Cambridge Assessment International Education

Cambridge O Level

COMBINED SCIENCE **5129/12**

Paper 1 Multiple Choice **October/November 2022**

1 hour

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

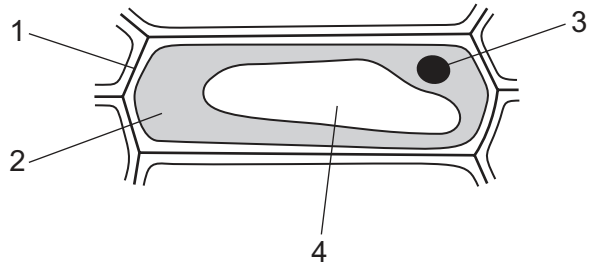
- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the 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.

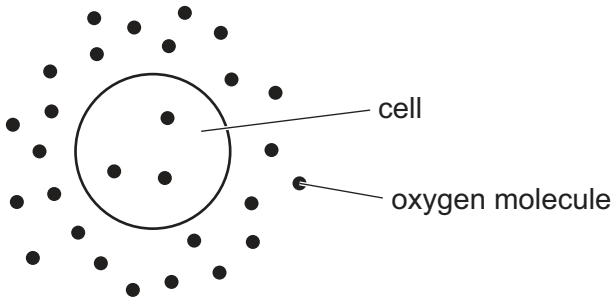
1 The diagram shows a plant cell.



Which structures are **not** found in a typical animal cell?

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

2 The diagram represents oxygen molecules around and inside a cell.



Which statement explains why oxygen molecules move into the cell?

A The oxygen molecules move from a high to a low concentration by diffusion.

B The oxygen molecules move from a high to a low concentration by osmosis.

C The oxygen molecules move from a low to a high concentration by diffusion.

D The oxygen molecules move from a low to a high concentration by osmosis.

3 Which statement about the enzymes used in the human alimentary canal is correct?

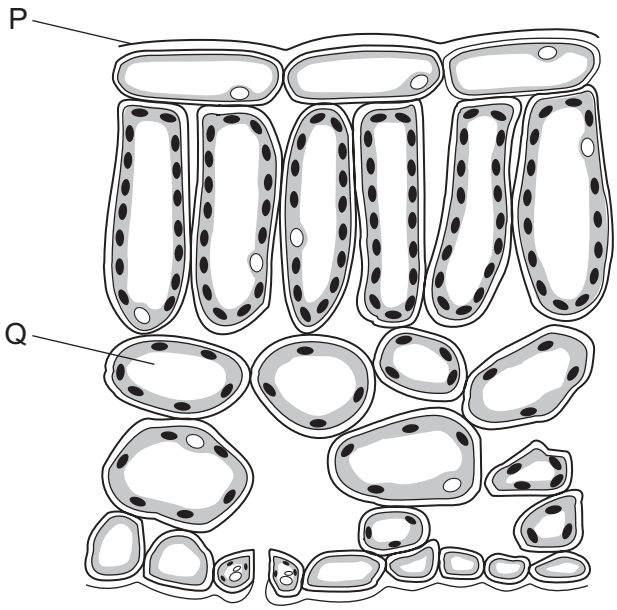
A They work best at very high temperatures.

B They are made of carbohydrate.

C They increase the rate of reactions.

D They work best at pH 1.

4 The diagram shows a cross-section of a leaf.



Which row identifies P and Q?

	P	Q
A	cuticle	stomata
B	cuticle	mesophyll cell
C	stomata	cuticle
D	stomata	mesophyll cell

5 Where does most absorption of the soluble products of digestion take place?

A from the large intestine into the capillaries

B from the large intestine into the veins

C from the small intestine into the capillaries

D from the small intestine into the veins

6 Which row correctly identifies a process occurring in the vascular bundle?

	tissue in which process occur	name of process	result of process
A	phloem	translocation	sugars moved
B	phloem	transpiration	water lost from stomata
C	xylem	translocation	water lost from stomata
D	xylem	transpiration	sugars moved

