



Cambridge IGCSE™

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/11

May/June 2021

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.
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- 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.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Any blank pages are indicated.



- 1 A drawing of a cell is 80 mm in length and the magnification is $\times 200$.

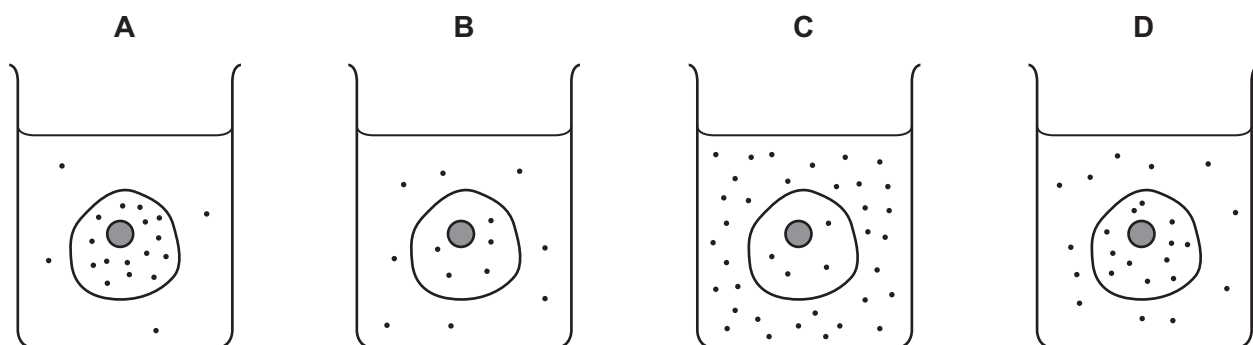
What is the actual size of the cell?

- A** 0.4 mm **B** 4.0 mm **C** 1.6 mm **D** 16.0 mm

- 2 The diagrams represent four similar animal cells immersed in blood plasma.

The black dots represent molecules of dissolved oxygen.

Which cell will have oxygen molecules diffusing into it most rapidly?

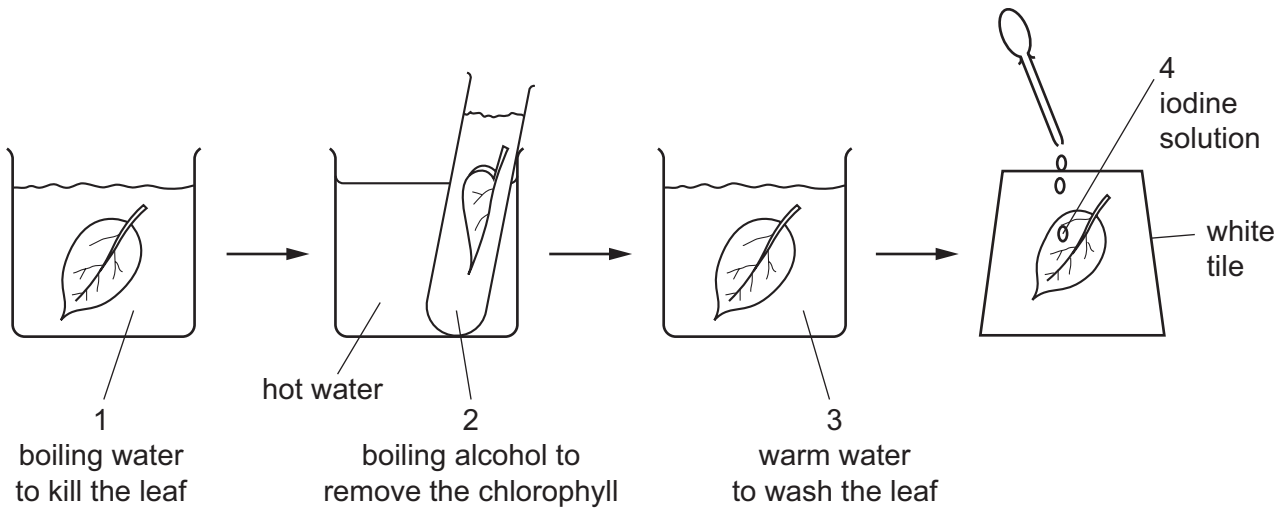


- 3 Which row shows the elements that occur in all proteins?

	carbon	hydrogen	nitrogen	oxygen
A	yes	yes	yes	no
B	yes	yes	no	yes
C	yes	no	yes	yes
D	yes	yes	yes	yes

4 The flow diagram shows the stages in testing a green leaf for starch.

1, 2, 3 and 4 are all liquids.



What are the colours of liquids 2 and 4 for a leaf that contains starch?

	2	4
A	green	blue / black
B	colourless	brown
C	colourless	blue / black
D	green	brown

5 A person is diagnosed with scurvy.

The table shows the content of vitamin C, vitamin D, calcium and iron in four different foods.

Which food should the person eat to help reduce scurvy?

	vitamin C / %	vitamin D / %	calcium / %	iron / %
A	0	6	72	3
B	88	0	4	0
C	3	0	5	10
D	0	54	12	15

- 6 This statement is about chemical digestion.

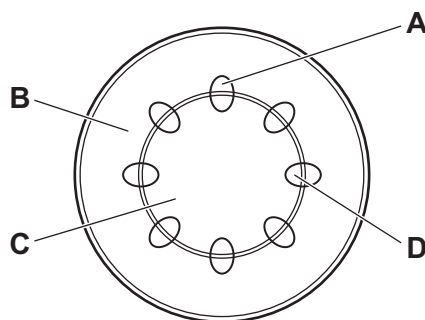
In the alimentary canal chemical digestion takes place in order to produce 1..... , ...2..... molecules so that they can be 3..... .

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	large	insoluble	ingested
B	small	soluble	absorbed
C	large	soluble	egested
D	small	insoluble	absorbed

- 7 The diagram shows a cross-section of a plant stem.

Which label indicates the tissue responsible for the transport of water through the plant?



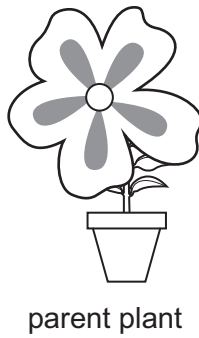
- 8 Which equation represents aerobic respiration?

- A** carbon dioxide + glucose $\rightarrow$ oxygen + water
- B** carbon dioxide + water $\rightarrow$ glucose + oxygen
- C** glucose + oxygen $\rightarrow$ carbon dioxide + water
- D** glucose + water $\rightarrow$ carbon dioxide + oxygen

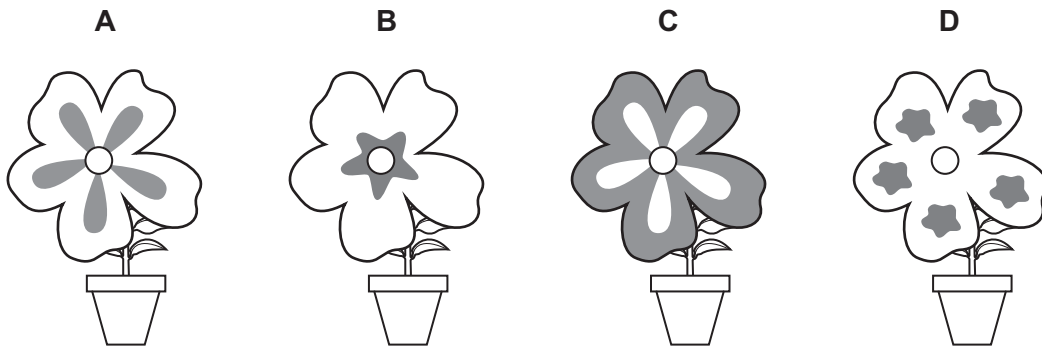
- 9 What are effects of increased adrenaline production in humans?

- A** increased rate of breathing and increased pulse rate
- B** increased rate of breathing and narrower pupils
- C** slower pulse rate and narrower pupils
- D** slower pulse rate and wider pupils

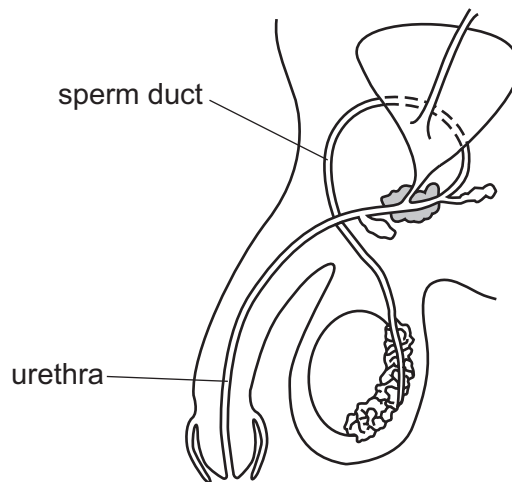
10 The diagram shows a parent plant.



Which offspring has been produced by asexual reproduction from this plant?



