



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**CO-ORDINATED SCIENCES**

**0654/01**

Paper 1 Multiple Choice

**October/November 2008**

**45 minutes**

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

\* 4 5 1 4 2 7 3 1 2 5 \*

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.  
Do not use staples, paper clips, highlighters, 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.

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.**

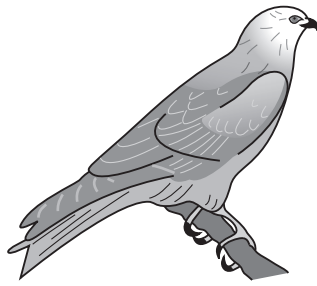
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.  
Any rough working should be done in this booklet.  
A copy of the Periodic Table is printed on page 20.

This document consists of **19** printed pages and **1** blank page.



2

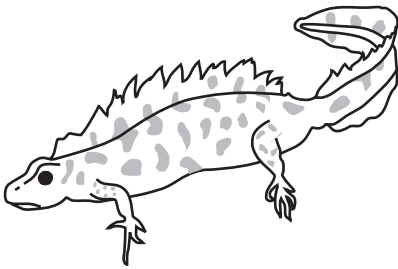
1 The diagram shows four vertebrate animals.



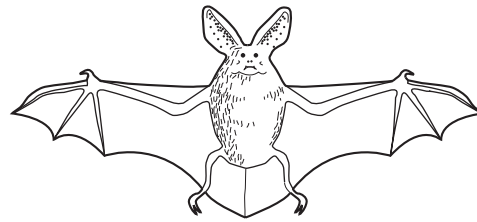
P



Q



R

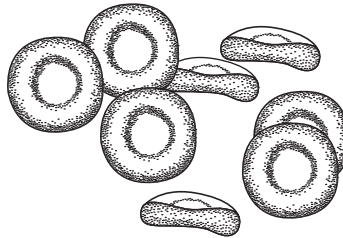


S

Which two animals belong to the same class?

- A** P and Q      **B** P and S      **C** Q and R      **D** Q and S

2 The diagram shows one kind of blood cell.

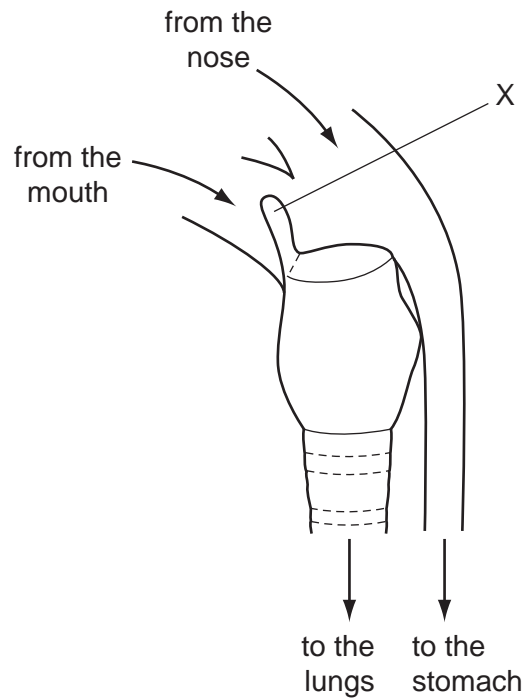


What describes a structural feature and a function of these cells?

	structural features	function
<b>A</b>	have chloroplasts	make glucose
<b>B</b>	have vacuoles	carry oxygen
<b>C</b>	have no cell walls	make glucose
<b>D</b>	have no nuclei	carry oxygen

3

- 3 Which shows the sequence that occurs when a person touches a hot object?
- A impulse → stimulus → receptor → spinal cord
  - B receptor → stimulus → impulse → brain
  - C stimulus → impulse → receptor → spinal cord
  - D stimulus → receptor → impulse → brain
- 4 The diagram shows structures in the throat of a mammal.

