Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/13**

Paper 1 Multiple Choice **May/June 2016**

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.

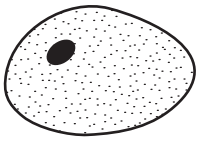
Read the instructions on the Answer Sheet very carefully.

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 16.
Electronic calculators may be used.

1 What are the characteristics of living organisms?

	excretion	growth	movement	nutrition	reproduction	respiration	sensitivity / response
A	✓	✓	✓	✓	✓	✓	✓
B	✓	✓	✗	✓	✓	✓	✓
C	✓	✗	✗	✓	✗	✓	✓
D	✗	✓	✓	✓	✓	✓	✗

2 The diagram shows an animal cell. The maximum diameter of the diagram is 25 mm.



The maximum diameter of the actual cell was 0.02 mm.

What is the magnification of the drawing?

A ×25 **B** ×200 **C** ×1250 **D** ×2500

3 Which statement about diffusion is correct?

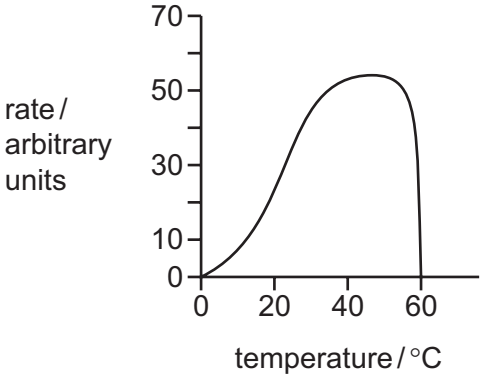
A Diffusion happens only in living organisms.

B Diffusion happens only through a cell wall.

C Diffusion occurs only down a concentration gradient.

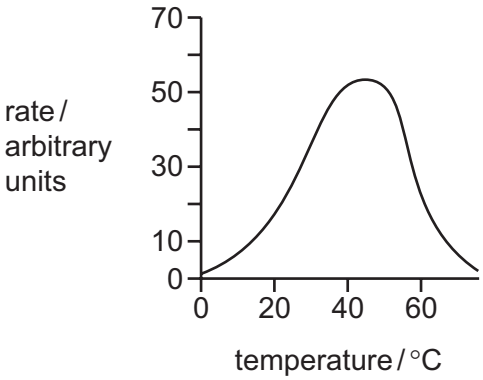
D Diffusion occurs only in solution.

4 The diagram shows the effect of increasing temperature on an enzyme-controlled reaction, during which the enzyme is **not** at its optimum (best) pH.

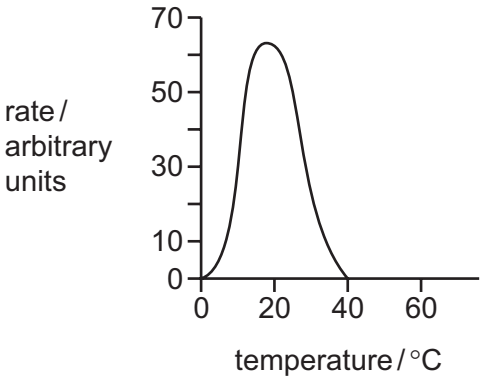


Which shows the effect of temperature on this enzyme when it is at its optimum pH?