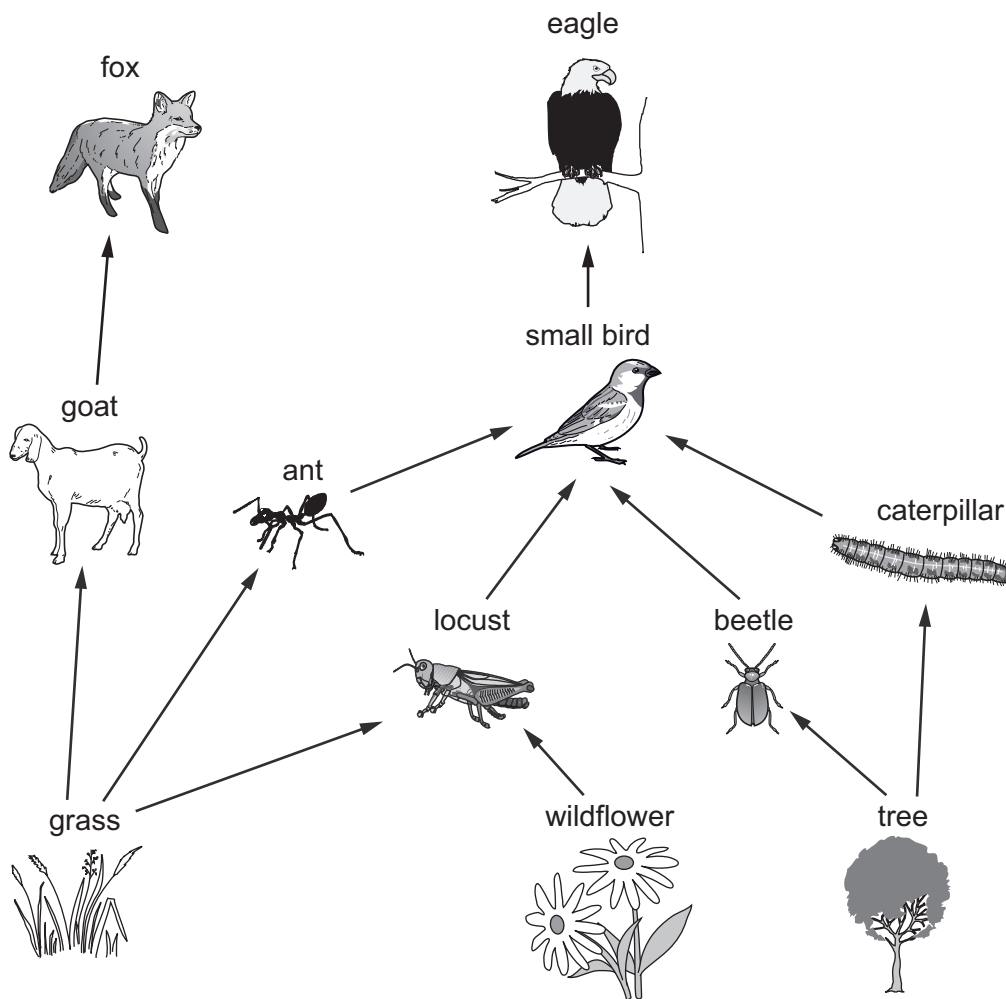
11 The diagram shows the male reproductive organs.



What is transported by the sperm duct and the urethra?

	sperm duct	urethra
A	sperm	semen and urine
B	sperm	urine only
C	urine	semen and urine
D	urine	semen only

12 The diagram shows a food web.



How many species are primary consumers in this food web?

- A** 2 **B** 3 **C** 4 **D** 5

13 Which process takes carbon dioxide out of the air?

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

- 14** A fixed mass of argon gas in a sealed container is heated.

The pressure inside the container increases.

Which statement explains why the pressure increases?

- A** There is an increase in the number of gaseous particles inside the container.
 - B** There is an increase in the number of collisions per second between the particles of gas and the walls of the container.
 - C** The particles of gas have less energy and collide with the wall of the container more frequently.
 - D** There is a decrease in the space that the particles have to move in.
- 15** What is an example of a physical change?
- A** carbon dioxide turning limewater milky
 - B** the crystallisation of copper(II) sulfate from solution
 - C** the electrolysis of molten lead(II) bromide
 - D** the thermal decomposition of calcium carbonate
- 16** Which row about elements and compounds is correct?

	elements	compounds
A	are metals only	contain ionic or covalent bonds
B	are non-metals only	contain covalent bonds only
C	are metals or non-metals	contain ionic bonds only
D	are metals or non-metals	contain ionic or covalent bonds

- 17** Dilute sulfuric acid is electrolysed using inert electrodes.

Which statement is correct?

- A** Hydrogen is produced at the anode.
- B** Both hydrogen and oxygen are produced at the negative electrode.
- C** Sulfur dioxide is produced at the cathode.
- D** Oxygen is produced at the positive electrode.

- 18** Some calcium carbonate and dilute hydrochloric acid start to react. Water is then added to the reaction mixture.

What happens to the rate of the reaction?

- A** It decreases.
- B** It increases.
- C** It stays the same.
- D** It stops.

- 19** Barium hydroxide is an alkali.

Which statement about barium hydroxide is correct?

- A** It has a pH greater than 7 in aqueous solution.
- B** It reacts with aqueous sodium hydroxide.
- C** It reacts with metal carbonates.
- D** It turns Universal Indicator red.

- 20** Which two substances form a white precipitate when they are mixed?

- A** barium chloride and hydrochloric acid
- B** barium chloride and nitric acid
- C** silver nitrate and hydrochloric acid
- D** silver nitrate and nitric acid

- 21** There are eight elements in Period 3 of the Periodic Table.

Na	Mg	Al	Si	P	S	Cl	Ar
----	----	----	----	---	---	----	----

Which statement about the elements in this period is correct?

- A** The elements become less metallic across the period.
- B** The most metallic elements are at both ends of the period.
- C** The most metallic elements are in the middle of the period.
- D** There is no pattern in metallic character across the period.

22 What are properties of transition elements?

- 1 They can act as catalysts.
- 2 They only form white compounds.
- 3 They have high densities.

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

23 Which words describe a noble gas?

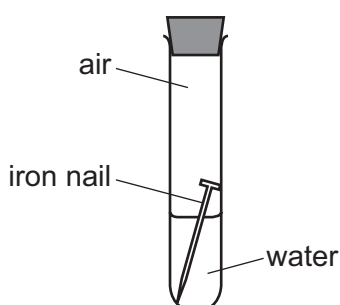
- A** compound, colourless, does not burn in air
- B** element, colourless, burns in air
- C** element, colourless, does not burn in air
- D** element, green, does not burn in air

24 Which substances conduct electricity when molten?

- 1 sodium chloride
- 2 naphtha
- 3 brass

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

25 An iron nail is left for a few days in a sealed test-tube containing air and water.



Which change in the air in the test-tube occurs as the iron nail rusts?

- A** The amount of carbon dioxide decreases.
- B** The amount of carbon dioxide increases.
- C** The amount of nitrogen increases.
- D** The amount of oxygen decreases.

26 Which type of compound contains only carbon and hydrogen?

- A carbohydrate
- B carbonate
- C hydrocarbon
- D hydroxide

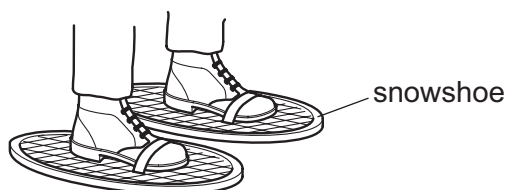
27 Which statement about ethene is **not** correct?

- A It is used to make an addition polymer.
- B It decolourises aqueous bromine.
- C It is a saturated hydrocarbon.
- D It is formed by cracking larger alkanes.

28 Which row shows apparatus used to measure length, time and volume?

	length	time	volume
A	measuring cylinder	metre rule	stop-clock
B	measuring cylinder	stop-clock	metre rule
C	metre rule	measuring cylinder	stop-clock
D	metre rule	stop-clock	measuring cylinder

29 Snowshoes make walking over snow easier than when wearing normal shoes.



Why do the snowshoes make it easier to walk over snow?

- A They decrease the pressure acting on the snow.
- B They decrease the weight acting on the snow.
- C They increase the pressure acting on the snow.
- D They increase the weight acting on the snow.

- 30** A boy runs up some stairs.

Which two physical quantities are used to calculate the power he develops?

- A** his mass and his acceleration
- B** his mass and the time taken
- C** the work done and the time taken
- D** the work done and the vertical distance moved

- 31** Which row contains a renewable and a non-renewable energy resource in the correct column?

	renewable	non-renewable
A	geothermal	wind
B	geothermal	coal
C	oil	wind
D	oil	coal

- 32** Cold water evaporates as molecules leave it.

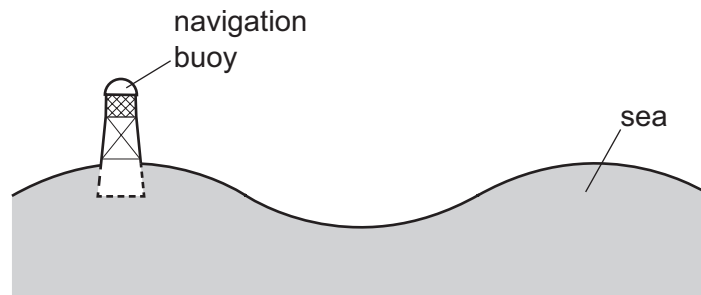
Which molecules leave the water and from which part of the water do they leave?

	molecules that leave the water	where they leave from
A	least energetic	the surface only
B	least energetic	throughout the water
C	most energetic	the surface only
D	most energetic	throughout the water

- 33** What is a property of infra-red radiation?

- A** It can only travel in a gas.
- B** It can only travel in a metal.
- C** It can only travel in liquids and gases.
- D** It can travel through a vacuum.

- 34** A navigation buoy floating on the sea oscillates up and down as a wave passes.



In 2.0 minutes, 6.0 wavelengths pass the buoy.