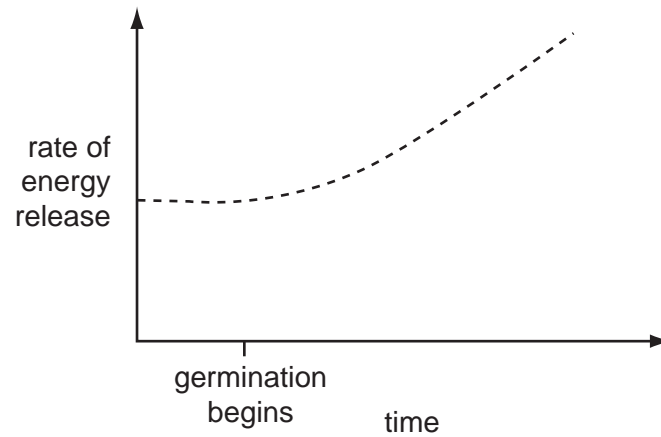


What is X?

- A epiglottis
  - B larynx
  - C oesophagus
  - D trachea
- 5 In which direction does blood circulate in the body?
- A from the left ventricle through the tricuspid valve
  - B from the limbs to the right atrium
  - C from the lungs along the pulmonary artery
  - D from the right ventricle to the right atrium

4

- 6 The graph shows the rate of energy release during seed germination.



Which process uses this energy?

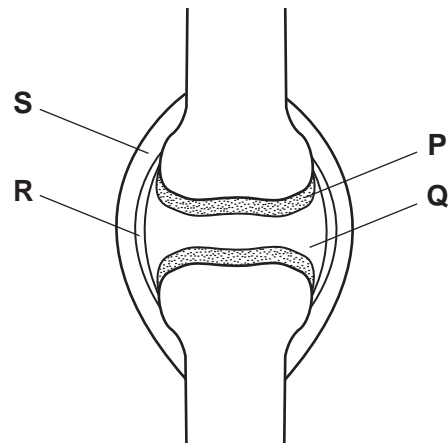
- A growth
  - B photosynthesis
  - C respiration
  - D transpiration
- 7 Muscle wastage, lack of growth and the accumulation of fluid in tissues are conditions which result from the lack of nutrient X in the diet.

What is nutrient X?

- A calcium
- B carbohydrate
- C fat
- D protein

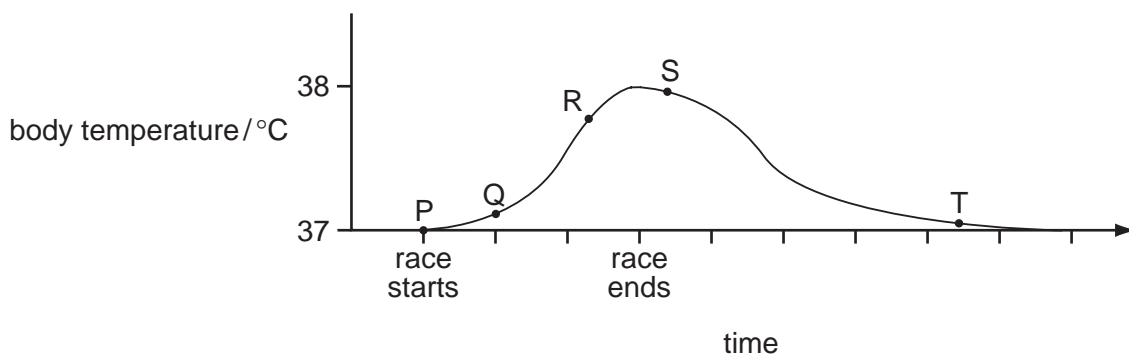
5

- 8 The diagram shows a synovial joint.



Which two parts prevent friction between the bones?

- A** P and Q      **B** P and R      **C** Q and R      **D** Q and S
- 9 The graph shows body temperature before, during and after running a race on a hot day.

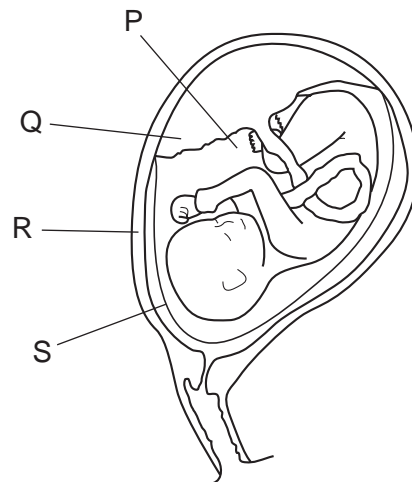


Which stage of the graph occurs as a result of homeostasis?

