Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/22**

Paper 2 Multiple Choice (Extended) **October/November 2019**

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

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

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

IB19 11_0653_22/2RP

1 A biologist keeps a potted plant in a laboratory.

Which feature of the potted plant shows that it is a living organism?

A It grows larger over time.

B It has green leaves.

C The compost in the pot dries after he waters it.

D The stems contain xylem.

2 Which statement about human gametes is correct?

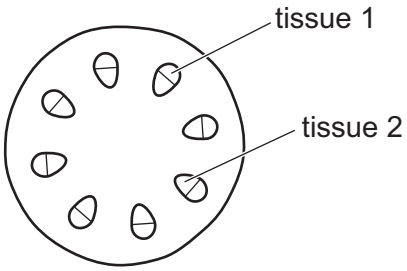
A Egg cells are much smaller than sperm cells.

B Egg cells are produced in larger numbers than sperm cells.

C Egg cells have a jelly coating that changes after fertilisation.

D The flagellum is an adaptive feature of an egg cell.

3 The diagram shows a cross section of a stem.



Which row shows the correct names and functions of the tissues?

	tissue 1		tissue 2	
	name	function	name	function
A	phloem	support only	phloem	transport only
B	phloem	transport only	xylem	support and transport
C	xylem	transport only	phloem	support and transport
D	xylem	support only	xylem	transport only

4 1 cm³ of substance **X** is added to 10 cm³ starch suspension and mixed. Food tests are carried out immediately after mixing and again after an hour.

The results of the tests are shown in the table.

test reagent	colour of solution after mixing	colour of solution after one hour
Benedict's solution	blue	orange
iodine solution	blue / black	brown

What is substance **X**?

A amylase

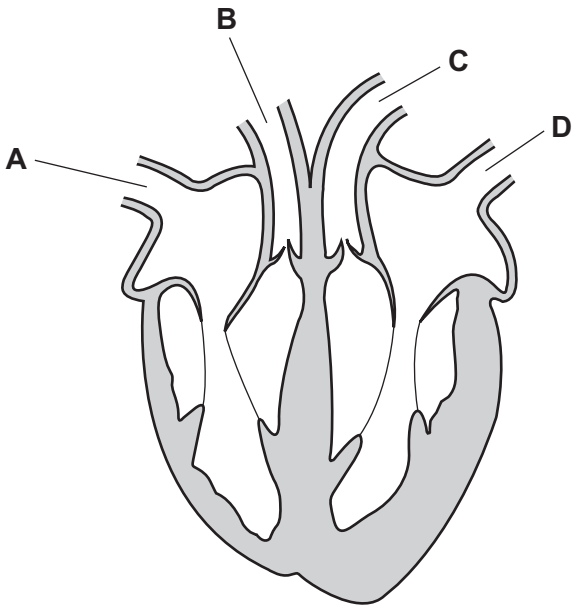
B protease

C lipase

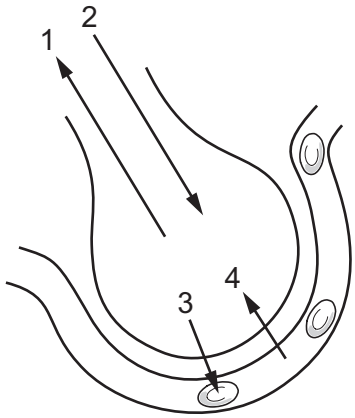
D sugar

5 The diagram represents the human heart and four blood vessels.

Which blood vessel contains blood at the highest pressure?



6 The diagram shows an alveolus and a blood capillary.



Which two arrows represent gas exchange by diffusion only?

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

7 Which statement about aerobic respiration is correct?

A It exchanges gases through the walls of the alveoli.

B It expels carbon dioxide from the lungs.

C It only produces carbon dioxide and energy.

D It uses oxygen to release energy from glucose.

8 Nitrates in the soil are taken up by the roots of a plant.

What are the nitrates used to make?

A fat

B glucose

C protein

D starch

9 Which statement about sexual reproduction is **always** correct?

A It involves only one parent.

B It involves the fusion of nuclei.

C It produces genetically identical offspring.