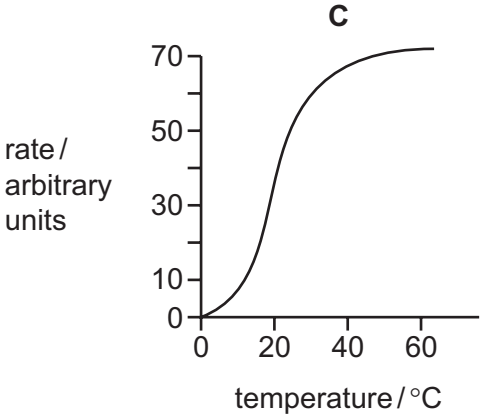
A



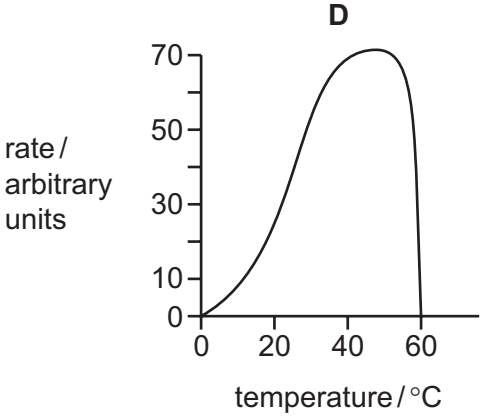
B



C

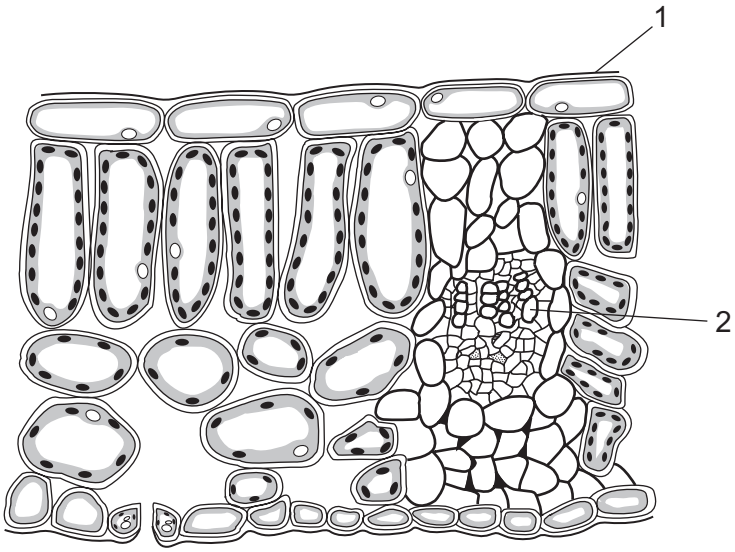


D



[Turn over

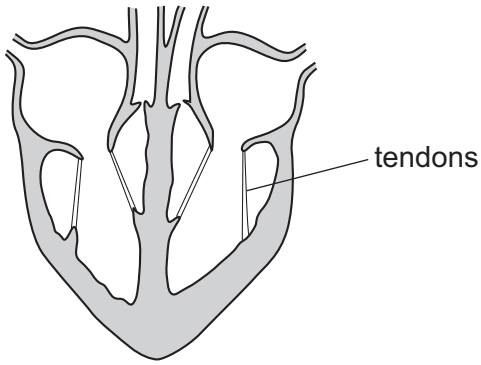
5 The diagram shows a section through part of a leaf as seen under a light microscope.



What are the labelled parts?

	1	2
A	cuticle	phloem
B	cuticle	xylem
C	epidermis	phloem
D	epidermis	xylem

6 The diagram shows a section through the human heart.



Which structures are joined by the tendons?

A atrium wall and septum

B atrium wall and valve

C septum and ventricle wall

D valve and ventricle wall

7 Where does most water enter a plant?

A epidermal cells

B root hair cells

C stomata

D xylem vessels

8 Limewater turns cloudy if a certain gas is bubbled through it.

Why will the limewater look different when expired air rather than inspired air is bubbled through it?

A Limewater detects oxygen in the inspired air.

B Oxygen has been taken from the expired air.

C There is less nitrogen in the expired air.

D There is more carbon dioxide in the expired air.

9 Which processes require energy in both plants and animals?

	cell division	protein synthesis	temperature control
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

10 What happens to adrenaline after it has had its effect?

A It is breathed out of the lungs as vapour.

B It is destroyed by the liver.

C It is egested in the alimentary canal.

D It is used in respiration.