- A** P to Q      **B** Q to R      **C** R to S      **D** S to T
- 10 A student placed four sets of seeds in different conditions.
- Which set of conditions must be kept constant to show the effect of temperature on germination?
- A** temperature and water only  
**B** temperature only  
**C** temperature, water and oxygen  
**D** water and oxygen only

6

11 The diagram shows a fetus in a uterus.



Which parts enable pressure to be spread evenly around the fetus?

- A** P and Q      **B** P and S      **C** Q and R      **D** R and S

12 Cystic fibrosis is an inherited disease.

Only people who are homozygous recessive, ff, suffer from this disease.

Which cross could **not** give rise to a child suffering from cystic fibrosis?

- A** FF × ff      **B** Ff × Ff      **C** Ff × ff      **D** ff × ff

13 Which process is responsible for the flow of energy along a food chain?

- A** feeding  
**B** pollination  
**C** respiration  
**D** seed dispersal

14 Element X has a proton number of 24 and a nucleon number of 52.

How many electrons and neutrons are there in an atom of X?

	electrons	neutrons
<b>A</b>	24	28
<b>B</b>	24	52
<b>C</b>	28	24
<b>D</b>	28	52

15 An element E is a metal.

In which Group of the Periodic Table could E occur and which type of oxide does E form?

	Group	type of oxide
<b>A</b>	I	basic
<b>B</b>	III	acidic
<b>C</b>	VI	basic
<b>D</b>	VII	acidic

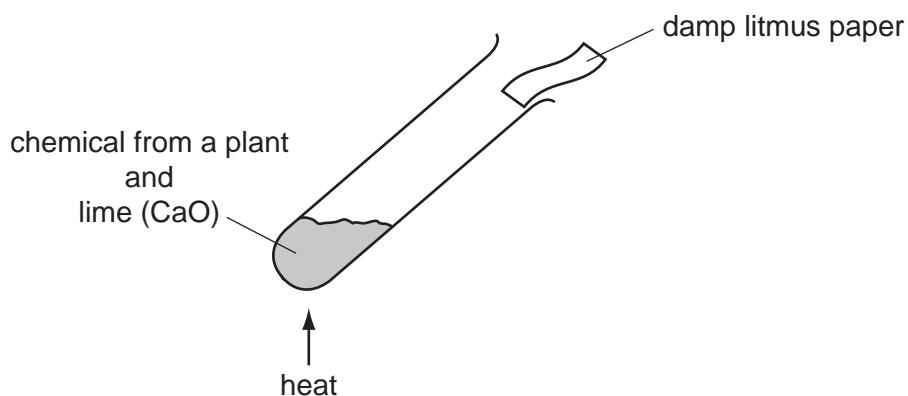
16 Large hydrocarbons can be .....1..... to make smaller, more useful molecules.

Small hydrocarbon molecules can be .....2..... to make long molecules.

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	cracked	distilled
<b>B</b>	cracked	polymerised
<b>C</b>	distilled	polymerised
<b>D</b>	distilled	cracked

17 A chemical from a plant is tested.

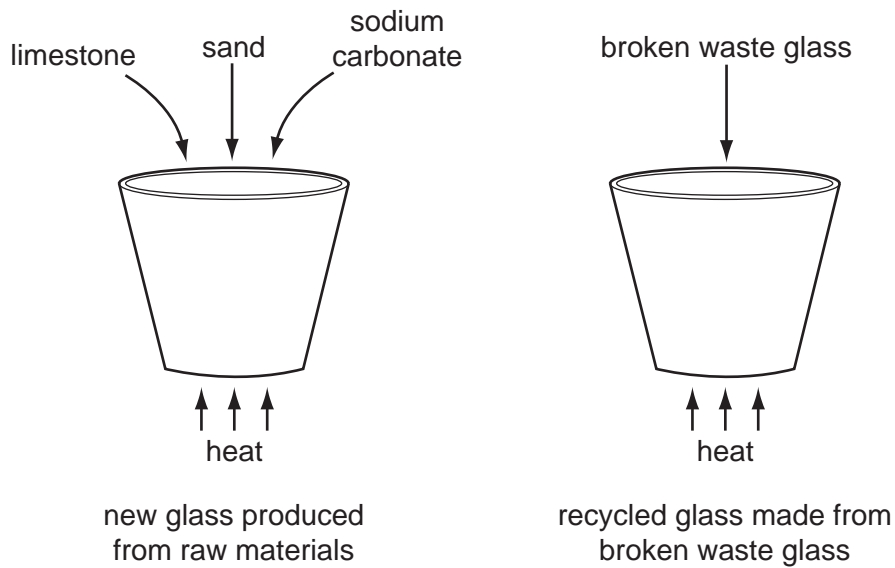


An alkaline gas, ammonia ( $\text{NH}_3$ ), is produced.