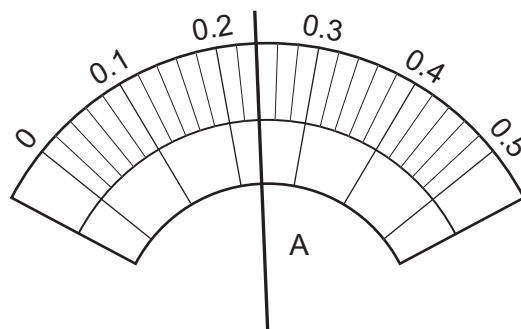
What is the frequency of the waves?

- A** 0.050 Hz **B** 0.33 Hz **C** 3.0 Hz **D** 20 Hz
- 35** Radio waves and gamma rays are travelling in a vacuum.

How do the frequency and speed of the radio waves compare with the frequency and speed of the gamma rays?

	frequency of radio waves	speed of radio waves
A	higher than gamma	greater than gamma
B	higher than gamma	same as gamma
C	lower than gamma	greater than gamma
D	lower than gamma	same as gamma

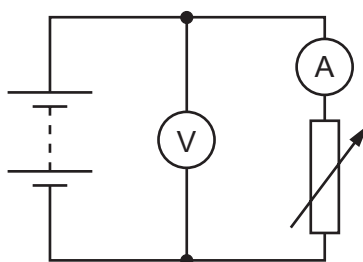
- 36** The diagram shows the scale of an analogue ammeter.



What is the reading on the ammeter?

- A** 0.22 A **B** 0.24 A **C** 0.27 A **D** 0.36 A

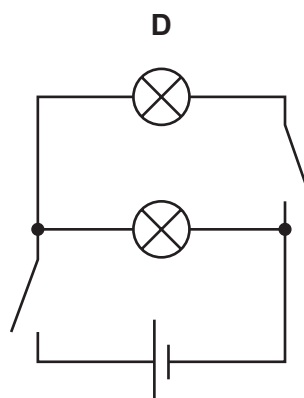
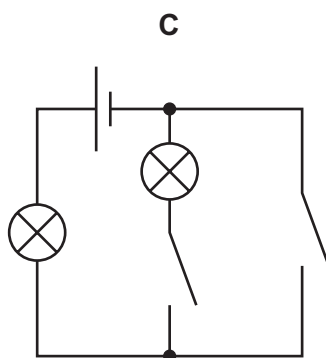
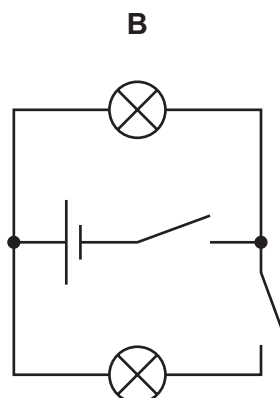
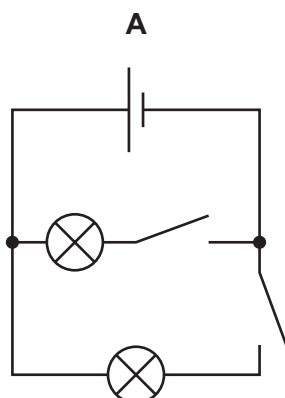
- 37 The diagram represents a circuit that includes a battery, an ammeter, a voltmeter and a variable resistor.



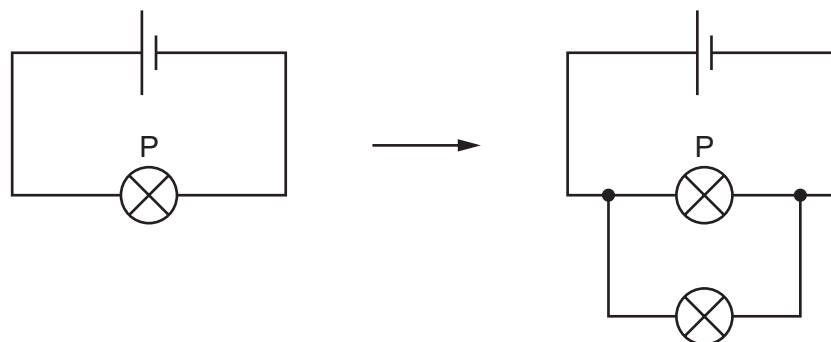
What happens to the readings on the meters as the resistance of the variable resistor is increased?

	ammeter reading	voltmeter reading
A	decreases	decreases
B	decreases	stays constant
C	increases	decreases
D	increases	stays constant

- 38 Which circuit allows each lamp to be switched on and off independently of the other lamp?



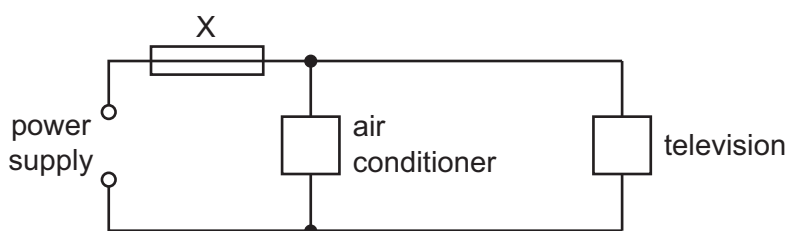
- 39 Lamp P is connected to a cell. A second lamp is then connected in parallel with lamp P.



How does this change affect the brightness of lamp P and how does it affect the current in the cell?

	brightness of lamp P	current in cell
A	less bright	greater
B	less bright	unchanged
C	unchanged	greater
D	unchanged	unchanged

- 40 An air conditioner and a television are both connected to the same electrical circuit.



The current in the air conditioner is 9.0 A and the current in the television is 2.0 A .

Several different fuses are available.

Which fuse should be connected at X?

- A** 1 A **B** 3 A **C** 7 A **D** 13 A

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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	Key atomic number atomic symbol name relative atomic mass										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
												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
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84							
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131							
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	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 —							
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —		114 Fl flerovium —		116 Lv livermorium —									

lanthanoids

actinoids

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
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.).



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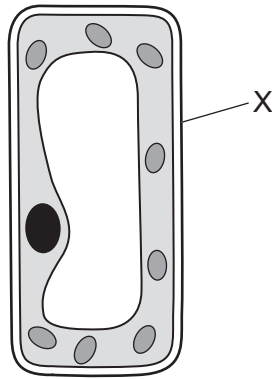
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- 1 The diagram shows a plant cell as seen under a light microscope.

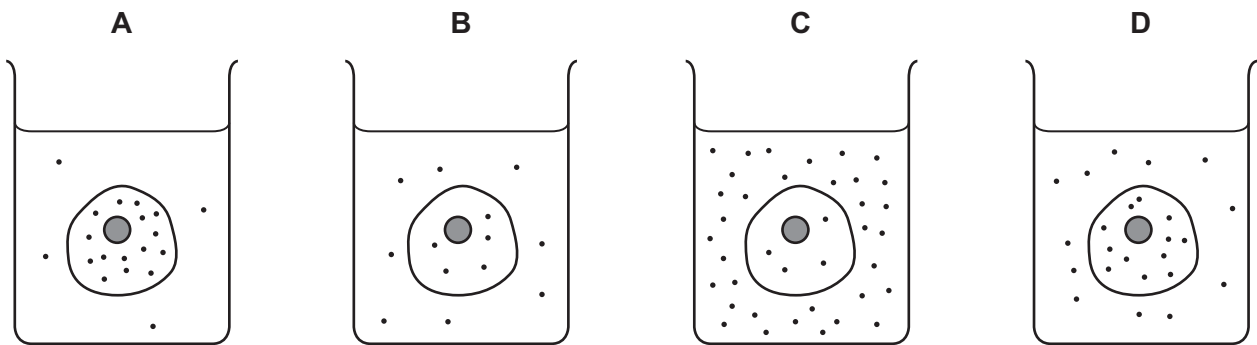


What is the function of the part labelled X?

- A photosynthesis
 - B site of chemical reactions
 - C stores DNA
 - D supports the cell
- 2 The diagrams represent four similar animal cells immersed in blood plasma.

The black dots represent molecules of dissolved oxygen.

Which cell will have oxygen molecules diffusing into it most rapidly?



- 3 A student tests an unknown substance with biuret reagent.

It produces a violet colour.

What is the unknown substance an example of?

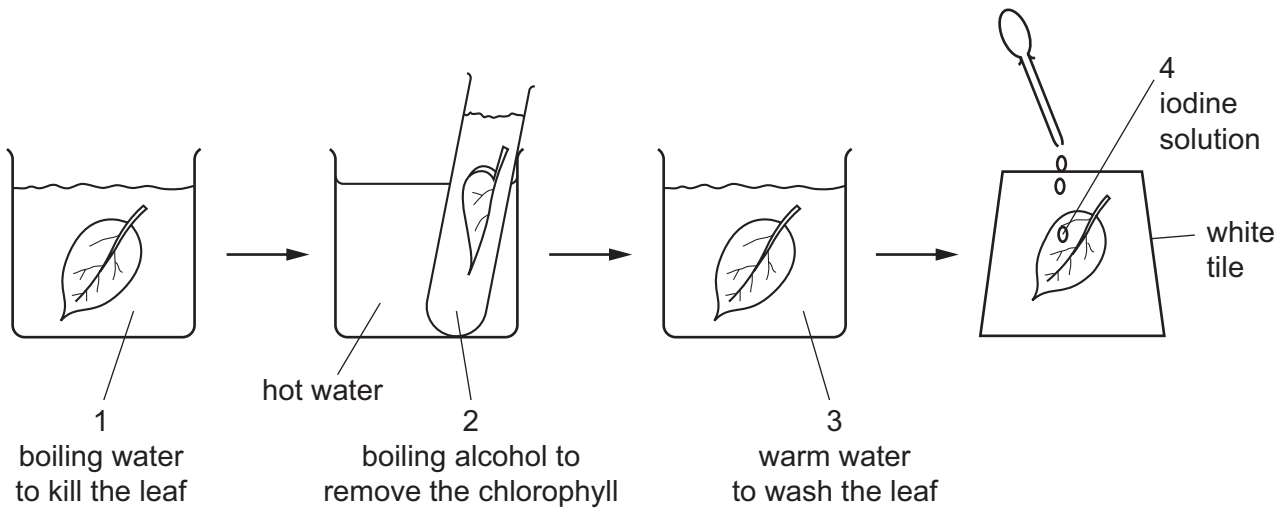
- A fat
- B protein
- C reducing sugar
- D starch

