

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**CO-ORDINATED SCIENCES**

**0654/01**

Paper 1 Multiple Choice

May/June 2005

**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, 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.

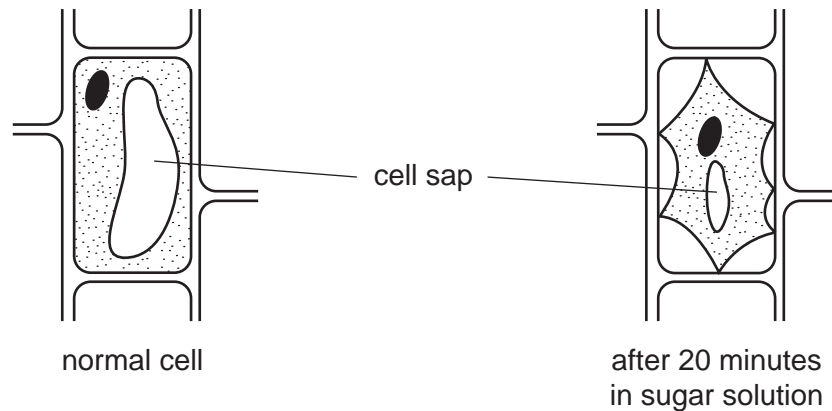
This document consists of **17** printed pages and **3** blank pages.



- 1 An animal is observed swimming in a river. It has legs, but no fins. Its skin is scaly.

To which class of vertebrates does this animal belong?

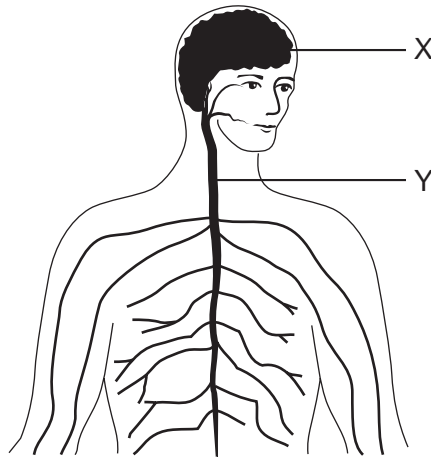
- A amphibians
  - B fish
  - C mammals
  - D reptiles
- 2 The diagrams show a normal plant cell, and a cell from the same plant, which has been in a sugar solution for 20 minutes.



What explains this change?

- A The sugar solution is less concentrated than the cell sap.
- B The sugar solution is more concentrated than the cell sap.
- C The sugar solution is the same concentration as the cell sap.
- D The sugar solution has killed the cell.

3 The diagram represents part of the human nervous system.

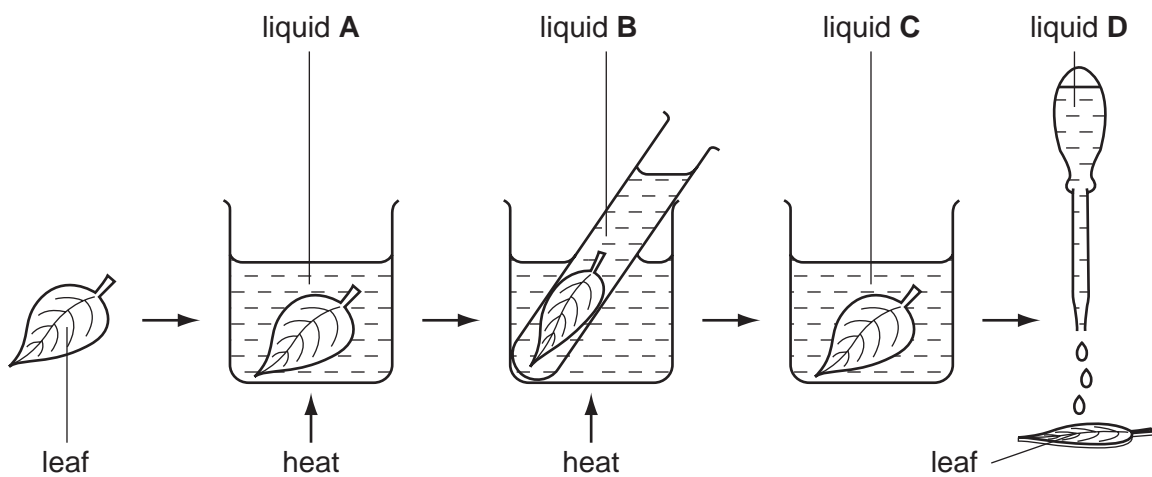


What name is given to X and Y together?

