Cambridge Assessment International Education

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.

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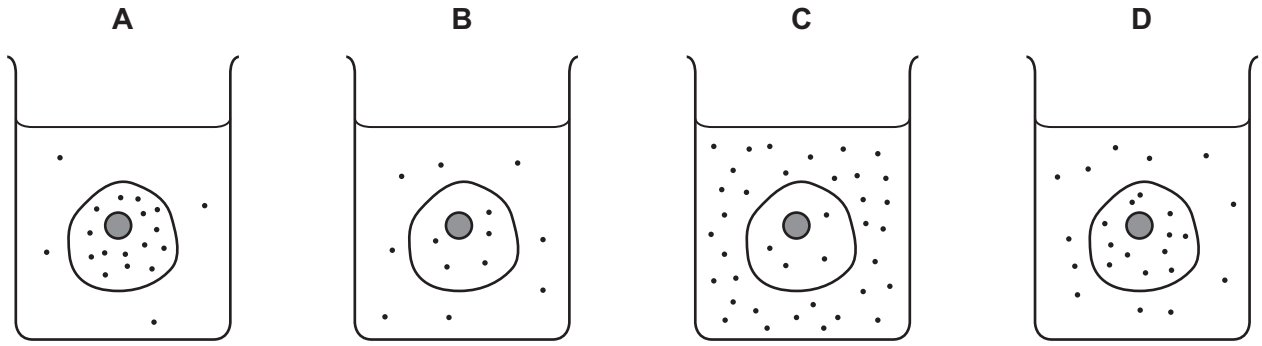
[Turn over

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

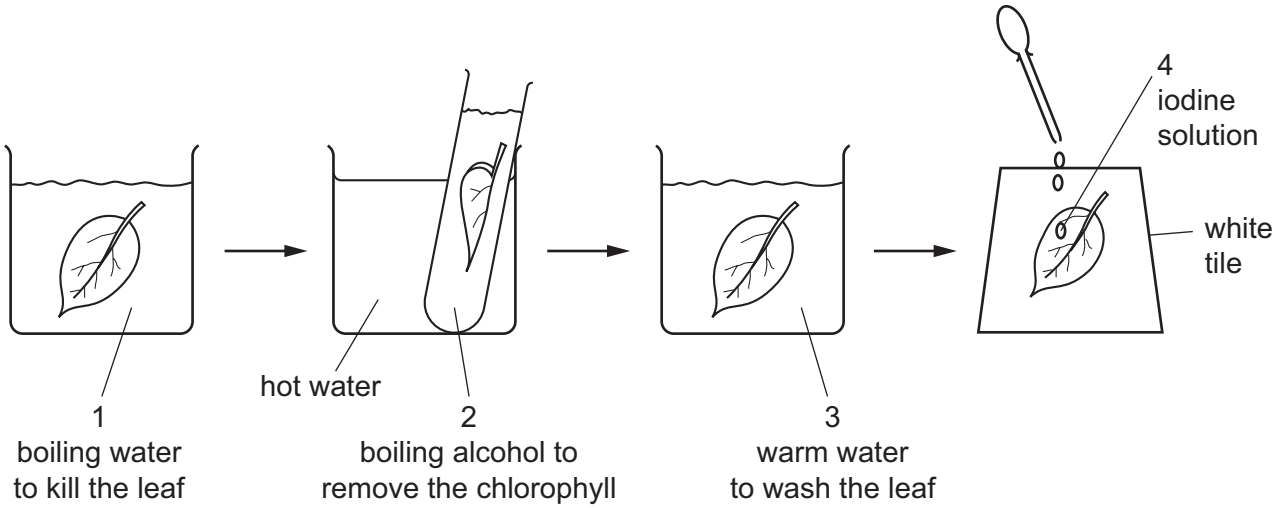
D starch and reducing sugar

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?