7 Which statements about white blood cells are correct?

1 They clot wounds.

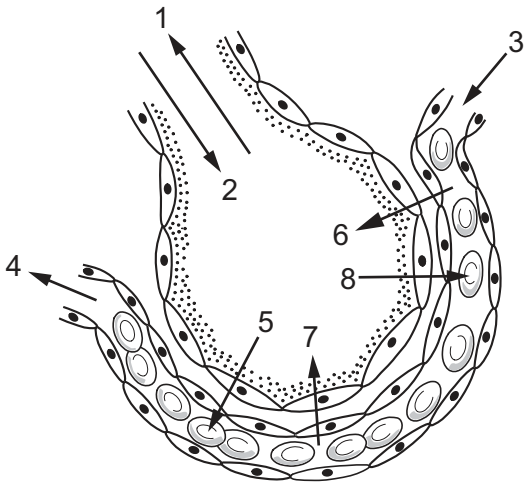
2 They engulf bacteria by phagocytosis.

3 They produce antibodies.

4 They transport urea.

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

8 The diagram shows one alveolus and its associated capillary.



Which arrows show the direction that gases move across the surface of the alveolus?

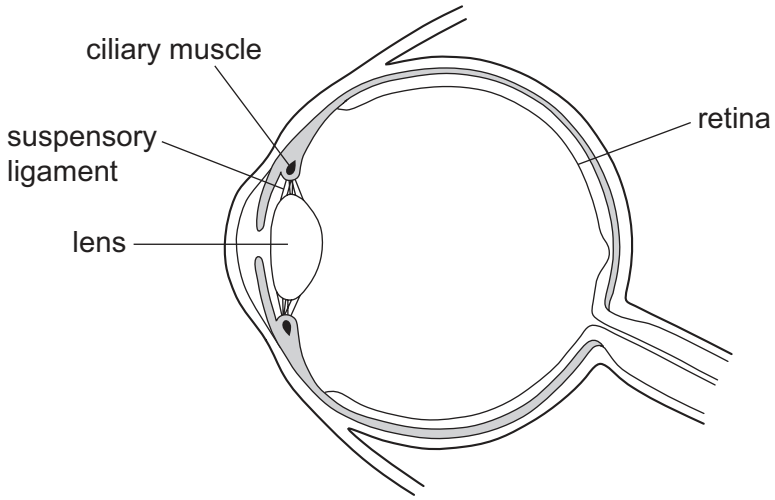
	oxygen	carbon dioxide
A	1 and 5	4 and 8
B	2 and 7	3 and 6
C	4 and 6	2 and 3
D	5 and 8	6 and 7

9 The blood leaving the kidney has a different composition to the blood flowing into the kidney.

Which row describes the composition of the blood leaving the kidney compared to the composition of the blood entering the kidney?

	carbon dioxide	urea
A	higher	higher
B	higher	lower
C	lower	higher
D	lower	lower

10 The diagram shows a section through the eye.



Which row describes different components of the eye when it is focused on a distant object?

	ciliary muscles	suspensory ligaments	lens shape
A	contracted	slack	fat
B	contracted	slack	thin
C	relaxed	stretched	fat
D	relaxed	stretched	thin

11 What can be the effect of the excessive consumption of alcohol?

A improved self-control

B quicker reaction time

C reduced chance of contracting HIV

D severe withdrawal symptoms

12 Which term is used to describe organisms that breakdown waste matter?

A carnivores

B consumers

C decomposers

D producers

[Turn over

13 Which method of birth control can also reduce the risk of spreading gonorrhoea?

A chemical

B hormonal

C mechanical

D surgical

14 Excess magnesium is added to dilute sulfuric acid.

Which method is used to remove the unreacted magnesium from the magnesium sulfate solution?

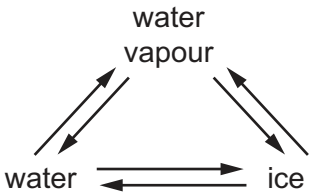
A boiling

B crystallisation

C distillation

D filtration

15 In which change of state do water molecules lose energy?



A ice → water

B ice → water vapour

C water vapour → ice

D water → water vapour

16 A proton has a relative mass of 1 and a relative charge of +1.

What are the relative mass and relative charge of an electron?

	relative mass	relative charge
A	0.0005	–1
B	0.0005	0
C	1	–1
D	1	0

17 Magnesium chloride, $MgCl_2$, is an ionic compound.

Which statement describes the formation of the ionic bonds in this compound?