- A brain
- B central nervous system
- C nerve
- D spinal cord

4 The diagram shows the stages in testing a green leaf for starch.

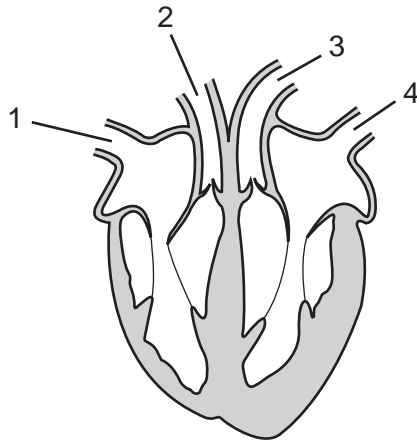
Which liquid is alcohol (methylated spirits)?



5 Which word equation represents aerobic respiration?

- A glucose → carbon dioxide + ethanol
- B glucose → lactic acid
- C glucose + oxygen → carbon dioxide + water
- D glucose + oxygen → lactic acid

6 The diagram shows a section through the heart.



Which two blood vessels are arteries?

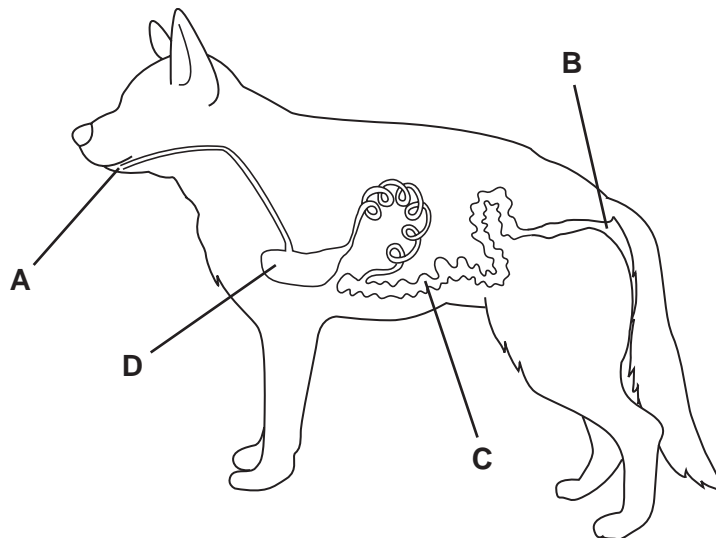
- A** 1 and 2      **B** 2 and 3      **C** 3 and 4      **D** 4 and 1

7 How do bacteria cause tooth decay?

- A** They release alkalis that dissolve enamel.  
**B** They release ethanol that digests enamel.  
**C** They release acids that dissolve enamel.  
**D** They release enzymes that digest enamel.

8 The diagram shows the alimentary canal of a dog.

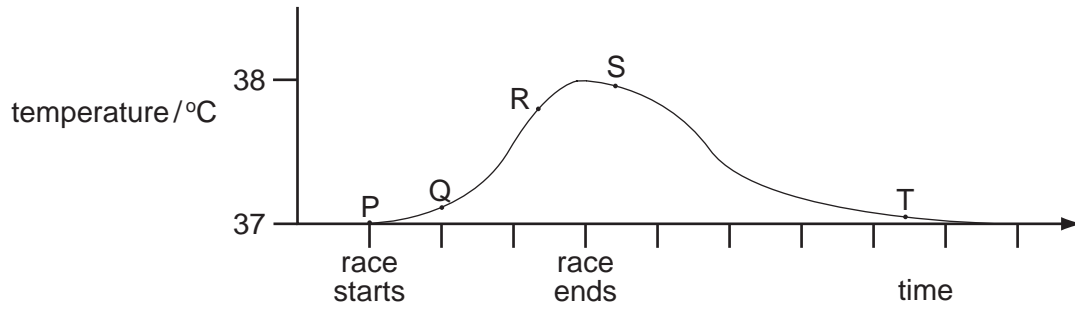
Where does egestion occur?