4 Which name is given to biological catalysts?

- A antibodies
- B enzymes
- C hormones
- D platelets

5 The flow diagram shows the stages in testing a green leaf for starch.

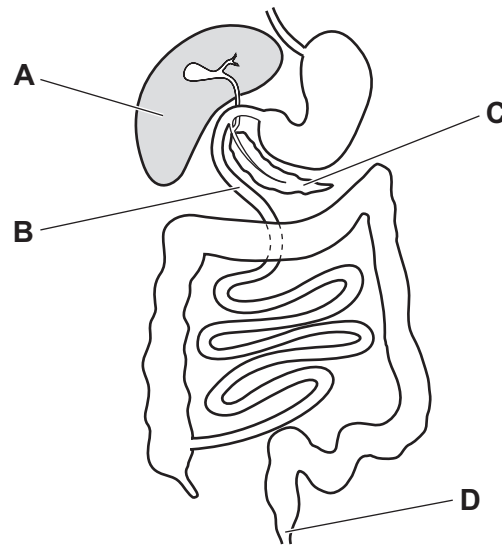
1, 2, 3 and 4 are all liquids.



What are the colours of liquids 2 and 4 for a leaf that contains starch?

	2	4
A	green	blue / black
B	colourless	brown
C	colourless	blue / black
D	green	brown

6 Which part of the alimentary canal carries out digestion **and** absorption?



7 Which statement describes chemical digestion?

- A food particles passing along the alimentary canal
- B large food molecules being broken down into smaller molecules
- C large pieces of food being broken down into smaller pieces
- D nutrients passing through the wall of the small intestine

8 What can be used to test for the presence of carbon dioxide?

- A Benedict's solution
- B ethanol
- C iodine solution
- D limewater

9 Which equation represents aerobic respiration?

- A carbon dioxide + glucose $\rightarrow$ oxygen + water
- B carbon dioxide + water $\rightarrow$ glucose + oxygen
- C glucose + oxygen $\rightarrow$ carbon dioxide + water
- D glucose + water $\rightarrow$ carbon dioxide + oxygen

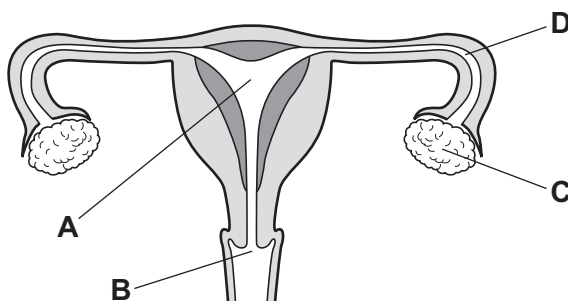
- 10** When the hormone adrenaline is released in humans it causes changes in breathing rate and pupil size.

What are the correct changes?

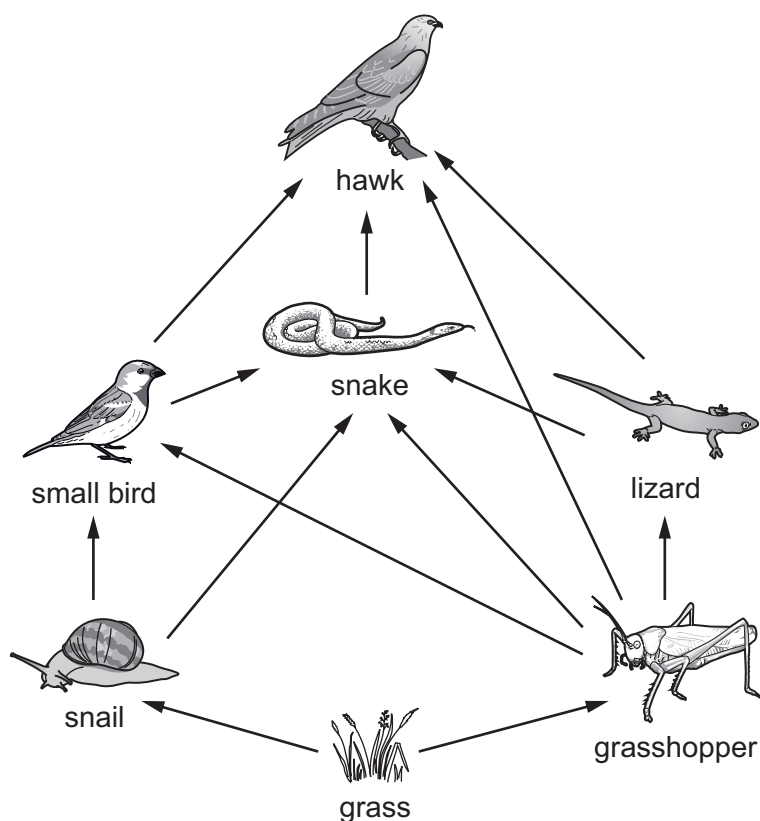
	breathing rate	pupil size
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- 11** The diagram shows the human female reproductive system.

Where does fertilisation usually take place?



12 The diagram shows a food web.



Which statement about the snake is correct?

- A It is a consumer and it is a carnivore.
- B It is a producer and it is a carnivore.
- C It is a consumer and it is a herbivore.
- D It is a producer and it is a herbivore.

13 Which process takes carbon dioxide out of the air?

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

14 What is an example of a physical change?

- A carbon dioxide turning limewater milky
- B the crystallisation of copper(II) sulfate from solution
- C the electrolysis of molten lead(II) bromide
- D the thermal decomposition of calcium carbonate

15 Which substances are mixtures?

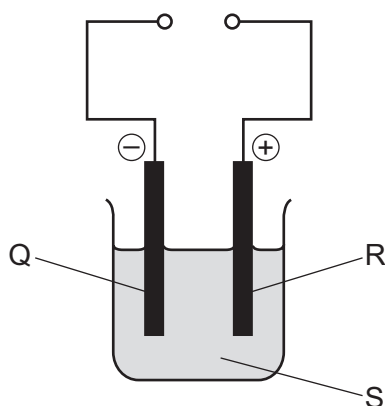
- 1 air
- 2 brass
- 3 sodium chloride

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

16 Which statement about the particles is correct?

- A** ${}^1_1\text{H}$ has the same number of protons as neutrons.
- B** ${}^2_1\text{H}^+$ has the same number of electrons as neutrons.
- C** OH^- contains more protons than electrons.
- D** NH_3 has the same number of protons as electrons.

17 The apparatus used in an electrolysis experiment is shown.



Which row identifies Q, R and S?

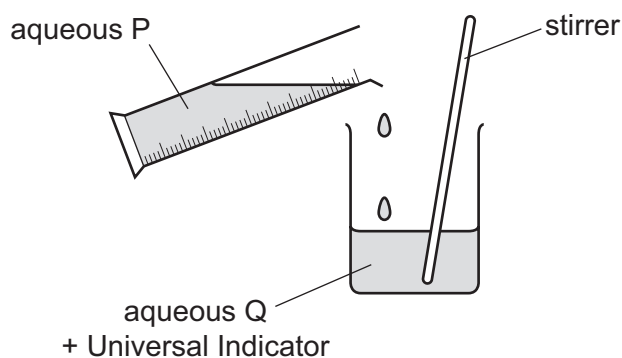
	Q	R	S
A	anode	cathode	electrode
B	cathode	anode	electrode
C	anode	cathode	electrolyte
D	cathode	anode	electrolyte

- 18 Some calcium carbonate and dilute hydrochloric acid start to react. Water is then added to the reaction mixture.

What happens to the rate of the reaction?

- A It decreases.
- B It increases.
- C It stays the same.
- D It stops.

- 19 The diagram shows an experiment to prepare a salt from compounds P and Q.



Aqueous Q has a pH value of 1.

Aqueous P is added until the pH value of the mixture reaches 7.

What are the formulae of compounds P and Q?

	compound P	compound Q
A	HCl	NaOH
B	HNO ₃	H ₂ SO ₄
C	KOH	HCl
D	NaOH	NH ₃

- 20 Which two substances form a white precipitate when they are mixed?

- A barium chloride and hydrochloric acid
- B barium chloride and nitric acid
- C silver nitrate and hydrochloric acid
- D silver nitrate and nitric acid

21 Which statement describes how the elements change across a period in the Periodic Table from left to right?

- A** They change from elements to compounds.
- B** They change from metals to non-metals.
- C** They change from gases to solids.
- D** They change from non-metals to metals.