What is the chemical from the plant?

- A** cellulose
- B** a protein
- C** starch
- D** a sugar

18 Glass may be produced by two processes.



Which statements are arguments against the recycling of glass?

- 1 Raw materials for new glass manufacture are plentiful.
- 2 Waste glass causes litter and injuries, if the glass is broken.
- 3 Waste glass is not biodegradable.

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

19 The table shows information about some minerals in rocks.

name	chemical formula
bauxite	$Al_2O_3$
galena	$PbS$
hematite	$Fe_2O_3$
rutile	$TiO_2$

From which two minerals can a transition element be extracted?

- A** bauxite and galena
- B** bauxite and hematite
- C** galena and rutile
- D** hematite and rutile



20 Which substances can be obtained from rocks?

- A ethene and carbohydrates
- B ethene and metals
- C lime and carbohydrates
- D lime and metals

21 Electrolysis of sodium chloride is used to obtain chlorine.

In what form is sodium chloride electrolysed and at which electrode is the chlorine obtained?

	form of sodium chloride	electrode at which chlorine is obtained
A	in aqueous solution	anode
B	in aqueous solution	cathode
C	solid	anode
D	solid	cathode

22 Tap water often contains compounds dissolved from rocks.

The list shows four minerals present in rocks.

- 1 gypsum,  $\text{CaSO}_4$
- 2 magnesite,  $\text{MgCO}_3$
- 3 rock salt,  $\text{NaCl}$
- 4 quartz,  $\text{SiO}_2$

Which of these minerals cause hardness in tap water?

- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 2 and 4 only

- 23 A soil is treated with lime. As a result, a plant that was growing well becomes diseased and dies.

Which conditions suit the plant?

	likes calcium ions in soil	likes alkaline soil
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

key

✓ = correct

x = not correct

- 24 Testing for which ion in solution involves reduction of the ion?

- A** ammonium
- B** chloride
- C** nitrate
- D** sulphate

- 25 Which types of substance can be obtained from plant material?

	alloys	drugs	dyes
<b>A</b>	✓	✓	✓
<b>B</b>	✓	x	x
<b>C</b>	x	✓	✓
<b>D</b>	x	x	✓



28 A car travels at various speeds during a short journey.

The table shows the distances travelled and the time taken during each of four stages P, Q, R and S.

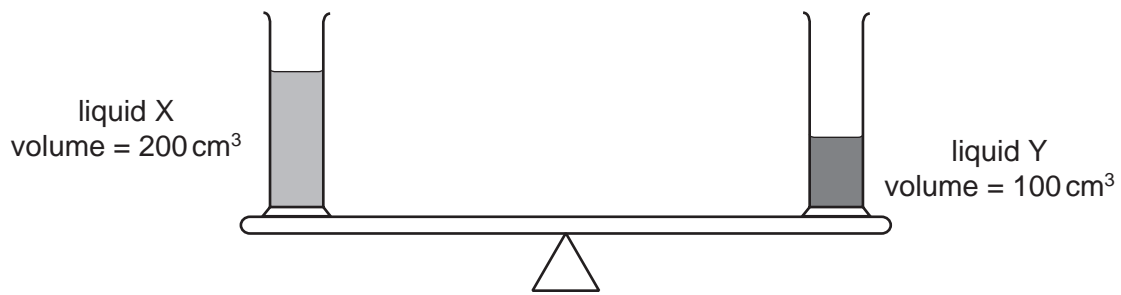
stage	P	Q	R	S
distance travelled / km	1.8	3.6	2.7	2.7
time taken / minutes	2	2	4	3

During which two stages is the car travelling at the same speed?