9 Which shows the sequence that occurs when a person becomes aware of light?

- A impulse → stimulus → receptor → spinal cord
- B receptor → stimulus → impulse → brain
- C stimulus → impulse → receptor → spinal cord
- D stimulus → receptor → impulse → brain

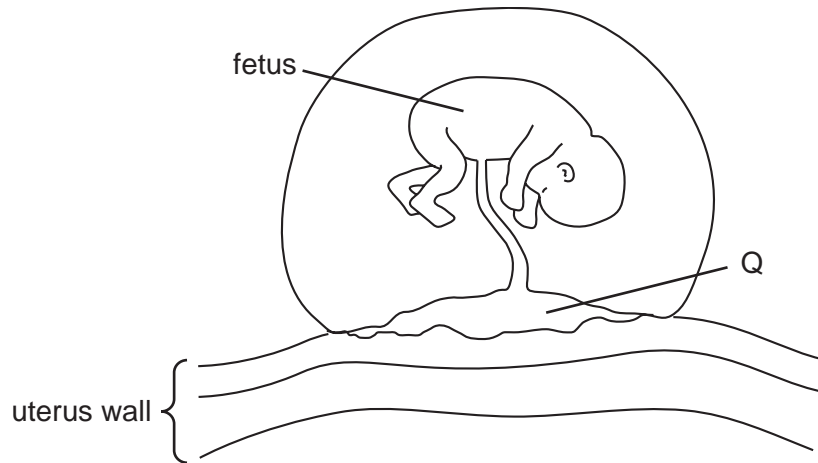
10 The graph shows body temperature before, during and after running a race on a hot day.



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

11 The diagram shows a developing fetus attached to the uterus wall.



What is the function of Q?

- A draining amniotic fluid
- B passing blood from the mother to the fetus
- C supplying carbon dioxide to the fetus
- D supplying oxygen to the fetus

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 x ff      **B** Ff x Ff      **C** Ff x ff      **D** ff x ff

13 What is an ecosystem?

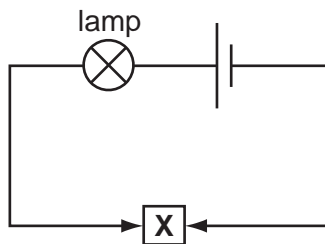
- A** a community and its habitat  
**B** a group of organisms and their predators  
**C** all organisms in a food chain  
**D** where an organism lives and breeds

14 What do the chemical symbols N<sub>2</sub> and Ni represent?

	N <sub>2</sub>	Ni
<b>A</b>	a compound	a compound
<b>B</b>	a compound	an element
<b>C</b>	an element	a compound
<b>D</b>	an element	an element

15 The diagram shows a circuit.

Solid **X** makes the lamp light.



What is solid **X**?

- A** copper  
**B** rubber  
**C** silicon(IV) oxide  
**D** sulphur

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

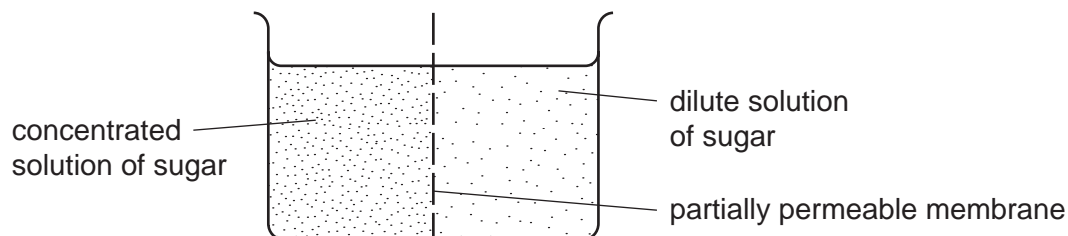
Small molecules can be .....Y..... to make long molecules.

What are **X** and **Y**?