D It takes place only in animals.

10 Which row gives the most suitable characteristics of a wind-pollinated flower?

	pollen grains	anthers	stigma
A	smooth	few	small
B	smooth	many	large
C	sticky	few	large
D	sticky	many	small

11 A developing fetus is connected to its mother by an umbilical cord and placenta.

What is the function of the placenta?

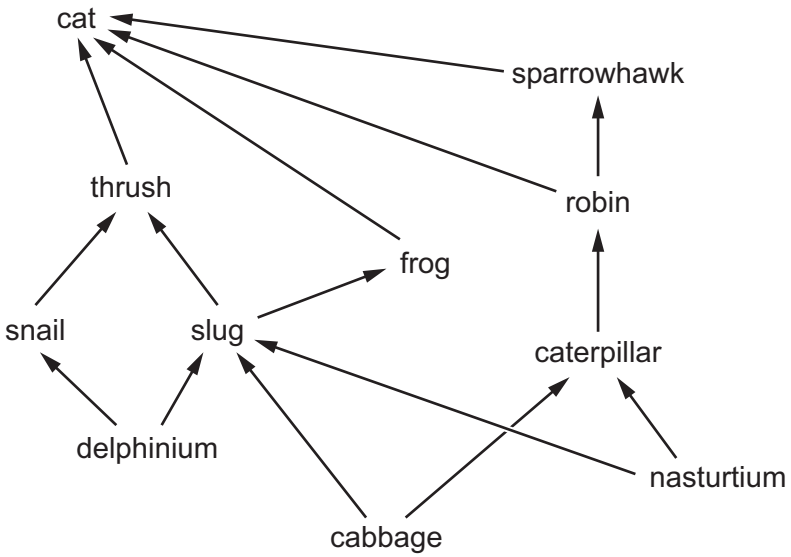
A to allow the mixing of the mother's blood with the blood of the fetus

B to exchange nutrients and waste

C to keep the fetus warm

D to stop the fetus from moving

12 The diagram shows a food web.



How could the frog be classed?

A second trophic level and secondary consumer

B second trophic level and tertiary consumer

C third trophic level and secondary consumer

D third trophic level and tertiary consumer

[Turn over

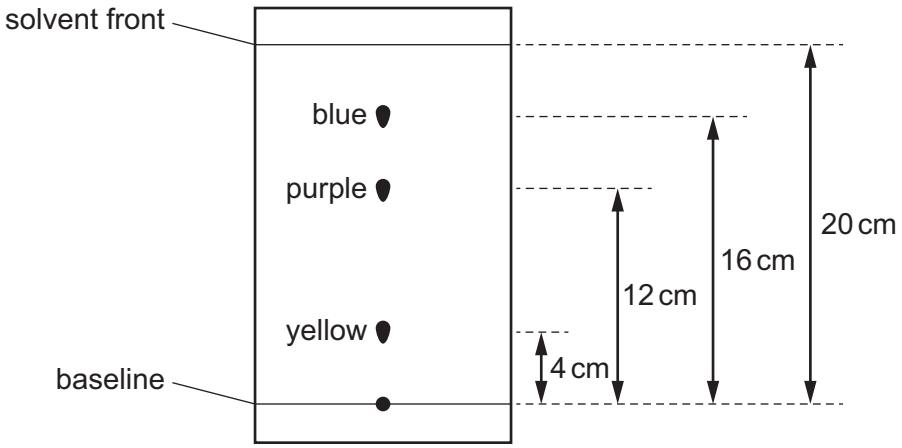
13 The table shows the possible effects of two processes on the concentration of two gases in the atmosphere.

	process	concentration of gases in atmosphere	
		carbon dioxide	oxygen
1	combustion of fossil fuels	decrease	increase
2	combustion of fossil fuels	increase	decrease
3	deforestation	decrease	increase
4	deforestation	increase	decrease

Which rows show the effects of deforestation and combustion of fossil fuels on the concentration of carbon dioxide and oxygen in the atmosphere?

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

14 The chromatogram of a black ink containing three dyes is shown.



What is the R_f value of the purple ink?