- A** P and Q      **B** P and S      **C** Q and R      **D** R and S

29 Two identical measuring cylinders containing different liquids are placed on a simple balance.

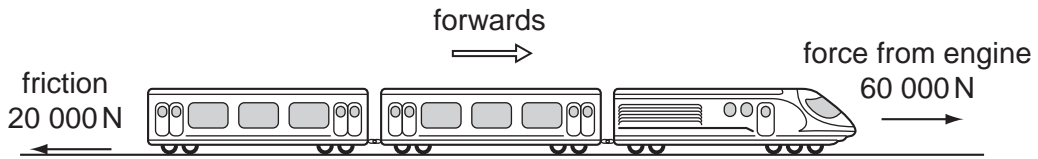
They balance as shown.



How does the density of X compare with the density of Y?

- A** density of X =  $\frac{1}{2}$  × density of Y  
**B** density of X = density of Y  
**C** density of X = 2 × density of Y  
**D** density of X = 4 × density of Y

30 A train is travelling along a horizontal track at constant speed. Two of the forces acting on the train are shown in the diagram.



A force of air resistance is also acting on the train so that the forces balance.

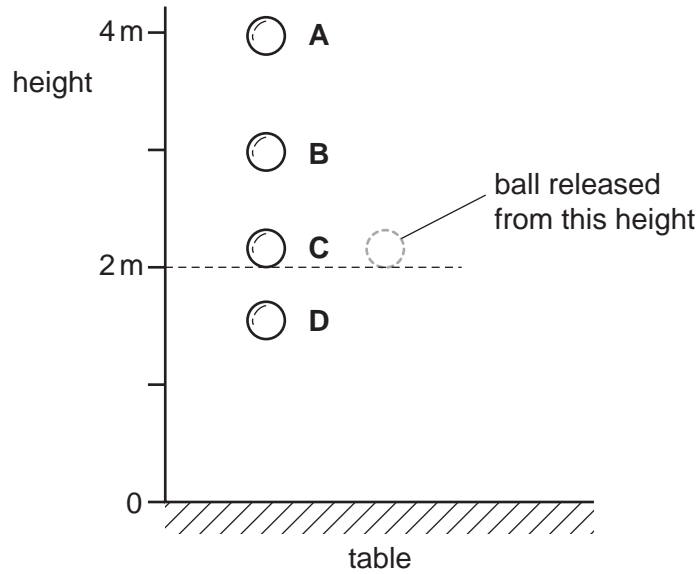
What is this air resistance force?

- A 40 000 N backwards
- B 80 000 N backwards
- C 40 000 N forwards
- D 80 000 N forwards

31 A rubber ball is dropped from a height of 2 metres onto a table.

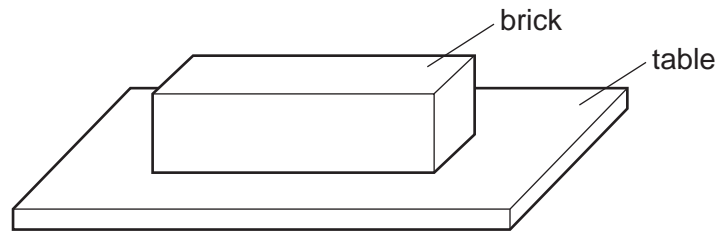
Whilst in contact with the table, some of its energy is converted into heat energy.

What is the highest possible point the ball could reach after bouncing?

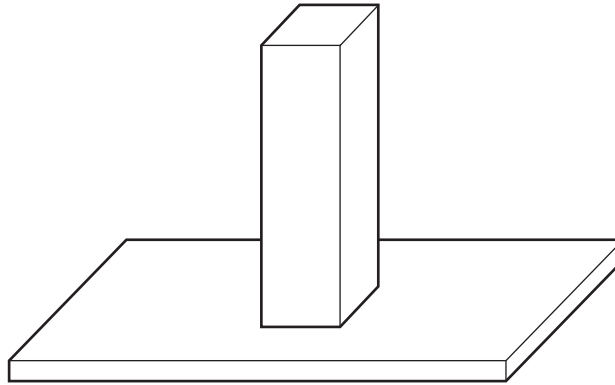


14

32 A brick with rectangular sides rests on a table.



The brick is now turned so that it rests on the table on its smallest face.