	<b>X</b>	<b>Y</b>
<b>A</b>	cracked	distilled
<b>B</b>	cracked	polymerised
<b>C</b>	distilled	polymerised
<b>D</b>	distilled	cracked

17 A concentrated solution of a sugar is separated from a dilute solution of this sugar by a partially permeable membrane.

Sugar molecules are bigger than water molecules.



After one hour, the concentration of each solution has changed.

The reason is that more .....1..... molecules pass to the .....2..... than to the .....3.....

Which words correctly fill gaps 1, 2 and 3?

	1	2	3
<b>A</b>	sugar	left	right
<b>B</b>	sugar	right	left
<b>C</b>	water	left	right
<b>D</b>	water	right	left

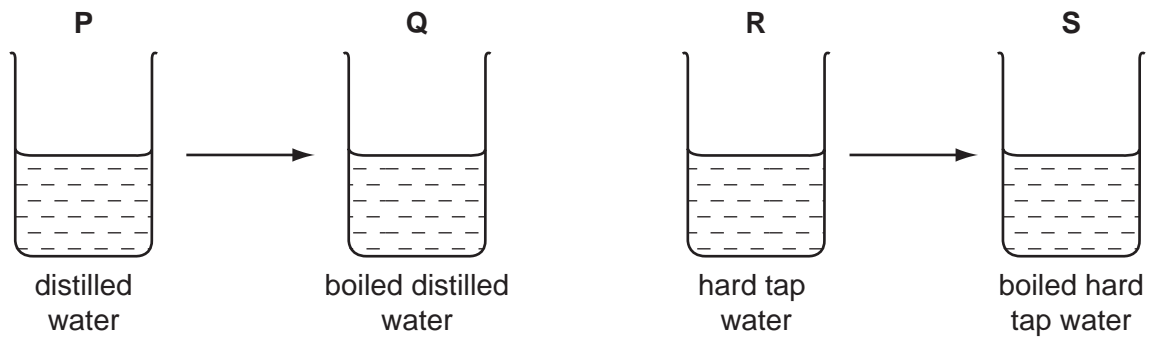
18 Carbon is used in the extraction of some metals from their ores because

- 1 carbon forms strong alloys with metals,
- 2 carbon reacts with oxygen in the ore.

Which of these statements are correct?

- A 1 only
- B 2 only
- C both 1 and 2
- D neither 1 or 2

19 Soap solution is gradually added to separate samples of water **P**, **Q**, **R** and **S** until a lather forms.

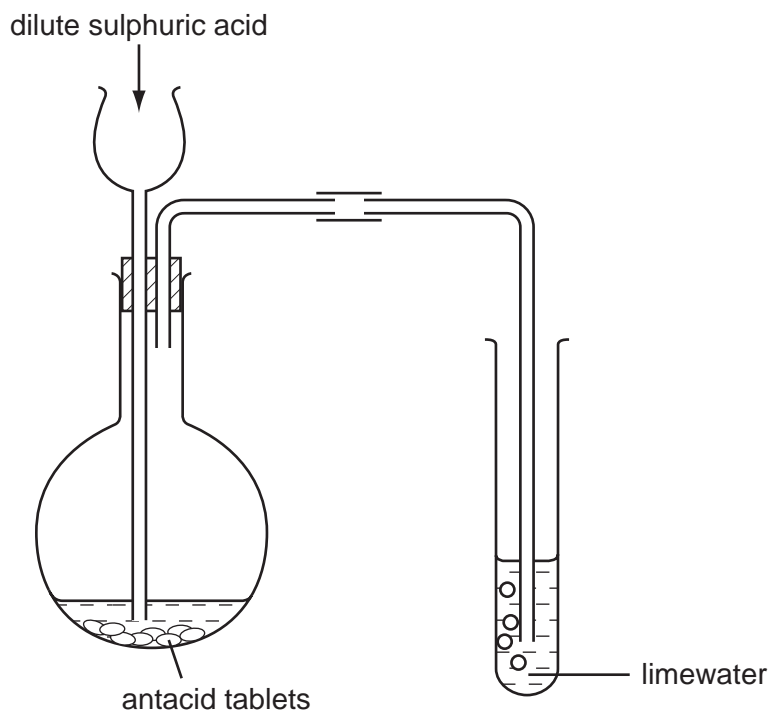


How does boiling affect the volume of soap solution needed for a lather?