A 0.2 **B** 0.4 **C** 0.6 **D** 1.67

15 A white solid X is formed when magnesium reacts with oxygen.

What is X?

A a compound

B a mixture

C an alloy

D an element

16 The fertiliser ammonium sulfate has the formula $(NH_4)_2SO_4$.

How many atoms of each element are present in the formula?

	number of hydrogen atoms	number of nitrogen atoms	number of oxygen atoms	number of sulfur atoms
A	4	1	1	1
B	4	2	4	1
C	8	1	4	1
D	8	2	4	1

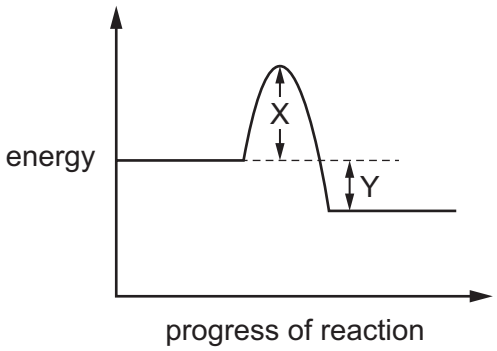
17 Element X is a non-metal used in the treatment of the water supply.

It is made during the electrolysis of a metal salt.

What is the colour of X and at which electrode is it made?

	colour	electrode
A	red	anode
B	red	cathode
C	yellow-green	anode
D	yellow-green	cathode

18 The energy level diagram for a reaction is shown.



Which statement is correct?

A X is the energy change of the reaction.

B Y is the activation energy of the reaction.

C The energy change of the reaction is larger than the activation energy of the reaction.

D The reaction is exothermic.

[Turn over

19 Dilute hydrochloric acid reacts with excess calcium carbonate.

The amount of carbon dioxide made in one minute is recorded.

The experiment is repeated using the same volume of more concentrated hydrochloric acid.

How does the volume of carbon dioxide collected in one minute and the frequency of collisions of reacting particles change?

	volume of carbon dioxide	frequency of collisions
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

20 Copper sulfate is a soluble salt.

How are pure crystals of copper sulfate prepared?

A Mix copper chloride solution with sodium sulfate solution, filter, rinse and dry.

B React copper oxide with excess dilute sulfuric acid, evaporate, cool, filter, rinse and dry.

C React excess copper carbonate, with dilute sulfuric acid, filter, evaporate, cool, filter, rinse and dry.

D React excess copper with dilute sulfuric acid, filter, evaporate, cool, filter, rinse and dry.

21 Which row describes the reactivity and the electronic structure of a noble gas?

	reactivity	electronic structure
A	reactive	full outer shell
B	reactive	incomplete outer shell
C	unreactive	incomplete outer shell
D	unreactive	full outer shell

22 Which statement about alloys is correct?

A They are made from metals because metals are poor electrical conductors.

B They are mixtures of compounds that contain metals.

C They have all the same properties as the metals from which they are made.

D They have different properties to the metals from which they are made.

23 Which statement about the extraction of iron in a blast furnace is **not** correct?

A Carbon dioxide reduces iron oxide.

B Carbon monoxide is oxidised by iron oxide.

C Carbon reduces carbon dioxide.

D The high temperatures required are produced by reacting carbon with oxygen.

24 What is the composition of clean air?

A 78% nitrogen, 21% carbon dioxide and small amounts of other gases

B 78% nitrogen, 21% oxygen and small amounts of other gases

C 78% oxygen, 21% carbon dioxide and small amounts of other gases

D 78% oxygen, 21% nitrogen and small amounts of other gases

25 Which two gases cause an enhanced greenhouse effect when their concentrations in the atmosphere increase?

A carbon monoxide and carbon dioxide

B carbon dioxide and methane

C methane and sulfur dioxide

D sulfur dioxide and carbon monoxide

26 Gasoline is one fraction obtained from petroleum.

Which row describes the boiling point of the compounds and the molecules in this fraction?

	boiling point	molecules
A	they have different boiling points	they contain different numbers of carbon atoms
B	they have different boiling points	they contain the same number of carbon atoms
C	they have the same boiling point	they contain different numbers of carbon atoms
D	they have the same boiling point	they contain the same number of carbon atoms

