does the student hear two bangs?

| | first bang caused by | second bang caused by |
|----------|---|---|
| A | sound of hammer hitting pole | sound of pole hitting hammer |
| B | sound reaching the student's left ear | sound reaching the student's right ear |
| C | sound reaching student directly | sound reflected back from school building |
| D | sound reflected back from school building | sound reaching student directly |

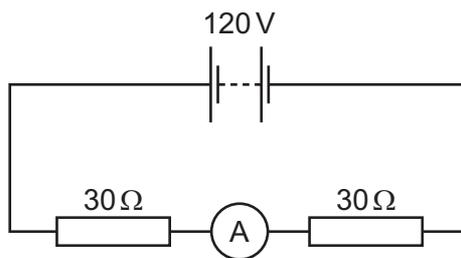
35 The diagram shows an electromagnet.



Which metal is used for the core of the electromagnet and why?

| | metal | reason |
|----------|-------|-------------------------------|
| A | iron | it becomes a permanent magnet |
| B | iron | it is easily magnetised |
| C | steel | it becomes a permanent magnet |
| D | steel | it is easily magnetised |

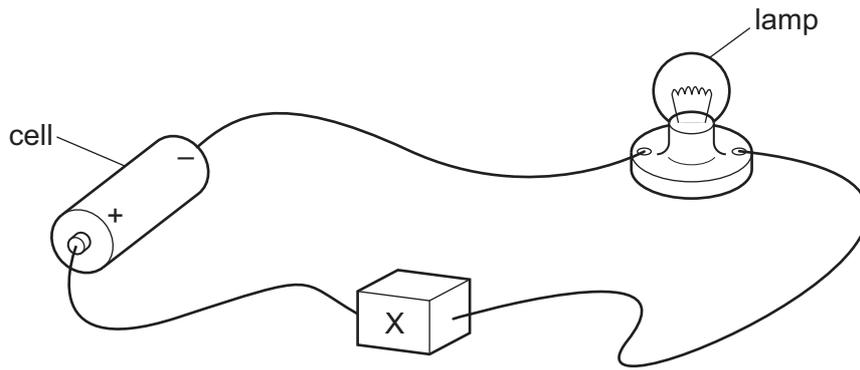
36 The diagram shows two $30\ \Omega$ resistors and an ammeter connected to a 120 V battery.



What is the reading on the ammeter?

- A** 0.25 A **B** 0.50 A **C** 2.0 A **D** 4.0 A

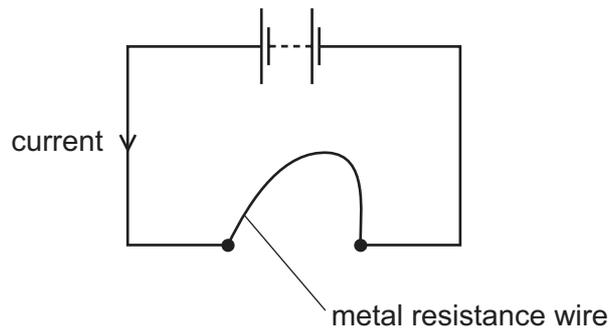
37 In the circuit, component X is used to control the brightness of the lamp.



What is component X?

- A an ammeter
- B a fixed resistor
- C a fuse
- D a variable resistor

38 A student connects a length of metal resistance wire to a battery.



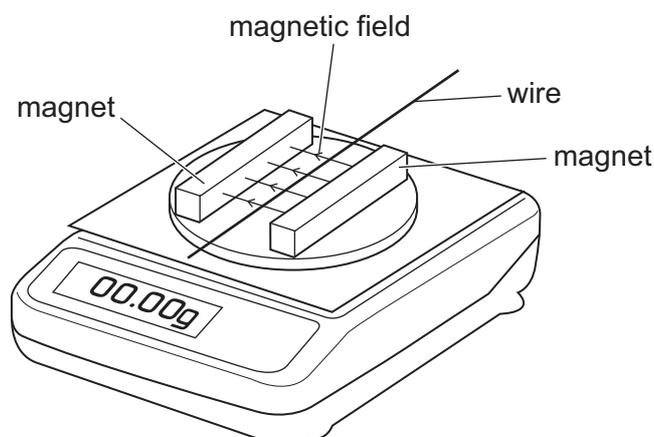
The student wishes to increase the current in the resistance wire.

Which change does this?

- A connecting a second wire in series with the first wire
- B heating the wire
- C making the wire shorter
- D making the wire thinner

- 39 The diagram shows two magnets on an electronic balance. The magnets produce a magnetic field in the direction shown. A wire lies in the magnetic field.