	<b>P to Q</b>	<b>R to S</b>
<b>A</b>	no change	no change
<b>B</b>	no change	<b>S</b> needs less
<b>C</b>	<b>Q</b> needs more	no change
<b>D</b>	<b>Q</b> needs more	<b>S</b> needs less



20 Dilute sulphuric acid is added to antacid tablets in the apparatus shown.

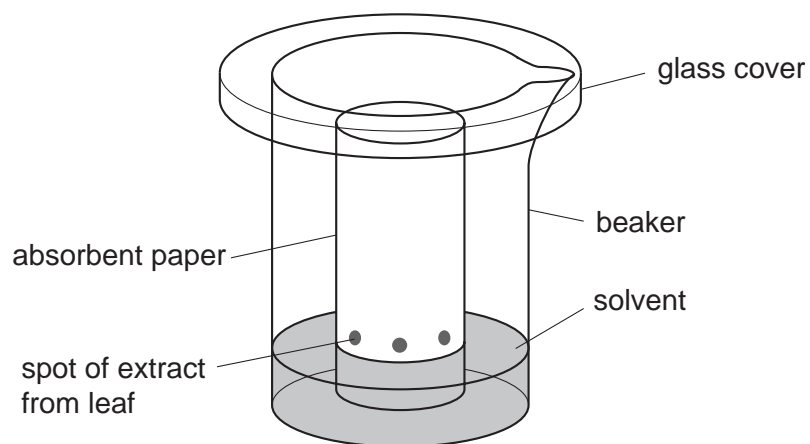


The limewater turns milky.

What do the antacid tablets contain?

- A magnesium
  - B magnesium carbonate
  - C magnesium hydroxide
  - D magnesium oxide
- 21 Which unit of time is most useful in describing the ages of rocks?
- A tens of years
  - B hundreds of years
  - C thousands of years
  - D millions of years
- 22 An increase in the world's population increases the demand for food.
- Which industrial process helps to increase food production?
- A chlorination of water
  - B distillation of petroleum to form petrol
  - C manufacture of ammonium sulphate
  - D recycling of glass bottles

23 A student uses the apparatus shown to find out how many different pigments are in leaves.



What is this separation method called?

- A chromatography
- B distillation
- C evaporation
- D filtration

24 The contents of a beaker scatter a beam of light

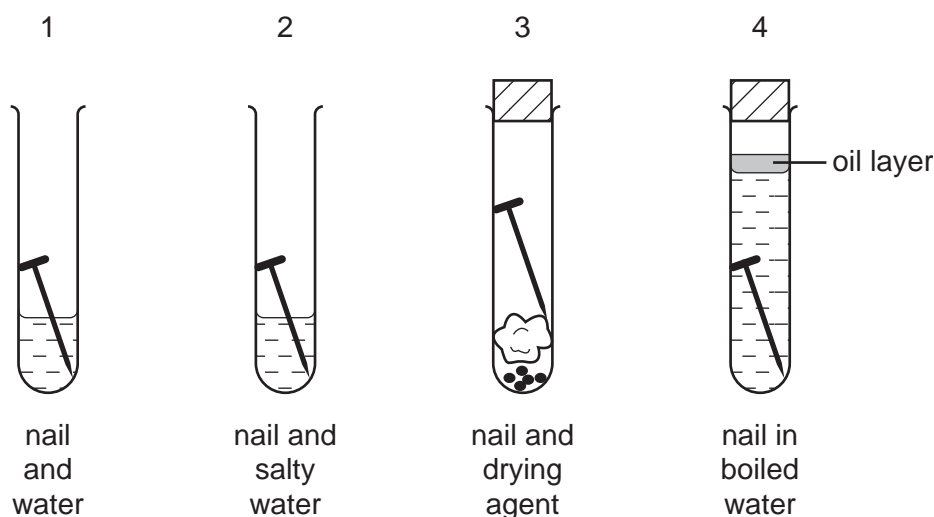
What does the beaker contain?