[Turn over

27 Which hydrocarbons belong to the same homologous series?

A C_2H_2, C_2H_4, C_2H_6

B CH_4, C_2H_4, C_3H_4

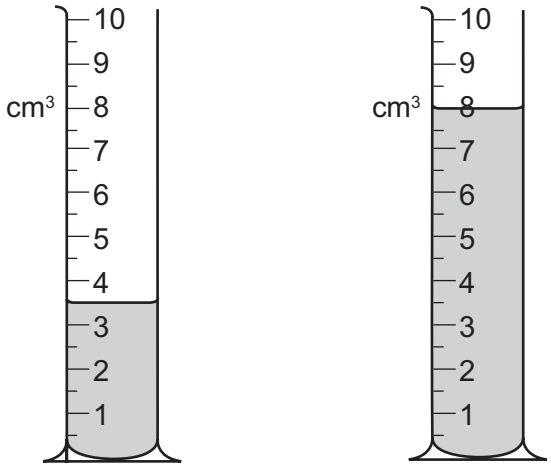
C C_2H_4, C_3H_6, C_4H_8

D C_2H_4, C_3H_8, C_4H_{10}

28 A measuring cylinder contains liquid.

More liquid is now poured into the measuring cylinder.

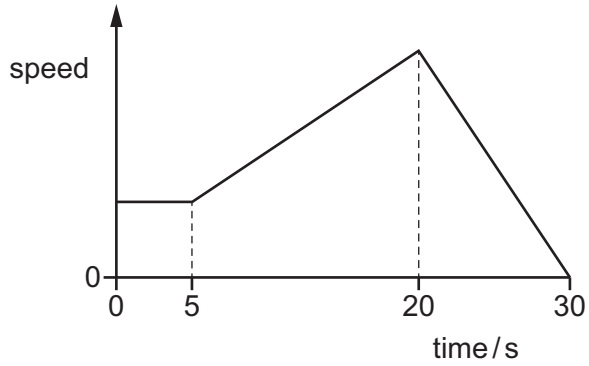
The diagrams show the measuring cylinder before and after the liquid is poured into it.



What volume of liquid is **poured** into the measuring cylinder?

A 3.5 cm^3 **B** 4.0 cm^3 **C** 4.5 cm^3 **D** 8.0 cm^3

29 The graph shows how the speed of a car changes with time. The car travels at constant speed, then accelerates, and finally brakes to a stop.



The car travels 60 m while it brakes to a stop.

What is the average speed of the car while it is braking?

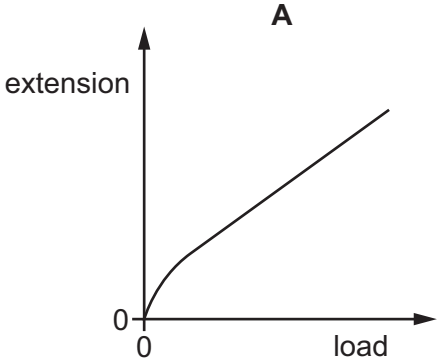
A 3.0 m / s **B** 4.0 m / s **C** 6.0 m / s **D** 12 m / s

30 A spring obeys Hooke's law until it reaches its limit of proportionality.

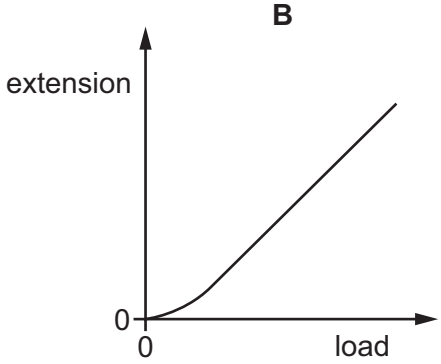
A load is hung from the spring. The load is gradually increased and the spring is stretched beyond its limit of proportionality.

Which is the extension-load graph for the spring?