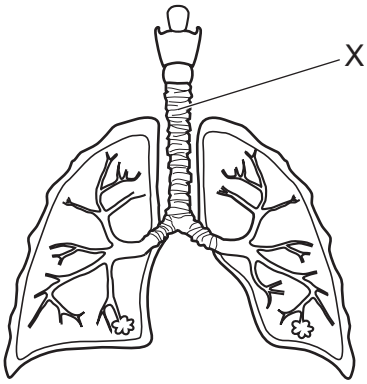
	type of digestion	change to food molecules
A	chemical	large molecules to small, insoluble molecules
B	chemical	large molecules to small, soluble molecules
C	mechanical	large molecules to small, soluble molecules
D	mechanical	large molecules to small, insoluble molecules

[Turn over

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?

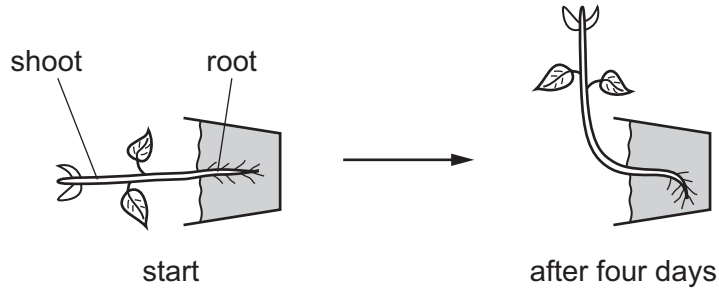
A carbon dioxide + glucose → oxygen + water

B carbon dioxide + water → glucose + oxygen

C glucose + oxygen → carbon dioxide + water

D glucose + water → 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.

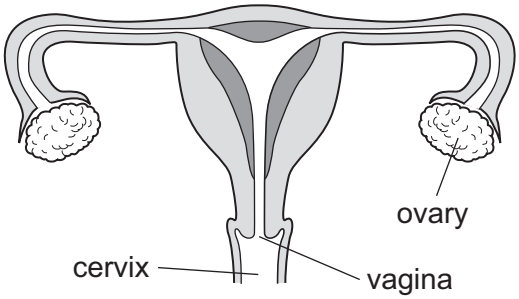
Which row describes the formation of these twins?

	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

[Turn over

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

A



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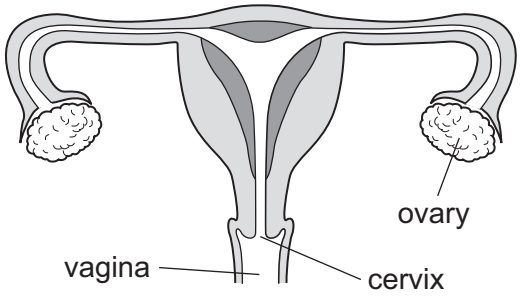

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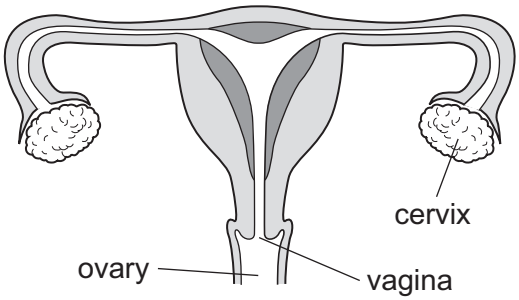

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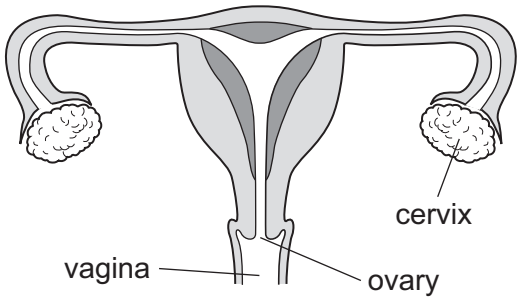
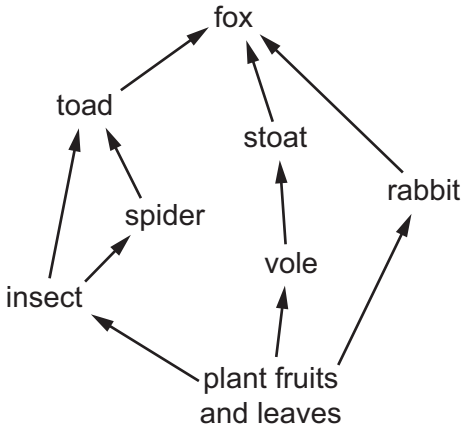