- A aqueous copper(II) sulphate
- B ethanol
- C milk
- D water

25 Which of the following is a solid fossil fuel?

- A coal
- B oil
- C sugar
- D wood

26 The diagrams show an investigation into the conditions needed for rusting of iron nails.



The nails in tubes 1 and 2 rust within a few days.

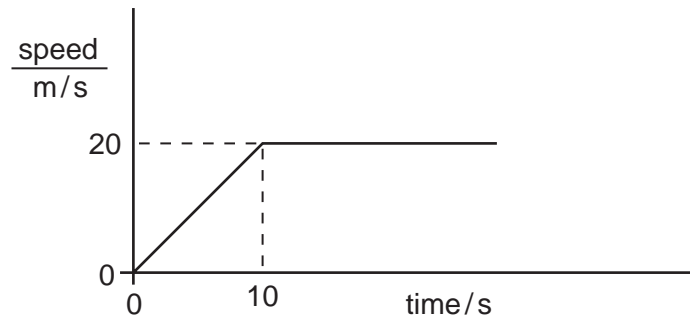
Which conditions are required for rusting?

- A air alone
  - B air and water
  - C salt and water
  - D water alone
- 27 Which ion gives a white precipitate **both** with aqueous sodium hydroxide **and** with aqueous ammonia?
- A  $\text{Cu}^{2+}(\text{aq})$
  - B  $\text{Fe}^{2+}(\text{aq})$
  - C  $\text{Fe}^{3+}(\text{aq})$
  - D  $\text{Zn}^{2+}(\text{aq})$
- 28 A decorator wishes to calculate the area of a bathroom tile so that he can estimate the amount of adhesive which he needs to buy.

What must he use?

- A a measuring cylinder only
- B a ruler only
- C a measuring cylinder and a clock only
- D a measuring cylinder and a ruler only

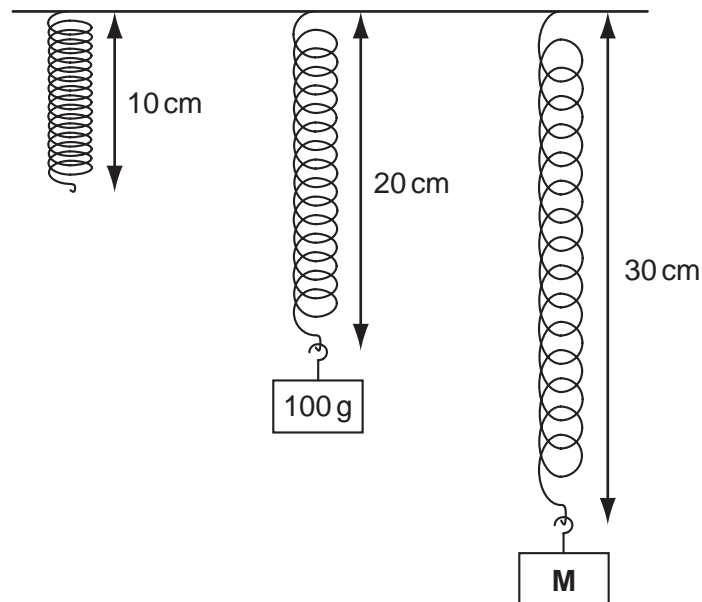
29 A car accelerates from traffic lights. The graph shows how the car's speed changes with time.



How far does the car travel before it reaches a steady speed?

- A 10 m            B 20 m            C 100 m            D 200 m

30 Objects with different masses are hung on a 10 cm spring. The diagram shows how much the spring stretches.



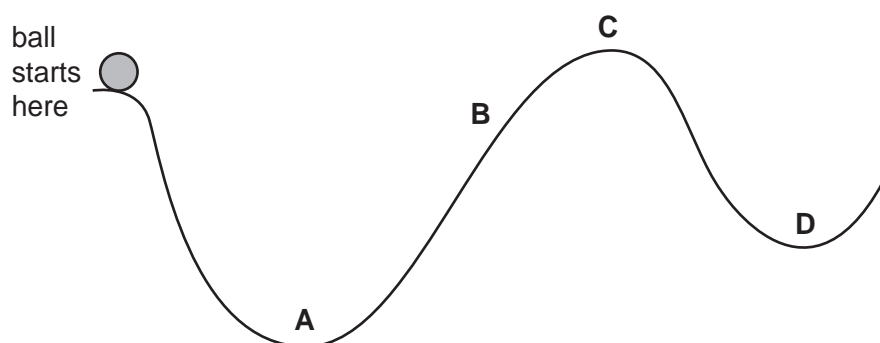
The extension of the spring is directly proportional to the mass hung on it.