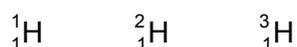
The reading on the balance is zero.



A current is produced in the wire and the balance now shows a positive reading.

Which change produces a negative reading on the balance?

- A decreasing the current
 - B increasing the current
 - C reversing the current direction
 - D switching off the current
- 40 There are three different isotopes of hydrogen.



Which statement about the nuclei of these three isotopes is correct?

- A They have different numbers of electrons.
- B They have the same number of nucleons.
- C They have the same number of neutrons.
- D They have the same number of protons.

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The Periodic Table of Elements

| | | Group | | | | | | | | | | |
|-----------------------------------|------------------------------------|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|------------------------------------|------------------------------------|--|--|---------------------------------------|
| I | II | III | IV | V | VI | VII | VIII | | | | | |
| 3 Li lithium 7 | 4 Be beryllium 9 | 1 H hydrogen 1 | 5 B boron 11 | 6 C carbon 12 | 7 N nitrogen 14 | 8 O oxygen 16 | 9 F fluorine 19 | 10 Ne neon 20 | | | | |
| 11 Na sodium 23 | 12 Mg magnesium 24 | <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> Key atomic number atomic symbol name relative atomic mass </div> | | | | | | | | | | |
| 19 K potassium 39 | 20 Ca calcium 40 | 13 Al aluminium 27 | 14 Si silicon 28 | 15 P phosphorus 31 | 16 S sulfur 32 | 17 Cl chlorine 35.5 | 18 Ar argon 40 | | | | | |
| 37 Rb rubidium 85 | 38 Sr strontium 88 | 31 Ga gallium 70 | 32 Ge germanium 73 | 33 As arsenic 75 | 34 Se selenium 79 | 35 Br bromine 80 | 36 Kr krypton 84 | | | | | |
| 55 Cs caesium 133 | 56 Ba barium 137 | 30 Zn zinc 65 | 49 In indium 115 | 50 Sn tin 119 | 51 Sb antimony 122 | 52 Te tellurium 128 | 54 Xe xenon 131 | | | | | |
| 87 Fr francium — | 88 Ra radium — | 29 Cu copper 64 | 48 Cd cadmium 112 | 80 Hg mercury 201 | 81 Tl thallium 204 | 82 Pb lead 207 | 83 Bi bismuth 209 | 84 Po polonium — | 85 At astatine — | 86 Rn radon — | | |
| | | 26 Fe iron 56 | 27 Co cobalt 59 | 28 Ni nickel 59 | 29 Cu copper 64 | 30 Zn zinc 65 | 47 Ag silver 108 | 78 Pt platinum 195 | 79 Au gold 197 | 80 Hg mercury 201 | 111 Rg roentgenium — | 112 Cn copernicium — |
| | | 25 Mn manganese 55 | 43 Tc technetium — | 44 Ru ruthenium 101 | 45 Rh rhodium 103 | 46 Pd palladium 106 | 76 Os osmium 190 | 77 Ir iridium 192 | 78 Pt platinum 195 | 109 Mt meitnerium — | 110 Ds darmstadtium — | 112 Cn copernicium — |
| | | 24 Cr chromium 52 | 42 Mo molybdenum 96 | 44 Ru ruthenium 101 | 45 Rh rhodium 103 | 46 Pd palladium 106 | 74 W tungsten 184 | 75 Re rhenium 186 | 76 Os osmium 190 | 107 Bh bohrium — | 108 Hs hassium — | 111 Rg roentgenium — |
| | | 23 V vanadium 51 | 41 Nb niobium 93 | 42 Zr zirconium 91 | 43 Tc technetium — | 44 Ru ruthenium 101 | 73 Ta tantalum 181 | 74 W tungsten 184 | 75 Re rhenium 186 | 105 Db dubnium — | 106 Sg seaborgium — | 111 Rg roentgenium — |
| | | 22 Ti titanium 48 | 40 Zr zirconium 91 | 41 Nb niobium 93 | 42 Mo molybdenum 96 | 43 Tc technetium — | 72 Hf hafnium 178 | 73 Ta tantalum 181 | 74 W tungsten 184 | 104 Rf rutherfordium — | 105 Db dubnium — | 110 Ds darmstadtium — |
| | | 21 Sc scandium 45 | 39 Y yttrium 89 | 40 Zr zirconium 91 | 41 Nb niobium 93 | 42 Mo molybdenum 96 | 57–71 lanthanoids | 72 Hf hafnium 178 | 73 Ta tantalum 181 | 103 actinoids | 104 Rf rutherfordium — | 109 Mt meitnerium — |

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

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