12 The diagram shows a food web.



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

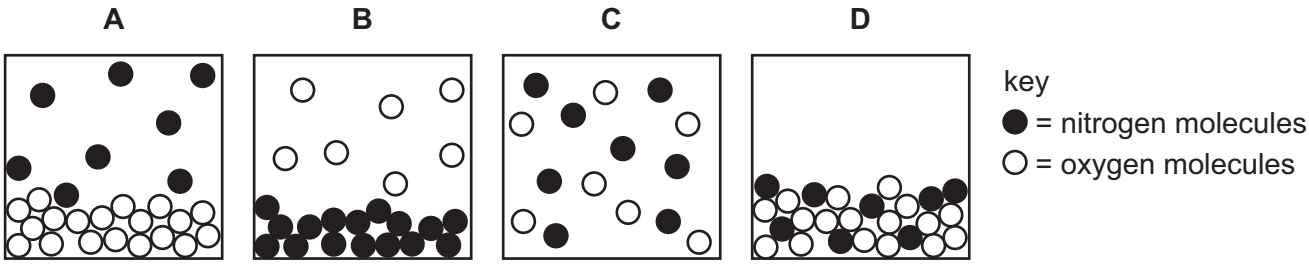
D plant respiration

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?



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.

[Turn over

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	✗	✗
B	✗	✓
C	✓	✗
D	✓	✓

key

✓ = yes

✗ = no

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

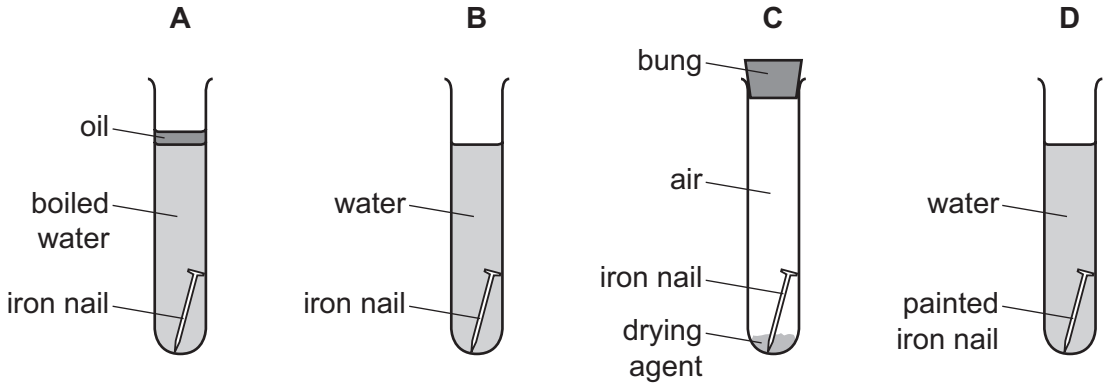
C magnesium

D zinc

[Turn over

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

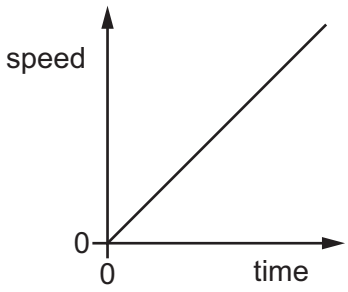
B an alkene

C a saturated hydrocarbon

D poly(ethene)

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

A



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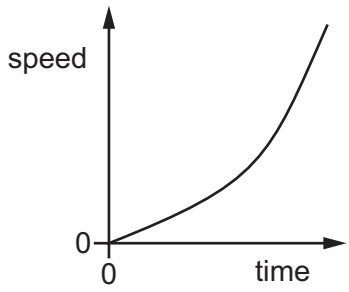