22 Which row shows the properties of a transition element?

	melting point	electrical conductivity	colour of chloride	catalytic properties
A	high	high	white	no
B	high	low	white	no
C	high	high	green	yes
D	low	low	blue	yes

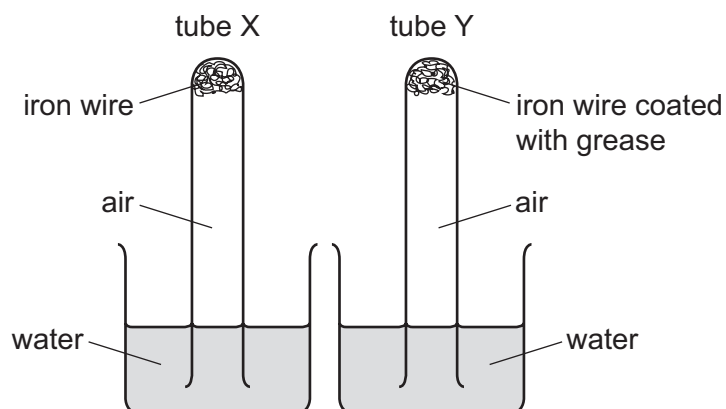
23 Which words describe a noble gas?

- A** compound, colourless, does not burn in air
- B** element, colourless, burns in air
- C** element, colourless, does not burn in air
- D** element, green, does not burn in air

24 Which compound can oxidise carbon?

- A** aluminium oxide
- B** copper oxide
- C** magnesium oxide
- D** potassium oxide

25 An experiment is set up to show the effect of air and water on iron.



The experiment is left for one week.

What happens to the water level in each tube?

	tube X	tube Y
A	falls	falls
B	no change	rises
C	rises	rises
D	rises	no change

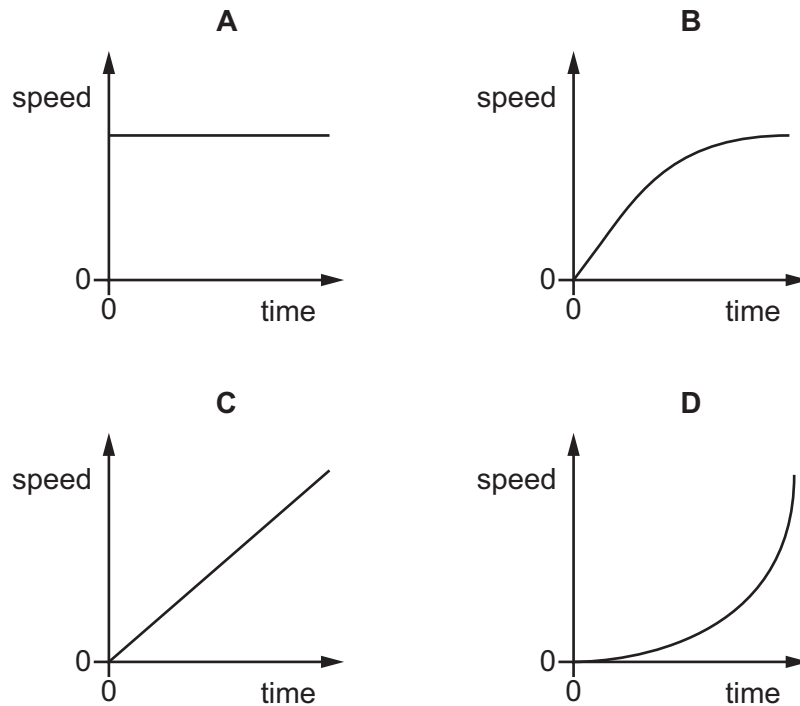
26 Which type of compound contains only carbon and hydrogen?

- A** carbohydrate
- B** carbonate
- C** hydrocarbon
- D** hydroxide

27 Which process produces alkenes?

- A** cracking
- B** fractional distillation
- C** polymerisation
- D** reduction

- 28 Which speed–time graph represents the motion of an object with constant, non-zero acceleration?



- 29 The gravitational field strength g on the surface of the Earth is 10 N/kg .

What is the weight of a 500 g mass on the surface of the Earth?

- A** 5.0 kg **B** 5.0 N **C** 5000 kg **D** 5000 N

- 30 Which row shows apparatus used to measure length, time and volume?

	length	time	volume
A	measuring cylinder	metre rule	stop-clock
B	measuring cylinder	stop-clock	metre rule
C	metre rule	measuring cylinder	stop-clock
D	metre rule	stop-clock	measuring cylinder

- 31 A block is placed on the ground causing a pressure on the ground.

Which row shows a pair of changes that **must** increase the pressure on the ground?

	weight of block	area of contact with ground
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- 32 A student applies a force to an object, causing the object to move in the same direction as the force.

She measures the size of the force and the distance moved by the object.

Which quantity can she now calculate?

- A** the acceleration of the object
 - B** the power she produces
 - C** the speed of the object
 - D** the work done on the object
- 33 Cold water evaporates as molecules leave it.

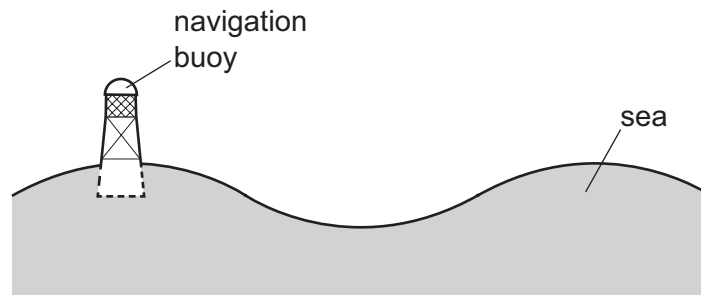
Which molecules leave the water and from which part of the water do they leave?

	molecules that leave the water	where they leave from
A	least energetic	the surface only
B	least energetic	throughout the water
C	most energetic	the surface only
D	most energetic	throughout the water

- 34 Which material is a good conductor of heat?

- A** copper
- B** glass
- C** plastic
- D** wood

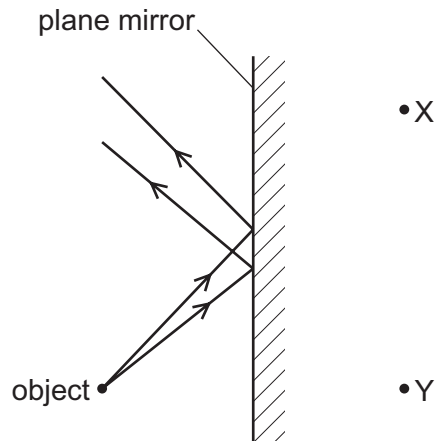
- 35 A navigation buoy floating on the sea oscillates up and down as a wave passes.



In 2.0 minutes, 6.0 wavelengths pass the buoy.

What is the frequency of the waves?

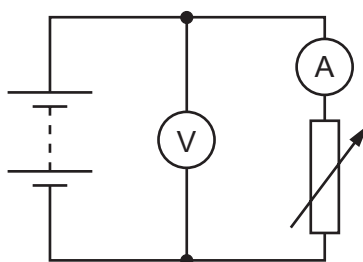
- A** 0.050 Hz **B** 0.33 Hz **C** 3.0 Hz **D** 20 Hz
- 36 The diagram shows rays of light from an object being reflected by a plane mirror.



At which labelled point is the image formed, and is the image real or virtual?

	image	real or virtual
A	at X	real
B	at X	virtual
C	at Y	real
D	at Y	virtual

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

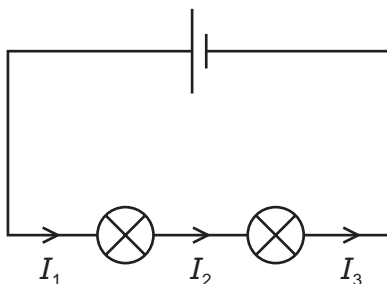


What happens to the readings on the meters as the resistance of the variable resistor is increased?

	ammeter reading	voltmeter reading
A	decreases	decreases
B	decreases	stays constant
C	increases	decreases
D	increases	stays constant

- 38 Two lamps are connected in the circuit shown.

The currents at three points are labelled I_1 , I_2 and I_3 .

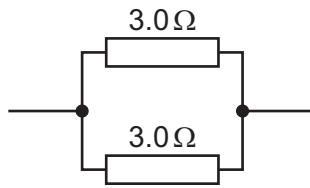


How are I_1 , I_2 and I_3 related? Use the key to help you.

key
 $<$ less than
 $>$ greater than
 $=$ equal to

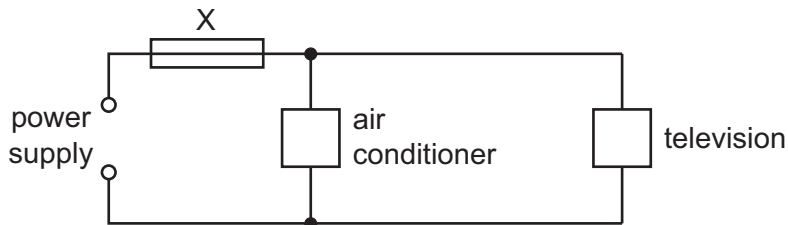
- A** $I_1 < I_2 < I_3$
B $I_1 = I_2 = I_3$
C $I_1 > I_2$ and $I_1 = I_3$
D $I_1 > I_2 > I_3$

- 39 Two resistors are connected as shown.



What is the combined resistance of the two resistors?

- A less than $3.0\ \Omega$
 - B $3.0\ \Omega$
 - C $6.0\ \Omega$
 - D $9.0\ \Omega$
- 40 An air conditioner and a television are both connected to the same electrical circuit.



The current in the air conditioner is $9.0\ \text{A}$ and the current in the television is $2.0\ \text{A}$.

Several different fuses are available.

Which fuse should be connected at X?

- A $1\ \text{A}$
- B $3\ \text{A}$
- C $7\ \text{A}$
- D $13\ \text{A}$

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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	Key atomic number atomic symbol name relative atomic mass										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
												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
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84							
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131							
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	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 —							
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —		114 Fl flerovium —		116 Lv livermorium —									

lanthanoids

actinoids

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
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.).