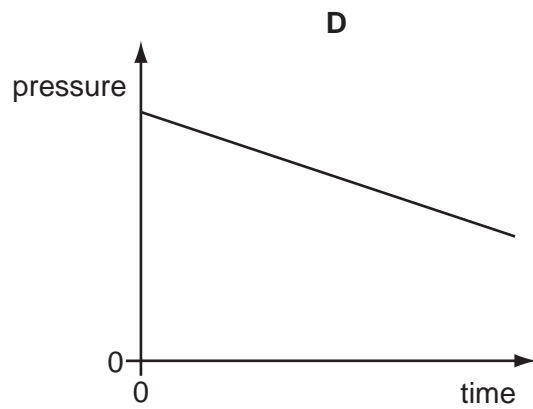
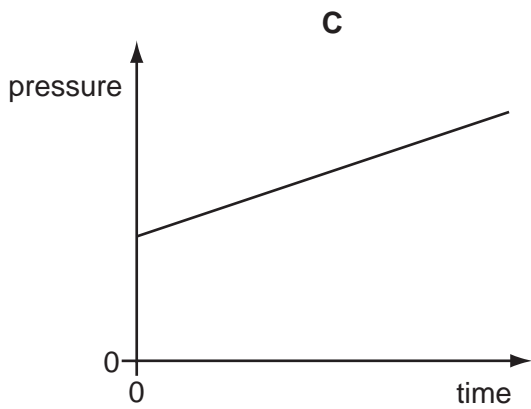
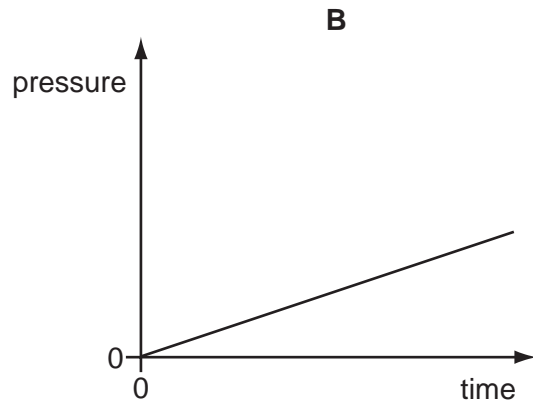
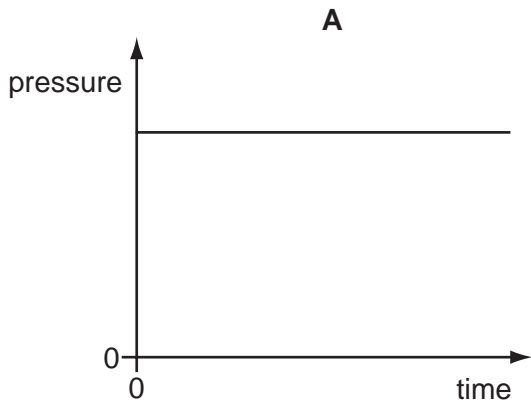


How has this change affected the force and the pressure exerted by the brick on the table?

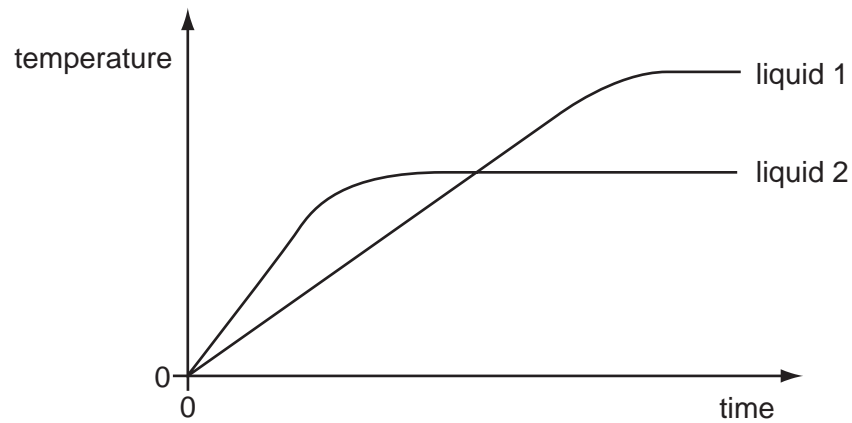
	force	pressure
<b>A</b>	unchanged	unchanged
<b>B</b>	increased	unchanged
<b>C</b>	unchanged	increased
<b>D</b>	increased	increased

33 The pressure of a fixed mass of gas in a cylinder is measured. The volume of the cylinder is slowly decreased.

Which graph could show the change of pressure of the gas during this process?