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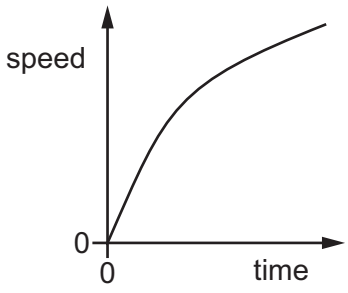

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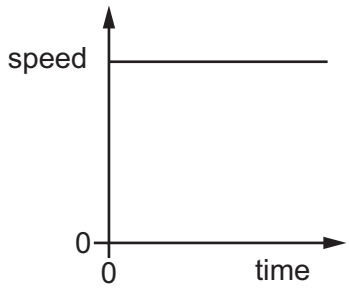


[Turn over

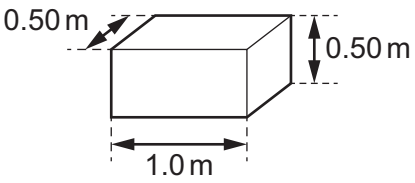
29 The diagrams show four solid blocks that each have a mass of 15 800 kg.

The dimensions of each block are shown.

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

Which block is made of iron?

A



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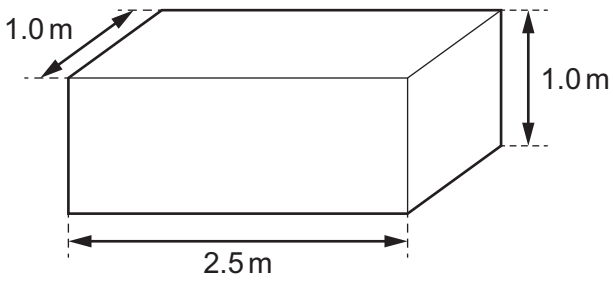

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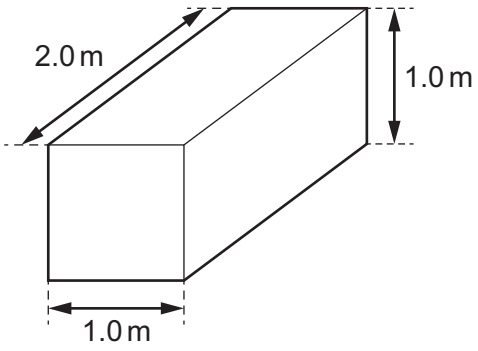

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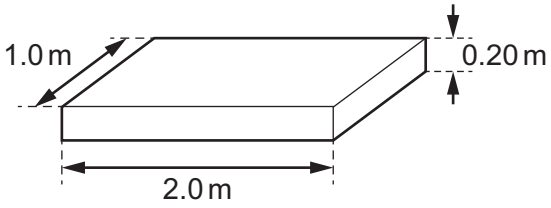


30 Which change **cannot** be caused by a force acting on an object?

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

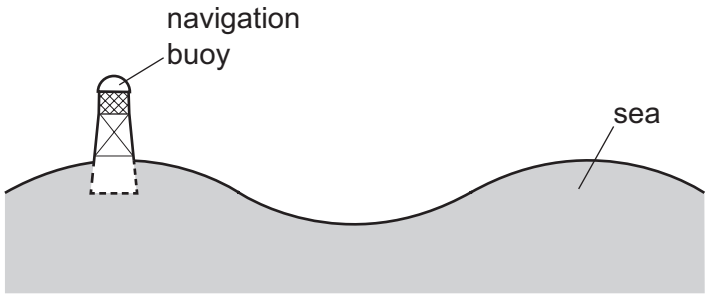
B convection

C evaporation

D radiation

[Turn over

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



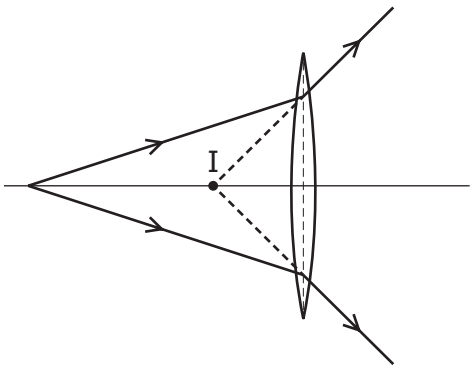
In 2.0 minutes, 6.0 wavelengths pass the buoy.