Cambridge IGCSE™

COMBINED SCIENCE

0653/13

Paper 1 Multiple Choice (Core)

May/June 2021

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.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

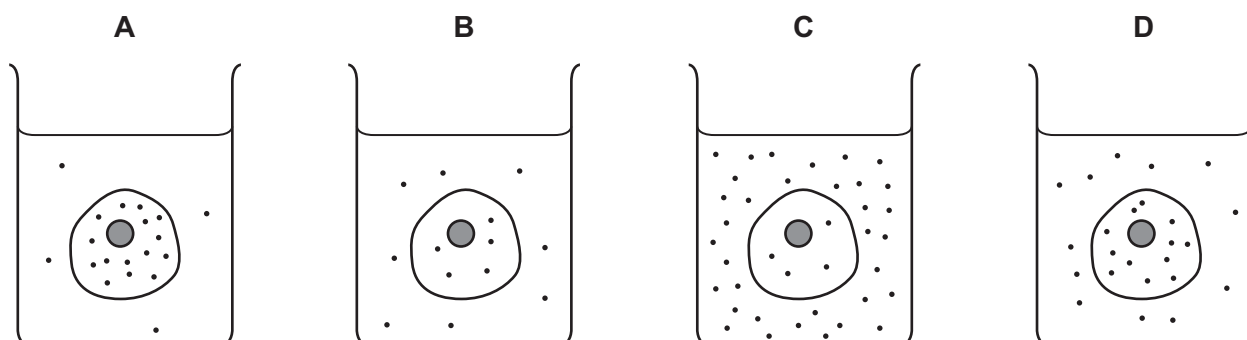
This document has **20** pages. Any blank pages are indicated.



- 1 The diagrams represent four similar animal cells immersed in blood plasma.

The black dots represent molecules of dissolved oxygen.

Which cell will have oxygen molecules diffusing into it most rapidly?



- 2 The table shows the results of some food tests carried out on one sample of food.

food test reagent	colour at start of test	colour at end of test
Benedict's solution	blue	blue
biuret reagent	blue	purple
iodine solution	brown	blue / black

Which nutrients does the food sample contain?

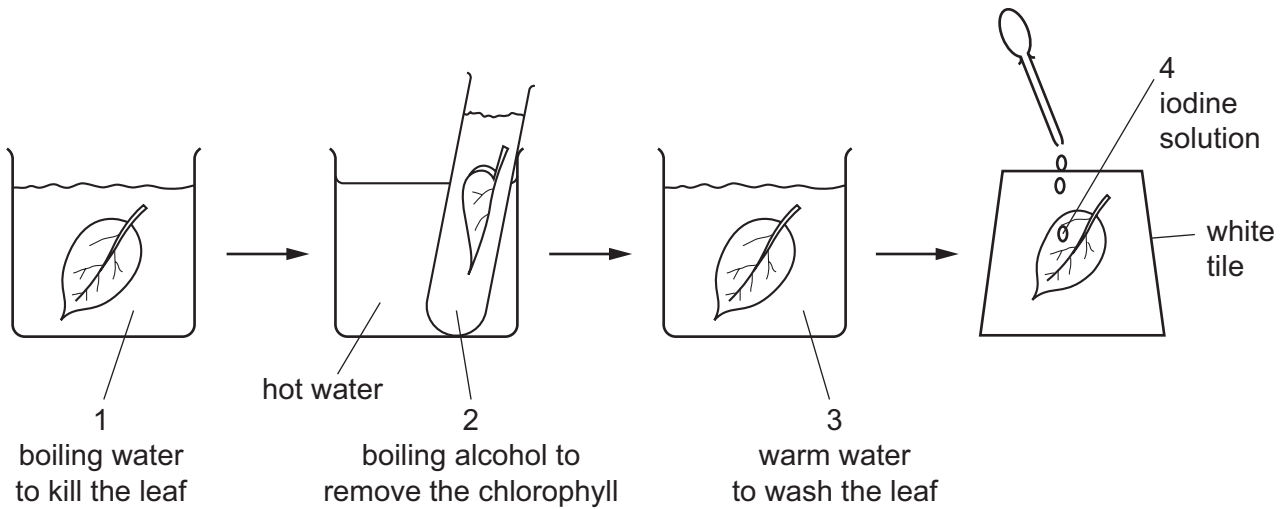
- A** protein and starch
- B** protein and reducing sugar
- C** starch only
- D** starch and reducing sugar

- 3 Which row describes an enzyme?

	type of molecule	function
A	carbohydrate	speeds up a reaction and is used up in the process
B	carbohydrate	speeds up a reaction and is not used up in the process
C	protein	speeds up a reaction and is used up in the process
D	protein	speeds up a reaction and is not used up in the process

4 The flow diagram shows the stages in testing a green leaf for starch.

1, 2, 3 and 4 are all liquids.



What are the colours of liquids 2 and 4 for a leaf that contains starch?

	2	4
A	green	blue / black
B	colourless	brown
C	colourless	blue / black
D	green	brown

5 Most food molecules need to be digested to allow them to be absorbed into the blood.

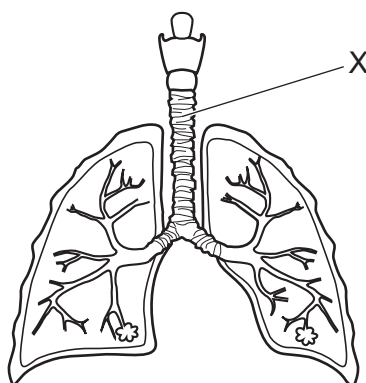
Which row shows the type of digestion and the change needed to allow absorption to happen?

	type of digestion	change to food molecules
A	chemical	large molecules to small, insoluble molecules
B	chemical	large molecules to small, soluble molecules
C	mechanical	large molecules to small, soluble molecules
D	mechanical	large molecules to small, insoluble molecules

6 Which conditions cause the lowest rate of transpiration?

	humidity	temperature
A	high	high
B	high	low
C	low	high
D	low	low

7 The diagram shows the human gas exchange system.



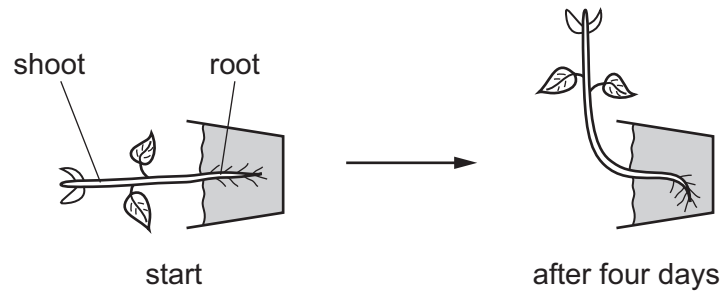
What is the part labelled X?

- A** alveolus
- B** bronchus
- C** larynx
- D** trachea

8 Which equation represents aerobic respiration?

- A** carbon dioxide + glucose $\rightarrow$ oxygen + water
- B** carbon dioxide + water $\rightarrow$ glucose + oxygen
- C** glucose + oxygen $\rightarrow$ carbon dioxide + water
- D** glucose + water $\rightarrow$ carbon dioxide + oxygen

- 9 A plant in a pot was placed on its side for four days.



Which row describes the gravitropic response in the root and shoot?

	root	shoot
A	positive	negative
B	negative	positive
C	negative	negative
D	positive	positive

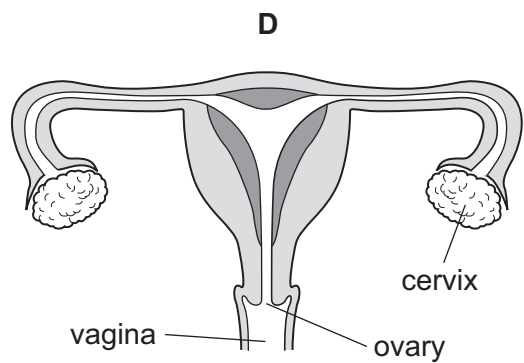
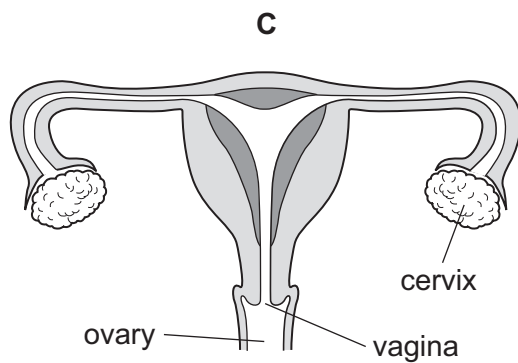
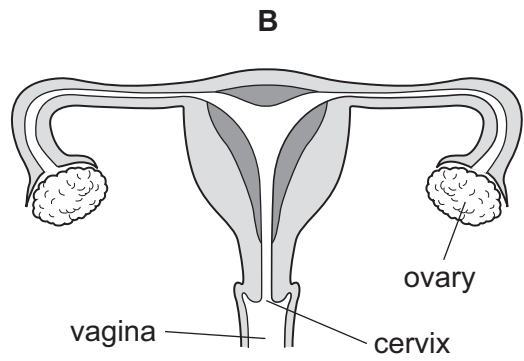
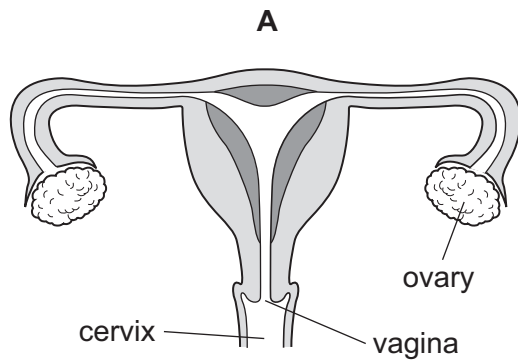
- 10 During human reproduction an egg fuses with a sperm.