[Turn over

11 What are the features of sexual reproduction?

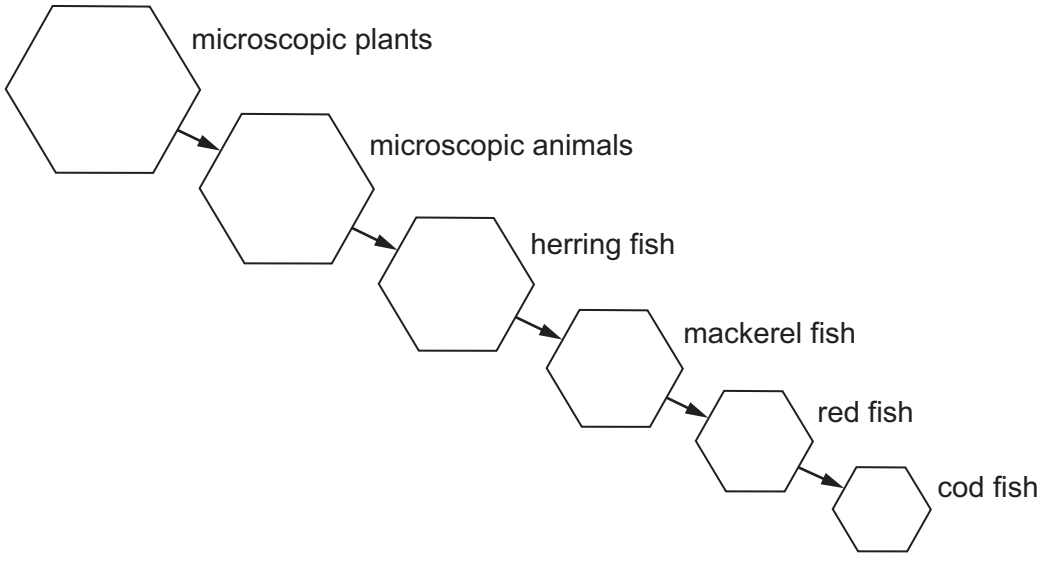
	number of parents	type of nuclei that fuse	nature of offspring
A	1	diploid	genetically dissimilar
B	1	haploid	genetically identical
C	2	diploid	genetically identical
D	2	haploid	genetically dissimilar

12 Some seeds are left in a warm place in different conditions.

Which seeds will germinate but will be able to grow only for a short time?

	light	oxygen present	water present
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

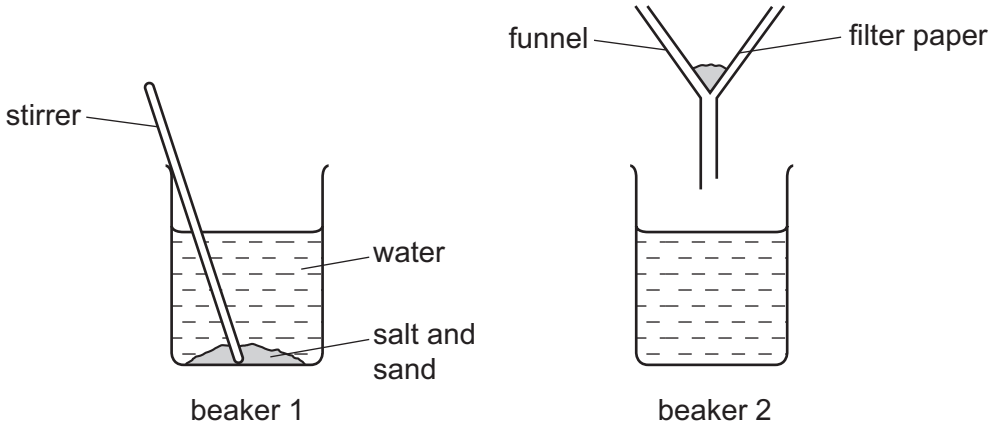
13 The diagram represents a food chain found in the sea.



How many consumer levels are there?

A 1 **B** 4 **C** 5 **D** 6

14 The apparatus used to remove sand from a mixture of salt and sand is shown.



The contents of beaker 1 are stirred and then poured into the funnel above beaker 2.

What is in beaker 2?