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?

A



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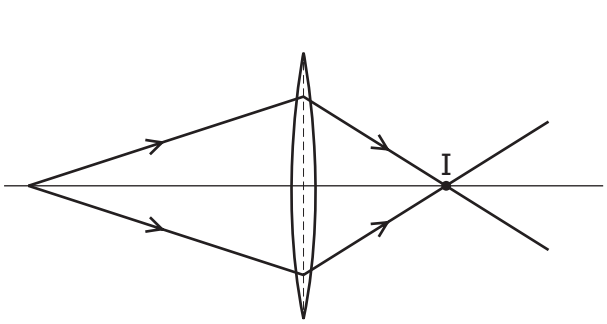

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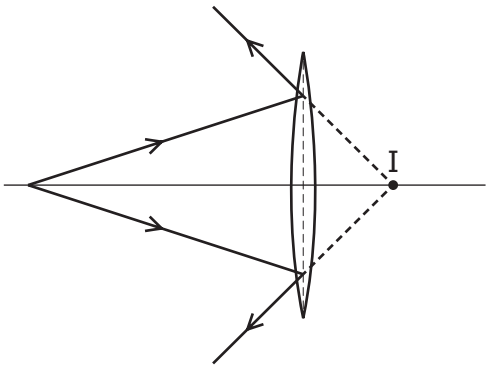

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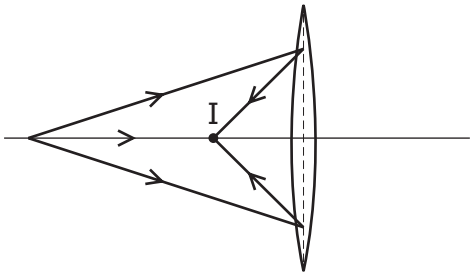
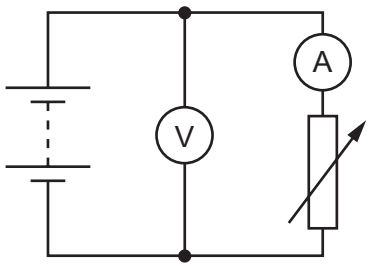


37 There is a current in a solid metal wire.

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.

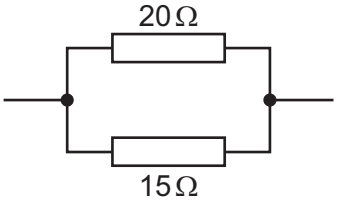


What happens to the readings on the meters as the resistance of the variable resistor is increased?

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

[Turn over

39 A 20 Ω resistor and a 15 Ω resistor are connected in parallel.



What is the combined resistance of the two resistors?

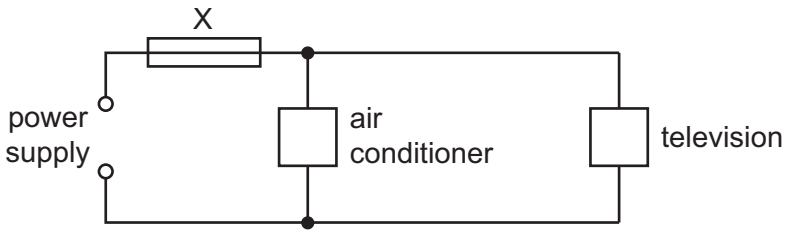
A less than 15 Ω

B between 15 Ω and 20 Ω

C 35 Ω

D greater than 35 Ω

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
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											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	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 –		

Key

atomic number
atomic symbol
name
relative atomic mass

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 dm^3 at room temperature and pressure (r.t.p.).