Sometimes the zygote splits into two and produces twins.

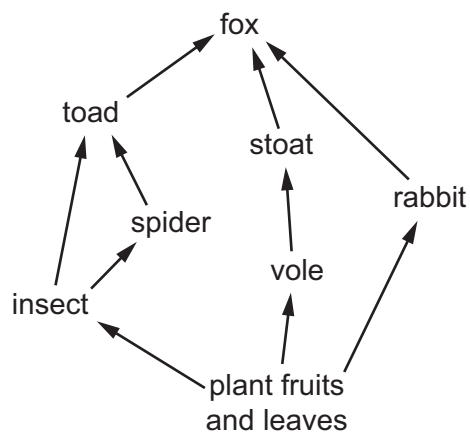
Which row describes the formation of these twins?

	original zygote produced by	twins
A	asexual reproduction	genetically identical
B	sexual reproduction	genetically identical
C	asexual reproduction	genetically different
D	sexual reproduction	genetically different

11 Which diagram of the female reproductive system is correctly labelled?



12 The diagram shows a food web.



Which two organisms are both secondary consumers?

- A** insect and spider
- B** insect and toad
- C** rabbit and stoat
- D** spider and toad

13 Which process takes carbon dioxide out of the air?

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

14 The melting point and boiling point of oxygen and nitrogen are shown.

	melting point /°C	boiling point /°C
oxygen	–219	–183
nitrogen	–210	–196

A sealed flask contains a mixture of oxygen and nitrogen.

Which diagram shows the arrangement of oxygen and nitrogen particles at –190 °C?

A

B

C

D

key

● = nitrogen molecules

○ = oxygen molecules

15 What is an example of a physical change?

- A carbon dioxide turning limewater milky
- B the crystallisation of copper(II) sulfate from solution
- C the electrolysis of molten lead(II) bromide
- D the thermal decomposition of calcium carbonate

16 Water has the chemical formula H_2O .

Which statement is correct?

- A Pure water is a mixture because it contains hydrogen and oxygen.
- B Pure water is an element because it contains only one type of molecule.
- C Salt water is a compound because it contains salt and water.
- D Salt water is a mixture because it contains salt and water.

- 17 What are the products of the electrolysis of concentrated aqueous sodium chloride using inert electrodes?

	anode	cathode
A	chlorine	hydrogen
B	chlorine	sodium
C	oxygen	hydrogen
D	oxygen	sodium

- 18 Some calcium carbonate and dilute hydrochloric acid start to react. Water is then added to the reaction mixture.

What happens to the rate of the reaction?

- A** It decreases.
- B** It increases.
- C** It stays the same.
- D** It stops.

- 19 In six separate experiments, dilute sulfuric acid is added separately to the substances listed.

- magnesium
- magnesium oxide
- magnesium carbonate
- copper
- copper oxide
- copper carbonate

How many of these experiments produce a gas?

- A** 2 **B** 3 **C** 4 **D** 5

- 20 Which two substances form a white precipitate when they are mixed?

- A** barium chloride and hydrochloric acid
- B** barium chloride and nitric acid
- C** silver nitrate and hydrochloric acid
- D** silver nitrate and nitric acid

21 How does the character of the elements change across a period of the Periodic Table from left to right?

- A** acidic to basic
- B** basic to acidic
- C** metallic to non-metallic
- D** non-metallic to metallic

22 Ruthenium is a transition element.

Which row describes ruthenium?

	forms coloured compounds	can be used as a catalyst	
A	X	X	key
B	X	✓	✓ = yes
C	✓	X	X = no
D	✓	✓	

23 Which words describe a noble gas?

- A** compound, colourless, does not burn in air
- B** element, colourless, burns in air
- C** element, colourless, does not burn in air
- D** element, green, does not burn in air

24 A steam boiler is a container in which water is converted into steam.

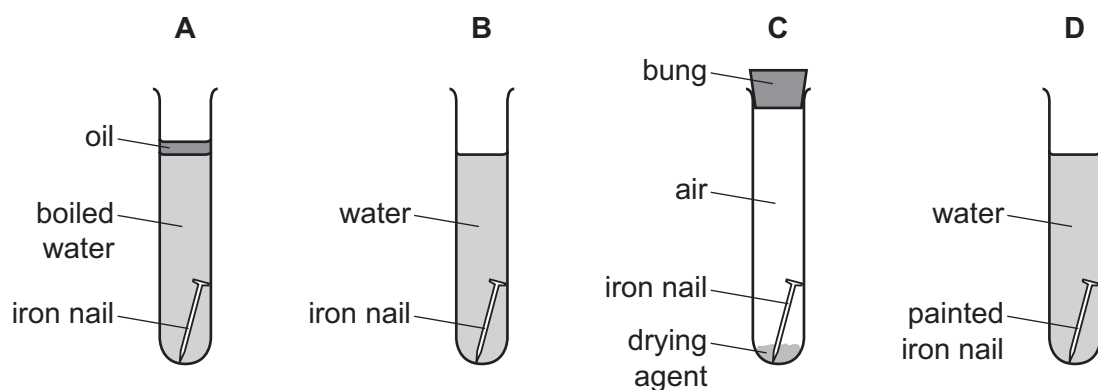
The steam is used to turn turbines which generate electricity.

Which metal can be used to make a steam boiler?

- A** calcium
- B** copper
- C** magnesium
- D** zinc

25 An experiment is set up to investigate the rusting of iron nails.

In which test-tube does the iron nail **not** rust because a barrier method of rust prevention is used?



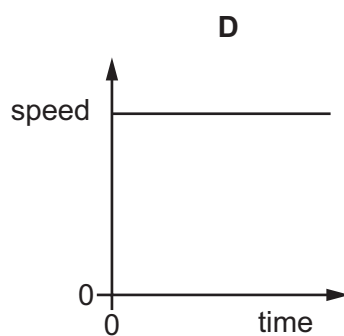
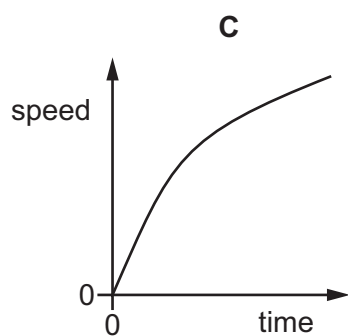
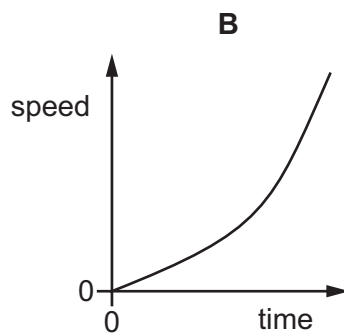
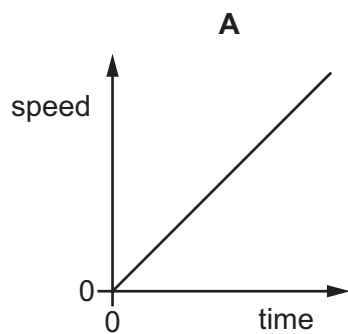
26 Which type of compound contains only carbon and hydrogen?

- A** carbohydrate
- B** carbonate
- C** hydrocarbon
- D** hydroxide

27 Which substance turns aqueous bromine colourless?

- A** an alkane
- B** an alkene
- C** a saturated hydrocarbon
- D** poly(ethene)

28 Which speed–time graph represents an object that is moving with constant speed?

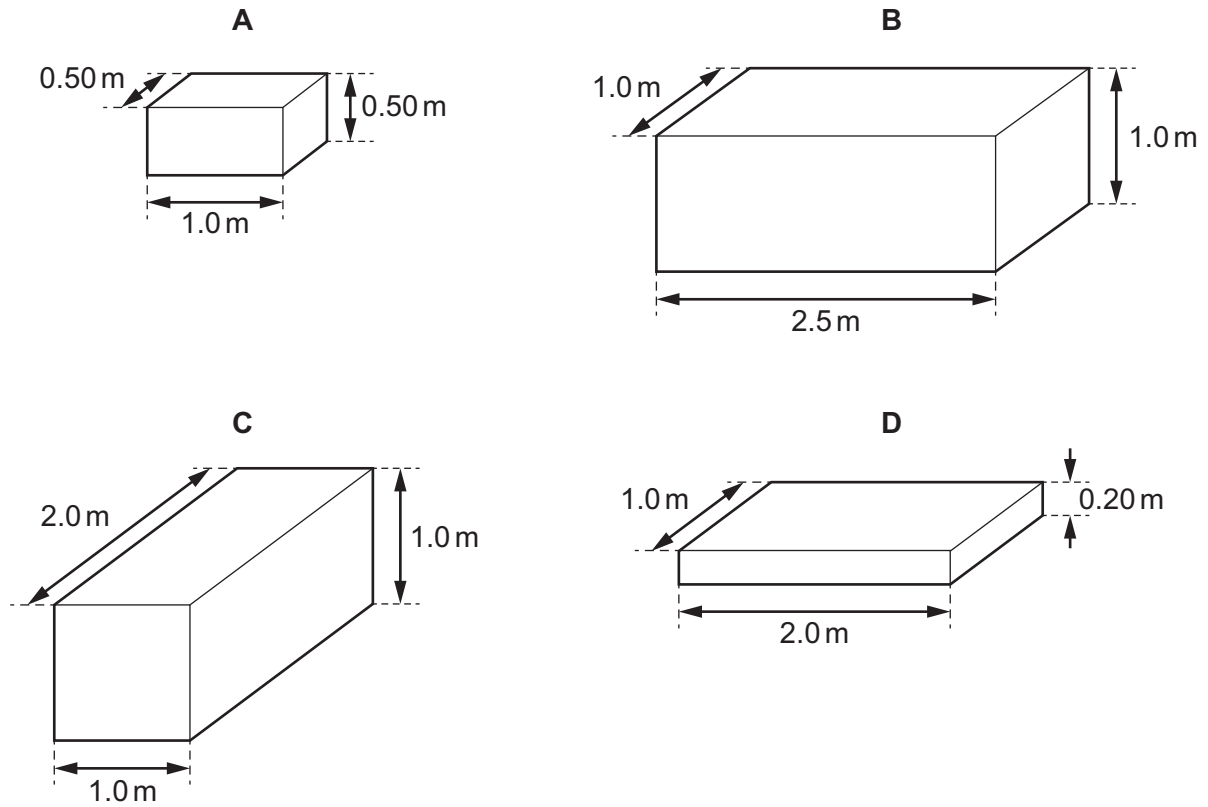


29 The diagrams show four solid blocks that each have a mass of 15 800 kg.

The dimensions of each block are shown.