A a mixture of an element and a compound

B a mixture of two compounds

C one compound only

D one element only

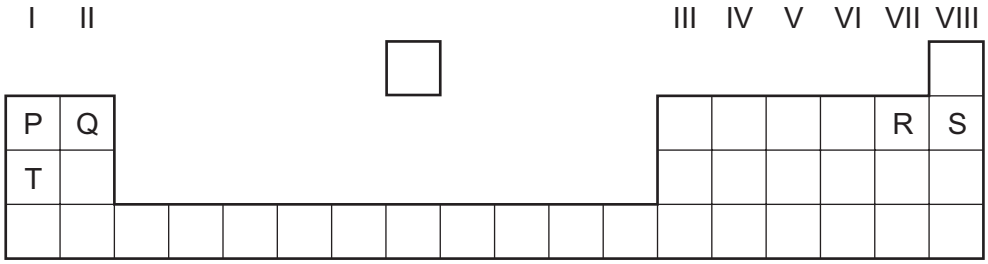
15 Which row describes an element and a compound?

	an element	a compound
A	contains more than one type of atom	contains elements chemically combined
B	contains more than one type of atom	contains elements mixed together
C	contains only one type of atom	contains elements chemically combined
D	contains only one type of atom	contains elements mixed together

[Turn over

16 The positions of elements P, Q, R, S and T in the Periodic Table are shown.

The letters are **not** the symbols for the elements.

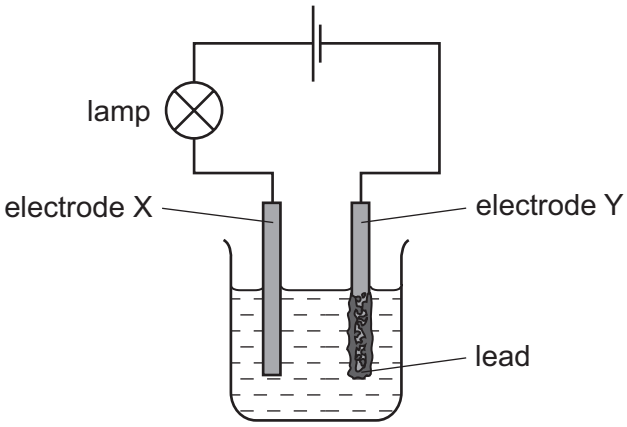


Which element forms an ionic compound with element P?

A Q **B** R **C** S **D** T

17 The diagram shows the apparatus used for the electrolysis of lead(II) bromide using inert electrodes X and Y.

Lead is formed at electrode Y.



Which statement about the electrolysis is correct?

A A green gas is given off at electrode X.

B Electrode Y is the anode.

C Only a physical change takes place when a current is passed.

D The electrolyte is in the molten state.

18 Which temperature changes occur during exothermic and endothermic reactions?

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

19 What is a catalyst?

A a substance that decreases the rate of reaction and is chemically changed at the end of the reaction

B a substance that decreases the rate of reaction and is chemically unchanged at the end of the reaction

C a substance that increases the rate of reaction and is chemically changed at the end of the reaction

D a substance that increases the rate of reaction and is chemically unchanged at the end of the reaction

20 Which word equation represents the reaction of an acid with a carbonate?

A acid + carbonate → salt + carbon dioxide

B acid + carbonate → salt + carbon dioxide + water

C acid + carbonate → salt + hydrogen + water

D acid + carbonate → salt + water

21 The results of two tests on a solution of substance R are shown.

tests	results
add aqueous sodium hydroxide	red brown precipitate formed, insoluble in excess
dilute nitric acid added followed by silver nitrate solution	white precipitate formed

What is R?

A iron(II) carbonate

B iron(III) carbonate

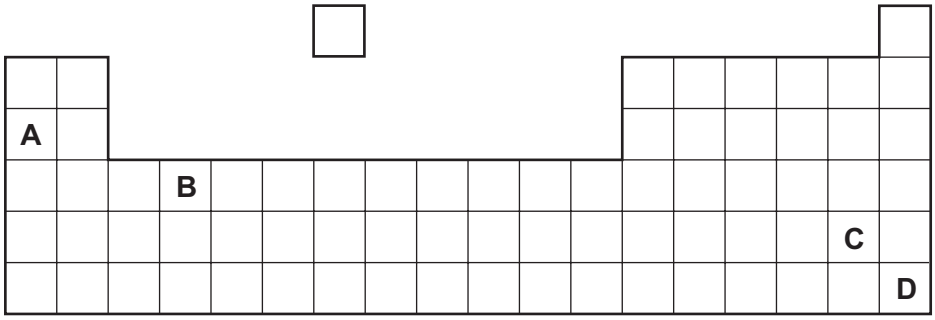
C iron(II) chloride

D iron(III) chloride

[Turn over

22 A soft metal reacts vigorously with cold water.

What is the position of this metal in the Periodic Table?