What is the mass of object **M**?

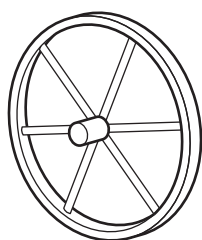
- A 110 g            B 150 g            C 200 g            D 300 g

31 A ball is released from rest and rolls down a track from the position shown.

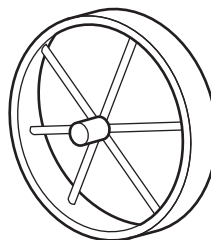
What is the furthest position the ball could reach?



32 A farmer has two carts. The carts have the same weight, but one has narrow wheels and the other has wide wheels.



narrow wheel

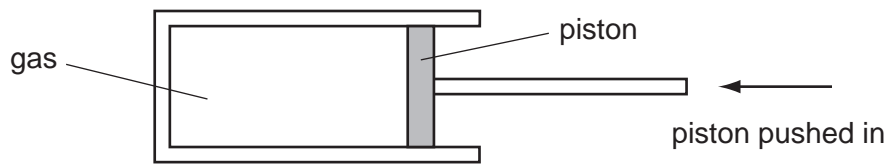


wide wheel

In rainy weather, which cart sinks **less** into soft ground, and why?

	cart wheels	why
<b>A</b>	narrow	greater pressure on the ground
<b>B</b>	narrow	less pressure on the ground
<b>C</b>	wide	greater pressure on the ground
<b>D</b>	wide	less pressure on the ground

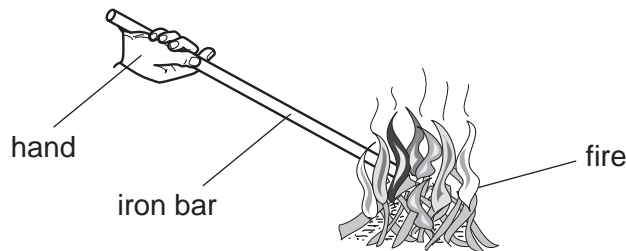
- 33 A measured mass of gas is placed in a cylinder at atmospheric pressure and is then slowly compressed.



The temperature of the gas does not change.

What happens to the pressure of the gas?

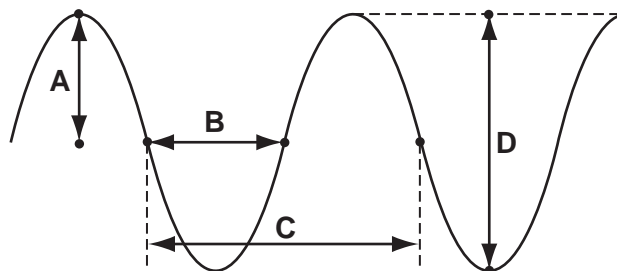
- A It drops to zero.
  - B It decreases, but not to zero.
  - C It stays the same.
  - D It increases.
- 34 An iron bar is held with one end in a fire. The other end soon becomes too hot to hold.