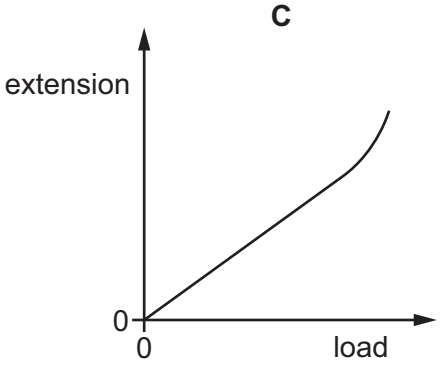
A



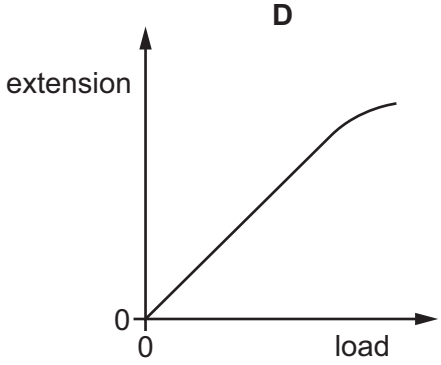
B



C

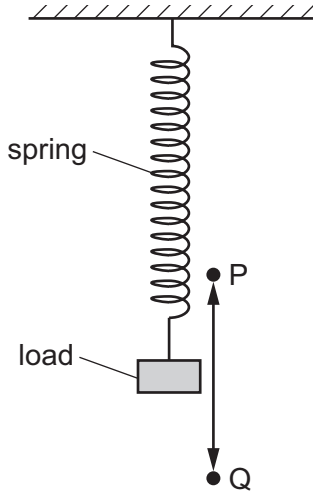


D



[Turn over

31 The diagram shows a load attached to a spring.



The load is pulled down and then released so that it oscillates between point P (highest point) and point Q (lowest point).

Which form of energy does the load have at point P?

A gravitational potential energy only

B kinetic energy only

C kinetic energy and gravitational potential energy

D neither kinetic energy nor gravitational potential energy

32 Liquids consist of molecules that are constantly moving.

Which row describes the motion of the molecules in a liquid and compares the forces between them to the forces between molecules in a gas?

	motion of molecules	forces between molecules
A	random	stronger than in a gas
B	random	weaker than in a gas
C	vibrating about fixed positions	stronger than in a gas
D	vibrating about fixed positions	weaker than in a gas

33 A circular bowl in a room contains water.

Which two factors both ensure that the smallest quantity of water evaporates in a day?

	temperature of room	diameter of bowl
A	high	large
B	high	small
C	low	large
D	low	small

34 In which process is thermal energy transferred by molecular vibrations?

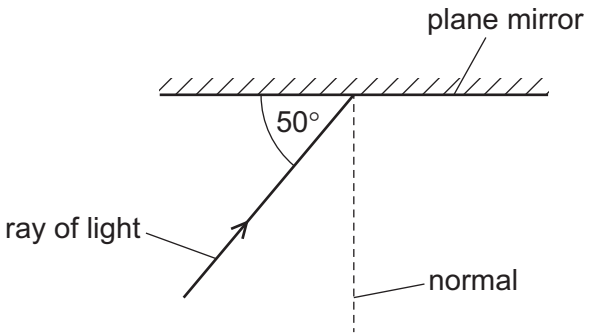
A conduction

B convection

C evaporation

D radiation

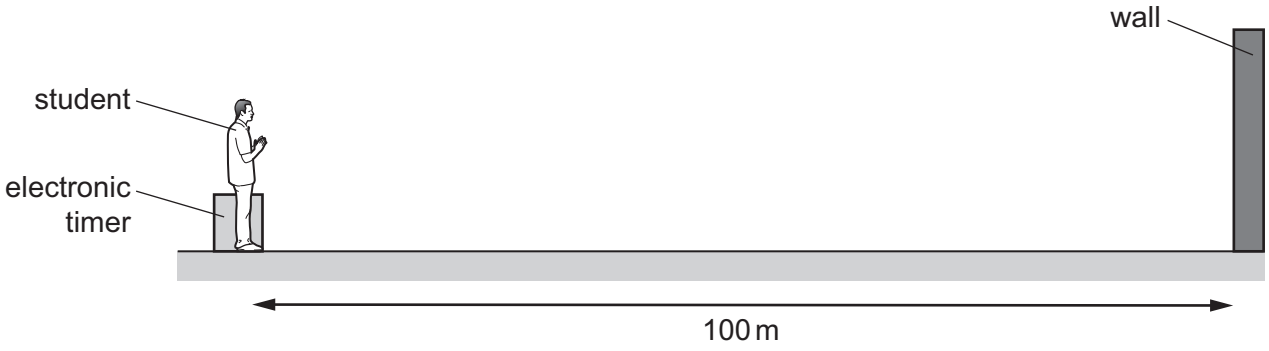
35 The diagram shows light striking a plane mirror.