23 W, X, Y and Z are four metals.

W forms a compound that is used to speed up chemical reactions.

X forms coloured compounds.

Y has a high melting point.

Z has a low density.

Which metals are transition elements?

A W, X and Y

B W and X only

C X, Y and Z

D Y and Z only

24 Which element does **not** produce a gas when added to dilute hydrochloric acid?

A copper

B iron

C magnesium

D zinc

25 Which processes are used in the purification of the water supply?

A fractional distillation and chlorination

B fractional distillation and crystallisation

C filtration and chlorination

D filtration and crystallisation

26 Which reaction involves combustion?

A calcium carbonate → calcium oxide + carbon dioxide

B methane + oxygen → carbon dioxide + water

C sodium carbonate + hydrochloric acid → sodium chloride + water + carbon dioxide

D sodium hydroxide + hydrochloric acid → sodium chloride + water

27 Which fuel is **not** obtained from petroleum?

A coal

B gasoline

C diesel

D refinery gas

28 It takes 2.0 hours for a car to travel 50 km.

Which calculation gives the average speed of the car?

A $\frac{50}{2.0}$ m/s

B $\frac{2.0}{50}$ m/s

C $\frac{50\,000}{(2.0 \times 60 \times 60)}$ m/s

D $\frac{(2.0 \times 60 \times 60)}{50\,000}$ m/s

29 A bottle full of oil has a mass of 1200 g. The same bottle when empty has a mass of 450 g. The volume of the oil is 1000 cm^3.

What is the density of the oil?

A 0.45 g/cm^3

B 0.75 g/cm^3

C 1.2 g/cm^3

D 1.3 g/cm^3

[Turn over

30 A motor is used to lift identical bags of flour between two floors in a windmill. The power output of the motor is doubled.

Which statement about the journey of the bags of flour between the two floors is now correct?

A The bags gain half as much potential energy.

B The bags gain twice as much potential energy.

C The bags travel at half the speed.

D The bags travel at twice the speed.

31 Which row describes the particles in a gas?

	average distance between particles	motion of particles
A	large	move randomly
B	large	vibrate about a fixed point
C	small	move randomly
D	small	vibrate about a fixed point

32 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

	melting point / °C	boiling point / °C
benzene	5.4	80
glycerine	18	290

At which temperature are both benzene and glycerine liquid?

A 0 °C **B** 50 °C **C** 90 °C **D** 300 °C

33 Convection is one method by which energy can be transferred thermally through a substance.

In which state(s) can convection occur?