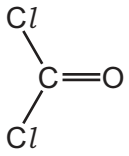
A A magnesium atom gains two electrons and two chlorine atoms each gain an electron.

B A magnesium atom gains two electrons and two chlorine atoms each lose an electron.

C A magnesium atom loses two electrons and two chlorine atoms each gain an electron.

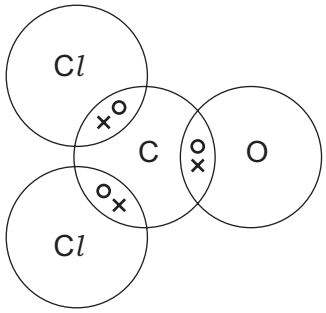
D A magnesium atom loses two electrons and two chlorine atoms each lose an electron.

18 The diagram shows the structure of carbonyl dichloride (phosgene).



Which dot-and-cross diagram shows the arrangement of the outer electrons in a molecule of carbonyl dichloride?

A



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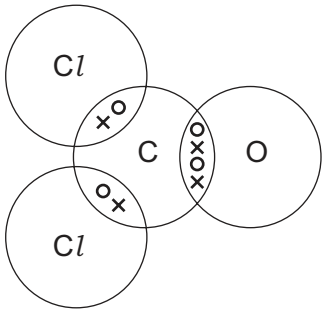

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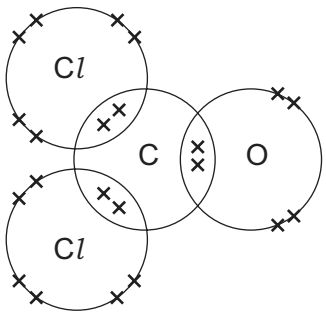

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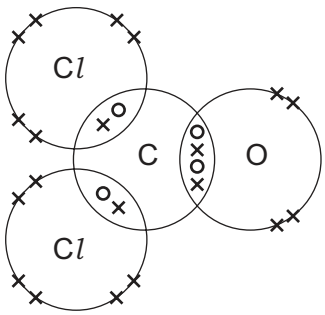
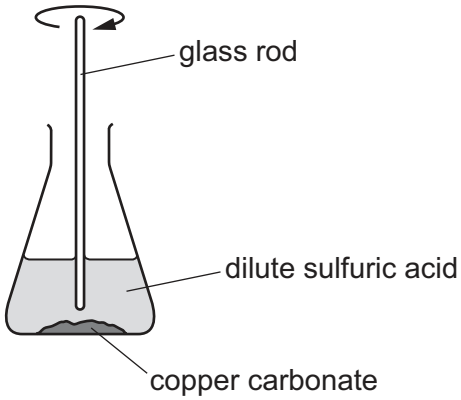


19 Sodium hydrogenphosphate has the formula Na_2HPO_4.

What is the formula of the hydrogenphosphate ion?

A HPO_4^- **B** HPO_4^{2-} **C** HPO_4^{3-} **D** HPO_4^{4-}

20 Copper sulfate can be made by reacting excess copper carbonate with dilute sulfuric acid.



What shows that all the sulfuric acid has reacted?

A No solid copper carbonate is left.

B No more carbon dioxide is given off.

C Solid copper sulfate is formed.

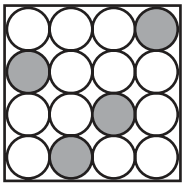
D The temperature drops.

21 Which row describes the atomic structure of elements in the same group of the Periodic Table?

	number of electron shells	number of electrons in the outer shell
A	different	different
B	different	same
C	same	different
D	same	same

22 Which diagram represents the structure of brass?

A



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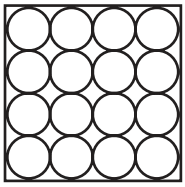

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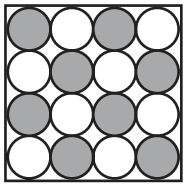

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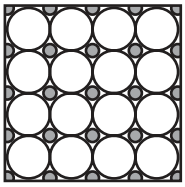


23 Which metal resists corrosion due to the presence of an oxide layer?

A A*l* **B** Ca **C** Cu **D** Fe

24 Which statement about the gases in air is correct?

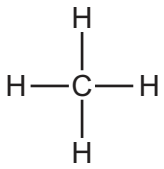
A Carbon monoxide is a poisonous pollutant formed by complete combustion of methane.