What is the angle of reflection of the ray when it is reflected from the mirror?

A 40° **B** 50° **C** 80° **D** 100°

36 A student measures the speed of sound. He claps his hands and the sound reflects from a wall that is 100 m away from him.

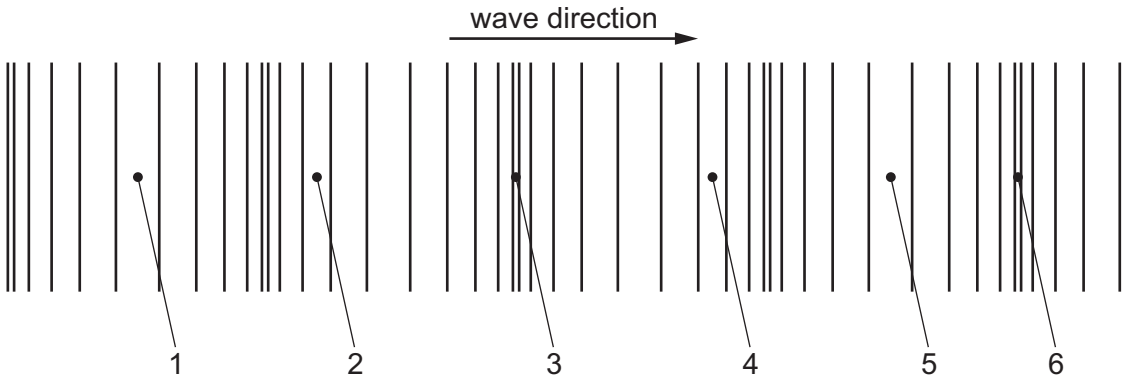


An electronic timer next to the student detects the echo of the sound 0.60 s after it is made.

Which calculation gives the speed of sound?

A $\frac{200}{0.30}$ m/s **B** $\frac{200}{0.60}$ m/s **C** $\frac{100}{0.60}$ m/s **D** $\frac{100}{1.2}$ m/s

37 The diagram represents a sound wave travelling in air.



Which numbered points are at the centre of a compression and which numbered points are at the centre of a rarefaction?

	centre of a compression	centre of a rarefaction
A	1 and 5	2 and 4
B	1 and 5	3 and 6
C	3 and 6	1 and 5
D	3 and 6	2 and 4

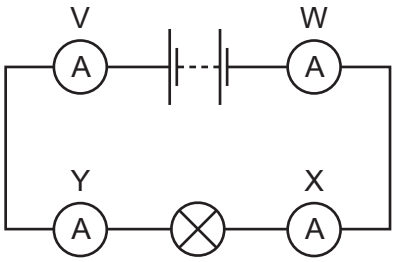
38 A piece of wire has a resistance of $8.0\,\Omega$.

The length of the wire is doubled and the diameter of the wire is halved.

What is the new resistance of the wire?

A $2.0\,\Omega$ **B** $4.0\,\Omega$ **C** $8.0\,\Omega$ **D** $64\,\Omega$

39 Four ammeters V, W, X and Y are connected in the circuit shown.



Which ammeters have the same reading as each other?

A V and W only

B V and Y only

C X and Y only

D V, W, X and Y

40 There is a current I in a lamp. The potential difference across the lamp is V and the power produced by the lamp is P.

In a second lamp, the current is $2I$ and the potential difference across it is $\frac{V}{2}$.

What is the power produced by this other lamp?

A $\frac{P}{4}$ **B** $\frac{P}{2}$ **C** P **D** $2P$

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.).