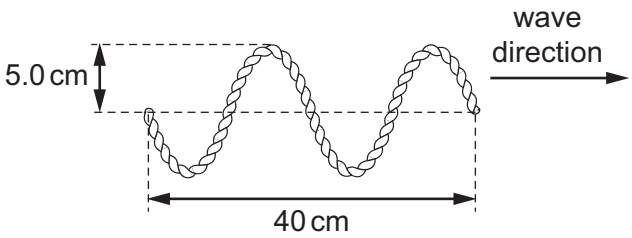
A liquids and gases only

B liquids only

C solids and gases only

D solids, liquids and gases

34 A student vibrates the end of a horizontal rope and sends a wave along the rope. The wave is shown in the diagram.

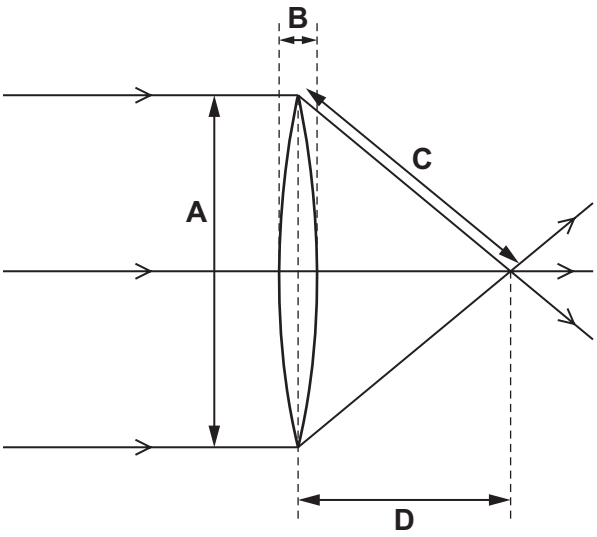


What is the amplitude of the wave, and what is the wavelength of the wave?

	amplitude / cm	wavelength / cm
A	5.0	10
B	5.0	20
C	10	10
D	10	20

35 The diagram shows rays of light passing through a converging lens.

Which labelled arrow represents the focal length of the lens?



36 The diagram shows part of the electromagnetic spectrum.

X-rays	P	visible light	Q	microwaves

Which row shows the missing types of radiation at P and at Q?

	at P	at Q
A	infra-red	radio waves
B	infra-red	ultraviolet
C	ultraviolet	infra-red
D	ultraviolet	radio waves

37 A boy stands 132 metres in front of a vertical cliff.

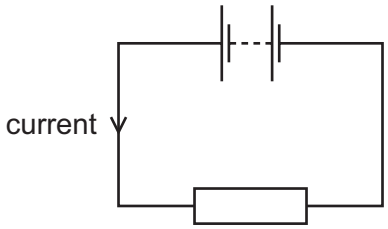
He claps his hands and then hears an echo from the cliff.

The speed of sound in air is 330 m / s.

What is the time between the boy clapping his hands and hearing the echo?

A 0.40 s **B** 0.80 s **C** 1.25 s **D** 2.50 s

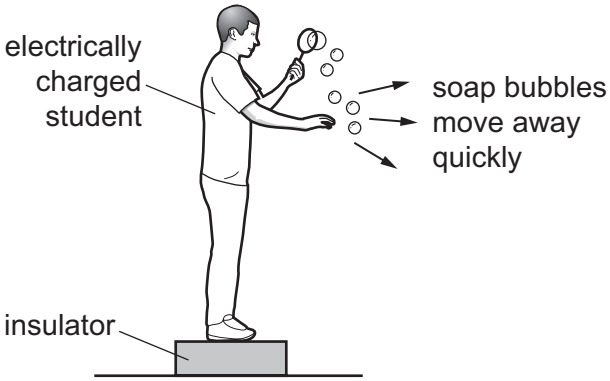
38 A battery is connected to a resistor.



Which changes to the resistance of the resistor, and to the potential difference across the resistor, **must** produce a smaller current?

	resistance	potential difference
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

39 An electrically charged student produces soap bubbles. When he holds his hand near the bubbles, they move away quickly from his hand.



For this movement of the bubbles to happen, which statement is correct?

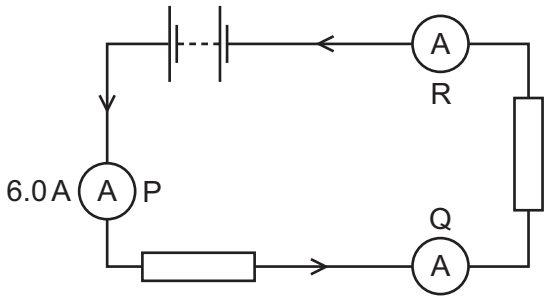
A The bubbles must be negatively charged.

B The bubbles must be positively charged.

C The bubbles must have the opposite charge to the charge on the student.

D The bubbles must have the same charge as the charge on the student.

40 The diagram shows two resistors in a circuit with three ammeters P, Q and R. Ammeter P reads 6.0 A.



Which row gives the reading on ammeter Q and the reading on ammeter R?

	ammeter Q / A	ammeter R / A
A	3.0	0
B	3.0	3.0
C	4.0	2.0
D	6.0	6.0

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.)