B Nitrogen causes acid rain and is formed by respiration.

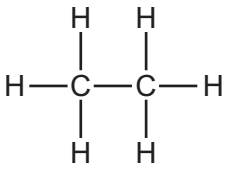
C Oxygen makes up 21% of clean air and is formed when iron rusts.

D Argon is not a pollutant and it is the most abundant noble gas in air.

25 The names and molecular structures of two alkanes are shown.



methane



ethane

What is the next alkane in the homologous series?

	name	formula
A	propene	C_3H_6
B	propene	C_3H_8
C	propane	C_3H_6
D	propane	C_3H_8

26 Petroleum is a mixture of hydrocarbons and is separated into fractions by fractional distillation.

Which statements about the fractions are correct?

1 Fractions that contain large hydrocarbon molecules have low boiling points and are not very flammable.

2 Fractions that contain large hydrocarbon molecules are cracked into smaller size alkene molecules used to make polymers.

3 Fractions that contain large hydrocarbon molecules have high boiling points and are very flammable.

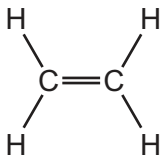
4 Fractions that contain large hydrocarbon molecules are used to make lubricants, waxes and polishes.

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

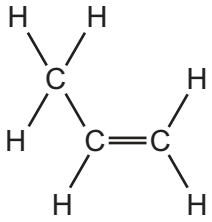
27 Ethane gas is heated to produce hydrogen gas and another gas, Y, which decolourises aqueous bromine.

What is the structural formula of Y?

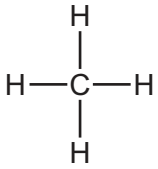
A



B



C



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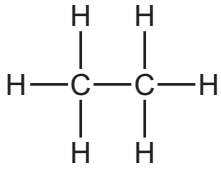
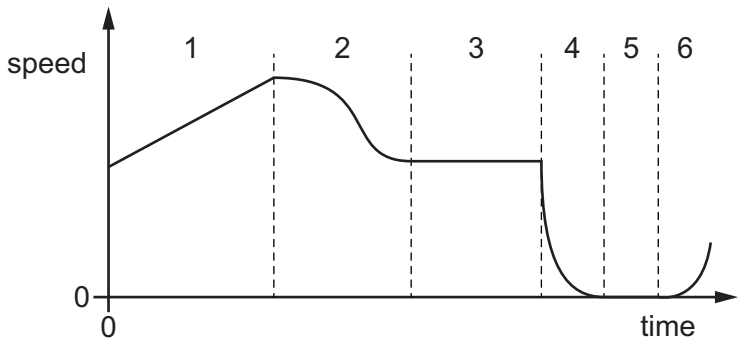


28 The speed–time graph represents a journey made by a car.



Which row correctly identifies parts of the journey?

	the car is at rest	the car is moving with constant acceleration	the car is moving with constant speed
A	3	2	4
B	3	1	5
C	5	6	1
D	5	1	3

29 Which statement about mass and weight is correct?

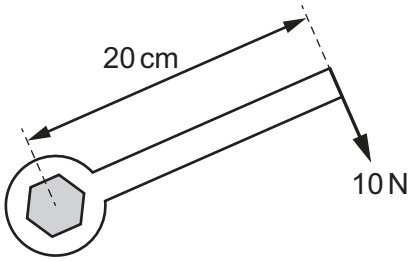
A A mass of 1 kg has a weight of 10 N everywhere.

B Mass can be measured in kilograms or newtons.

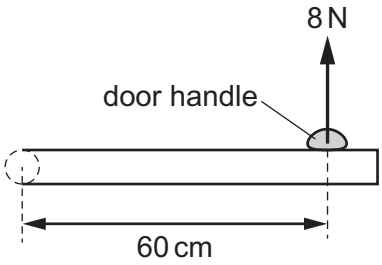
C The mass of an object depends on the effect of a gravitational field acting on it.

D Weight is a force with size and direction.