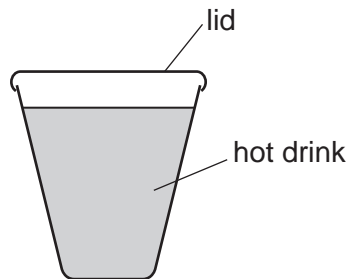


- 34 Equal masses of two different liquids are heated using the same heater. The graph shows how the temperature of each liquid changes with time.



What does the graph tell us about the liquids?

- A Liquid 1 has a higher melting point than liquid 2.
  - B Liquid 1 has a higher boiling point than liquid 2.
  - C Liquid 1 starts to melt sooner than liquid 2.
  - D Liquid 1 starts to boil sooner than liquid 2.
- 35 A white plastic lid is placed on a plastic cup used for a hot drink.



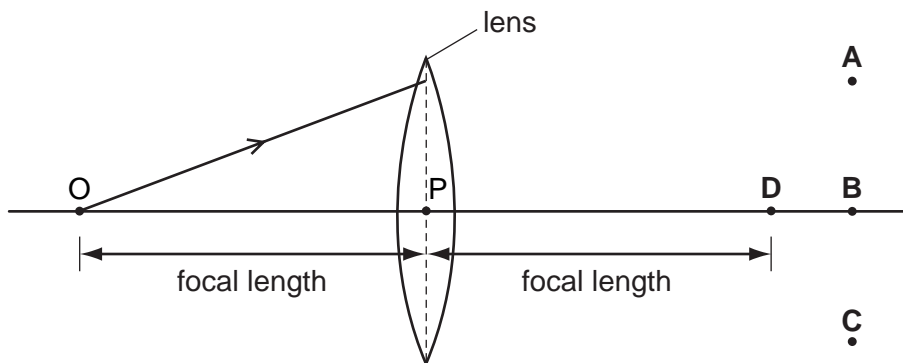
This would have no effect on the loss of heat by

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



36 In the diagram, the distance OP is the focal length of the lens.

Through which point will the ray shown pass, after refraction by the lens?

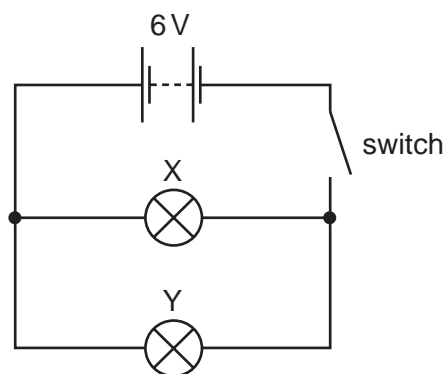


37 The table shows the voltage and current ratings for four electric heaters.

Which heater has the least resistance?

	voltage/V	current/A
<b>A</b>	110	5.0
<b>B</b>	110	10.0
<b>C</b>	230	5.0
<b>D</b>	230	10.0

38 In the circuit below, X and Y are identical 6 V lamps.



What happens when the switch is closed (the current is switched on)?

- A** X lights more brightly than Y.
- B** Y lights more brightly than X.
- C** X and Y both light with full brightness.
- D** X and Y both light with half brightness.

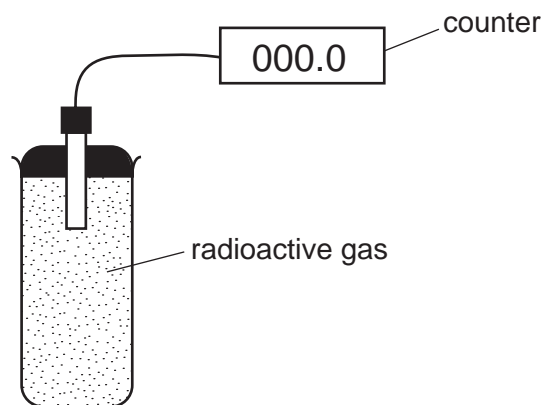
- 39 Two different systems are used to transmit equal amounts of electrical power from one place to another.

One system uses low voltage and the other uses high voltage.