Iron has a density of 7900 kg/m^3 .

Which block is made of iron?



30 Which change **cannot** be caused by a force acting on an object?

- A change of mass
- B change of motion
- C change of shape
- D change of size

31 An object is lifted vertically upwards.

Which change results in the same quantity of work being done?

- A** lifting a heavier object through a greater distance in the same time
- B** lifting a lighter object through the same distance in a smaller time
- C** lifting the same object through a greater distance in the same time
- D** lifting the same object through the same distance in a greater time

32 Which source of energy is non-renewable?

- A** chemical energy stored in fossil fuels
- B** energy stored in waves
- C** energy stored in water behind a hydroelectric dam
- D** wind energy

33 Cold water evaporates as molecules leave it.

Which molecules leave the water and from which part of the water do they leave?

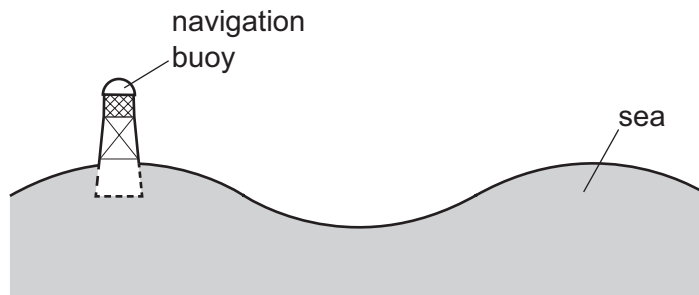
	molecules that leave the water	where they leave from
A	least energetic	the surface only
B	least energetic	throughout the water
C	most energetic	the surface only
D	most energetic	throughout the water

34 Energy is transferred from the Sun to the Earth through the vacuum of space.

Which method of energy transfer is involved?

- A** conduction
- B** convection
- C** evaporation
- D** radiation

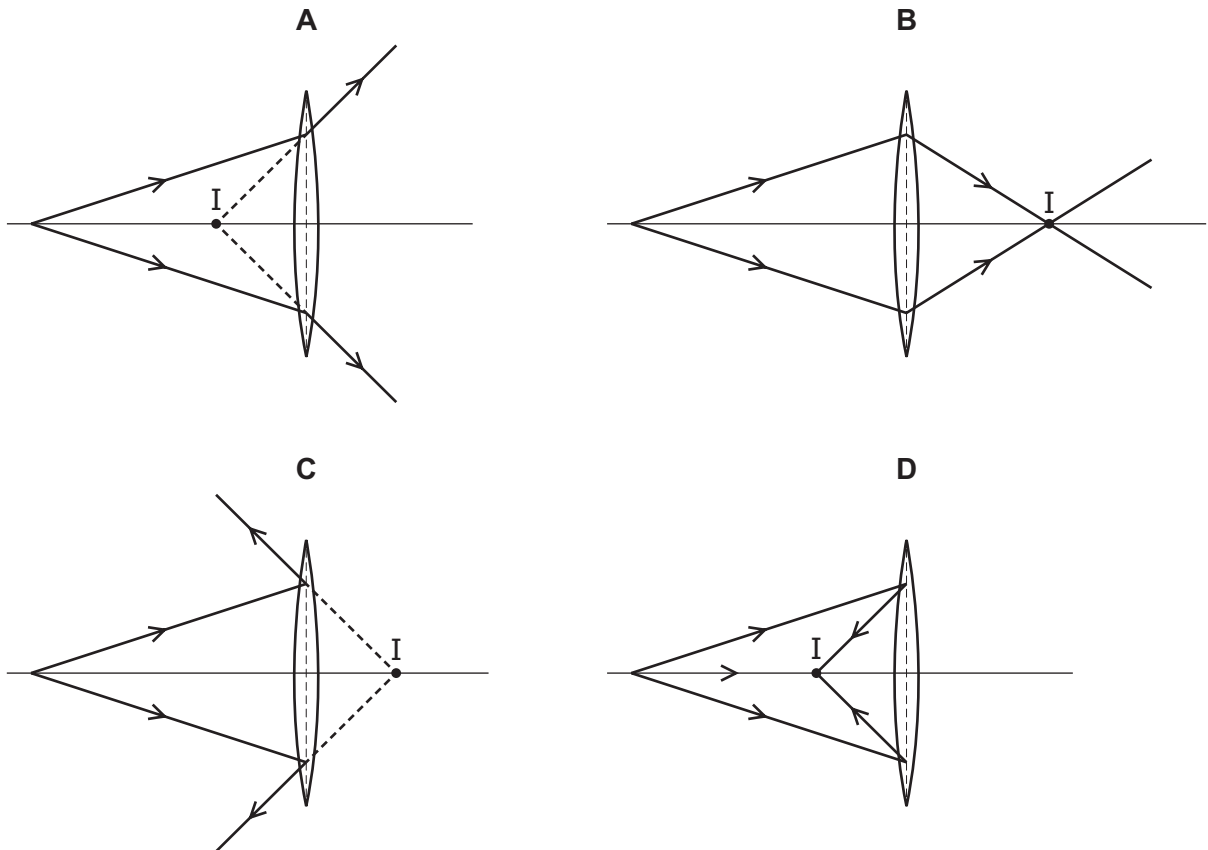
- 35 A navigation buoy floating on the sea oscillates up and down as a wave passes.



In 2.0 minutes, 6.0 wavelengths pass the buoy.

What is the frequency of the waves?

- A** 0.050 Hz **B** 0.33 Hz **C** 3.0 Hz **D** 20 Hz
- 36 Which diagram shows how a converging lens forms a real image at the point labelled I?

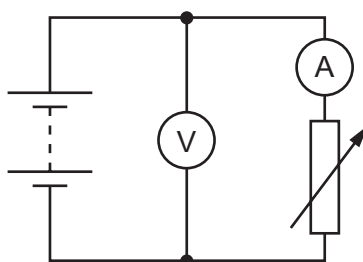


37 There is a current in a solid metal wire.

Which particles flow through the wire, and which instrument is used to measure a current?

	particles	instrument
A	electrons	ammeter
B	electrons	voltmeter
C	ions	ammeter
D	ions	voltmeter

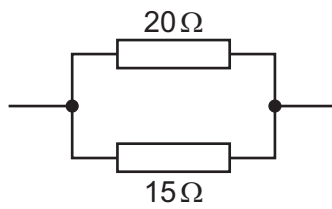
38 The diagram represents a circuit that includes a battery, an ammeter, a voltmeter and a variable resistor.



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

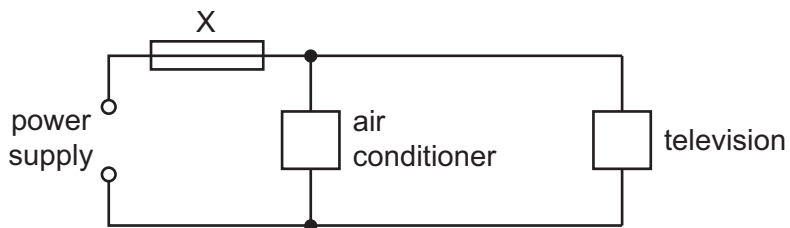
	ammeter reading	voltmeter reading
A	decreases	decreases
B	decreases	stays constant
C	increases	decreases
D	increases	stays constant

- 39 A $20\ \Omega$ resistor and a $15\ \Omega$ resistor are connected in parallel.



What is the combined resistance of the two resistors?

- A less than $15\ \Omega$
 - B between $15\ \Omega$ and $20\ \Omega$
 - C $35\ \Omega$
 - D greater than $35\ \Omega$
- 40 An air conditioner and a television are both connected to the same electrical circuit.



The current in the air conditioner is $9.0\ \text{A}$ and the current in the television is $2.0\ \text{A}$.

Several different fuses are available.

Which fuse should be connected at X?

- A 1 A
- B 3 A
- C 7 A
- D 13 A

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The Periodic Table of Elements

Group																	
I	II	1 H hydrogen 1										III	IV	V	VI	VII	VIII
3 Li lithium 7	4 Be beryllium 9	Key atomic number atomic symbol name relative atomic mass										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											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	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 —
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	114 Fl flerovium —	116 Lv livermorium —				

lanthanoids

actinoids

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
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.).