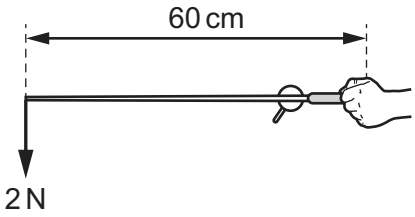
30 The diagrams show objects that have different forces applied to them to cause a moment.



spanner



door

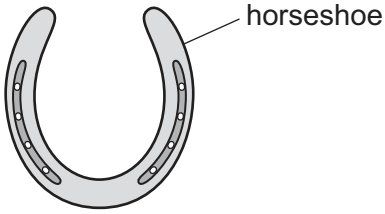


fishing rod

What is the correct order for the size of the moment produced by each force?

	smallest moment →		largest moment
A	door	fishing rod	spanner
B	door	spanner	fishing rod
C	fishing rod	door	spanner
D	fishing rod	spanner	door

31 A horseshoe can be made from a piece of metal by first heating it and then hitting it with a hammer to apply a force.



Which property of the metal changes during the hammering action?

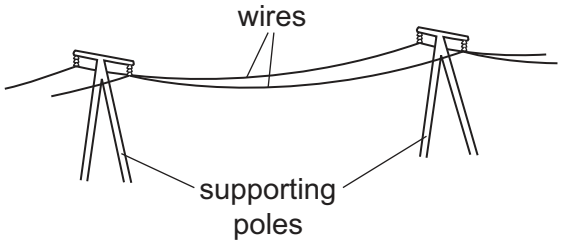
A density

B mass

C shape

D volume

32 Telephone wires are designed so that they hang loosely from their supporting poles most of the time.



What is the reason for this?

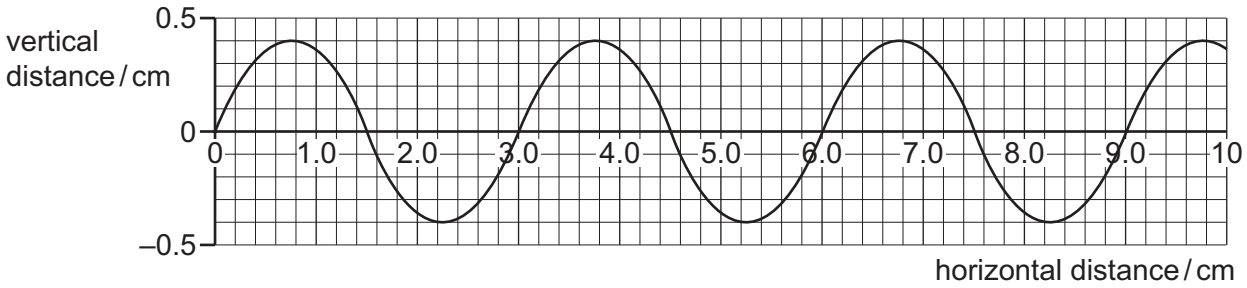
A to allow for contraction on a hot summer day

B to allow for contraction on a cold winter night

C to allow for expansion on a hot summer day

D to allow for expansion on a cold winter night

33 The diagram shows a graph of a wave.

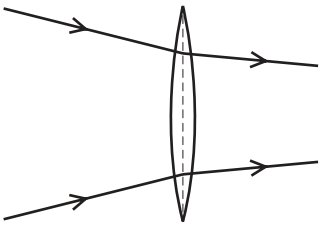


Which row gives the wavelength and amplitude of this wave?

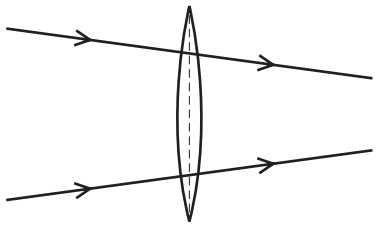
	wavelength / cm	amplitude / cm
A	1.5	0.4
B	1.5	0.8
C	3.0	0.4
D	3.0	0.8

34 Which diagram shows the action of a thin converging lens on light?

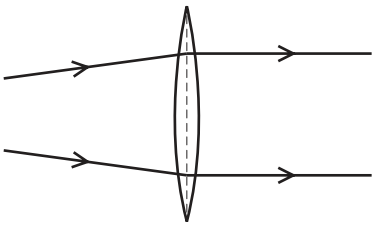
A



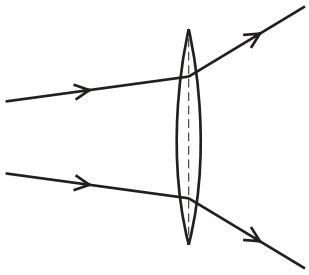
B



C



D



35 Which statement about electrostatic charges is correct?

A Negative charges repel negative charges.