Which line in the table is correct about which system wastes least energy and why?

	least energy wasted	why
<b>A</b>	high voltage system	the current in the wires is bigger
<b>B</b>	high voltage system	the current in the wires is smaller
<b>C</b>	low voltage system	the current in the wires is bigger
<b>D</b>	low voltage system	the current in the wires is smaller

- 40 The diagram shows an experiment to monitor the radiation from a radioactive gas. The counter readings are corrected for background radiation.



The table shows how the counter reading varies with time.

time / seconds	0	20	40	60	80	100	120	140	160	180
counter reading / counts per minute	140	105	82	61	44	36	27	20	15	10

What is the half-life of the gas?

- A** between 20 and 40 seconds
- B** between 40 and 60 seconds
- C** between 60 and 140 seconds
- D** between 140 and 180 seconds



**DATA SHEET**  
**The Periodic Table of the Elements**

		Group															
I	II	III	IV	V	VI	VII	0					0					
1 <b>H</b> Hydrogen 1											2 <b>He</b> Helium 2						
3 <b>Li</b> Lithium 4	9 <b>Be</b> Beryllium 4											10 <b>Ne</b> Neon 10					
11 <b>Na</b> Sodium 11	12 <b>Mg</b> Magnesium 12	13 <b>Al</b> Aluminium 13	14 <b>Si</b> Silicon 14	15 <b>P</b> Phosphorus 15	16 <b>S</b> Sulphur 16	17 <b>Cl</b> Chlorine 17	18 <b>Ar</b> Argon 18					36 <b>Kr</b> Krypton 36					
19 <b>K</b> Potassium 19	20 <b>Ca</b> Calcium 20	21 <b>Sc</b> Scandium 21	22 <b>Ti</b> Titanium 22	23 <b>V</b> Vanadium 23	24 <b>Cr</b> Chromium 24	25 <b>Mn</b> Manganese 25	26 <b>Fe</b> Iron 26	27 <b>Co</b> Cobalt 27	28 <b>Ni</b> Nickel 28	29 <b>Cu</b> Copper 29	30 <b>Zn</b> Zinc 30	31 <b>Ga</b> Gallium 31	32 <b>Ge</b> Germanium 32	33 <b>As</b> Arsenic 33	34 <b>Se</b> Selenium 34	35 <b>Br</b> Bromine 35	36 <b>Kr</b> Krypton 36
37 <b>Rb</b> Rubidium 37	38 <b>Sr</b> Strontium 38	39 <b>Y</b> Yttrium 39	40 <b>Zr</b> Zirconium 40	41 <b>Nb</b> Niobium 41	42 <b>Mo</b> Molybdenum 42	43 <b>Tc</b> Technetium 43	44 <b>Ru</b> Ruthenium 44	45 <b>Rh</b> Rhodium 45	46 <b>Pd</b> Palladium 46	47 <b>Ag</b> Silver 47	48 <b>Cd</b> Cadmium 48	49 <b>In</b> Indium 49	50 <b>Sn</b> Tin 50	51 <b>Sb</b> Antimony 51	52 <b>Te</b> Tellurium 52	53 <b>I</b> Iodine 53	54 <b>Xe</b> Xenon 54
55 <b>Cs</b> Caesium 55	56 <b>Ba</b> Barium 56	57 <b>La</b> Lanthanum 57	72 <b>Hf</b> Hafnium 72	73 <b>Ta</b> Tantalum 73	74 <b>W</b> Tungsten 74	75 <b>Re</b> Rhenium 75	76 <b>Os</b> Osmium 76	77 <b>Ir</b> Iridium 77	78 <b>Pt</b> Platinum 78	79 <b>Au</b> Gold 79	80 <b>Hg</b> Mercury 80	81 <b>Tl</b> Thallium 81	82 <b>Pb</b> Lead 82	83 <b>Bi</b> Bismuth 83	84 <b>Po</b> Polonium 84	85 <b>At</b> Astatine 85	86 <b>Rn</b> Radon 86
87 <b>Fr</b> Francium 87	88 <b>Ra</b> Radium 88	89 <b>Ac</b> Actinium 89											103 <b>Lr</b> Lawrencium 103				
*58-71 Lanthanoid series																	
†90-103 Actinoid series																	

Key

a	<b>X</b>	a = relative atomic mass
b	<b>X</b>	X = atomic symbol
		b = proton (atomic) number

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

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