B Positive charges attract positive charges.

C Positive charges repel and negative charges attract.

D The flow of charge is measured in volts.

36 A current of 1.25 A flows through an ammeter for 20 seconds.

Which statement is correct?

A 0.0625 coulombs of charge flow through the ammeter.

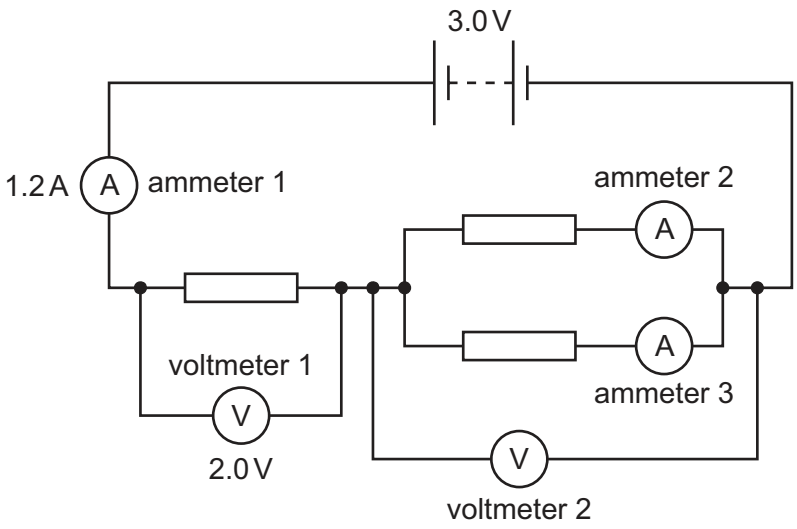
B 0.0625 joules of energy is transferred electrically in the ammeter.

C 25 coulombs of charge flow through the ammeter.

D 25 joules of energy is transferred electrically in the ammeter.

[Turn over

37 The diagram shows three identical resistors connected to a battery, together with some voltmeters and ammeters.

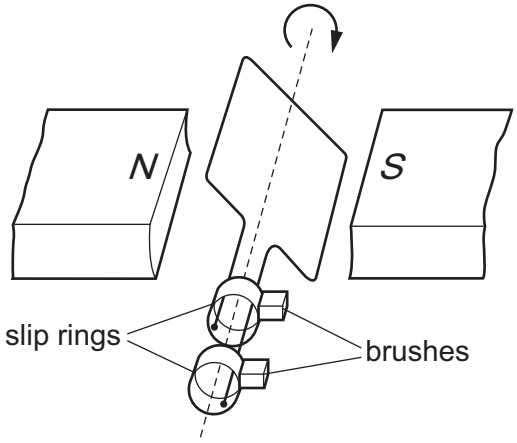


The reading on ammeter 1 is 1.2 A and the reading on voltmeter 1 is 2.0 V.

Which row shows the readings on voltmeter 2 and ammeter 2?

	reading on voltmeter 2 / V	reading on ammeter 2 / A
A	0.5	0.6
B	0.5	1.2
C	1.0	0.6
D	1.0	1.2

38 The simple generator shown contains brushes and slip rings.



Which material is used for the brushes and what is the output from the generator?

	brush material	output from the generator
A	carbon	a.c.
B	carbon	d.c.
C	glass	a.c.
D	glass	d.c.

39 An atom of lithium has a nucleon number of 7.

What is found in a nucleus of this atom?

A a total of 7 neutrons and electrons

B a total of 7 neutrons and protons

C a total of 7 neutrons, protons and electrons

D a total of 7 protons and electrons

40 The half-life of uranium-232 is 70 years.

A pure sample has a mass of 160 g.

How many years is it before the mass of uranium-232 in the sample is 20 g?

A 210 years

B 280 years

C 490 years

D 560 years

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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.).