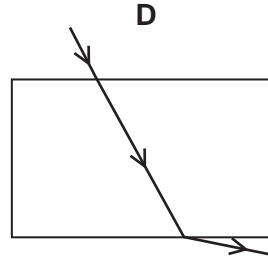
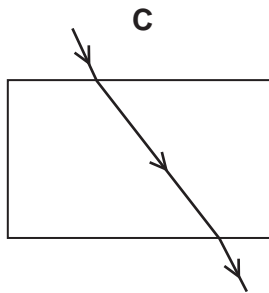
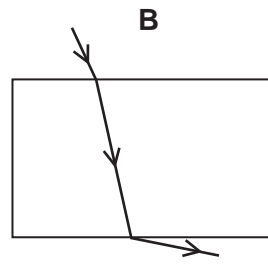
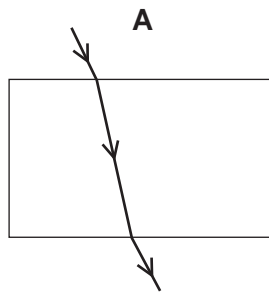
How has the heat travelled along the iron bar?

- A by conduction
  - B by convection
  - C by expansion
  - D by radiation
- 35 The drawing shows a wave.

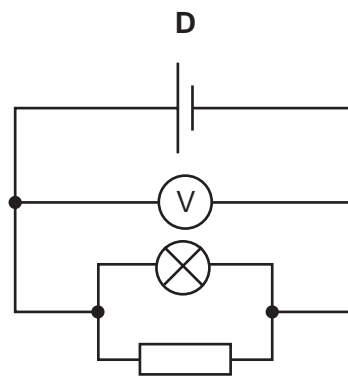
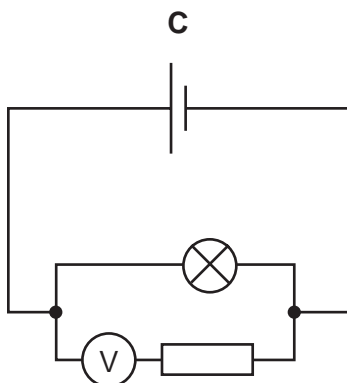
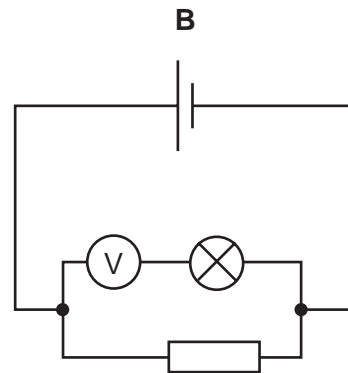
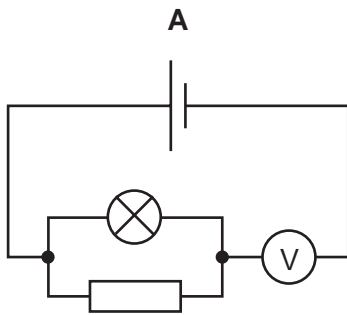
Which labelled distance is the wavelength?



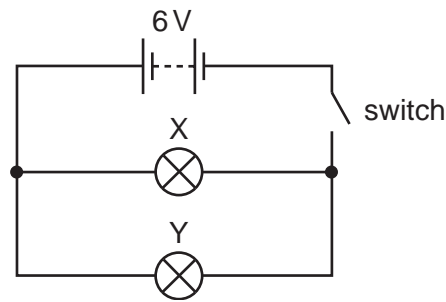
36 Which diagram correctly shows a ray of light passing through a rectangular glass block?



37 In which circuit does the voltmeter read the potential difference across the lamp?



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



What happens when the switch is closed?

- A X lights more brightly than Y.
  - B Y lights more brightly than X.
  - C X and Y light with equal brightness.
  - D Neither X nor Y light.
- 39 Which type of radiation produces the most ionisation?
- A alpha-particles
  - B beta-particles
  - C gamma-rays
  - D all produce the same amount
- 40 A powder contains 400 mg of a radioactive material which emits alpha-particles.  
The half-life of the material is 5 days.  
What mass of that material remains after 10 days?
- A 0 mg            B 40 mg            C 100 mg            D 200 mg



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

		Group																			
I	II	III	IV	V	VI	VII	O														
		1 <b>H</b> Hydrogen 1										4 <b>He</b> Helium 2									
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											20 <b>Ne</b> Neon 10									
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9					35.5 <b>Ar</b> Argon 18										
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulphur 16	35.5 <b>Cl</b> Chlorine 17					84 <b>Kr</b> Krypton 36										
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35					131 <b>Xe</b> Xenon 54										
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	65 <b>Zn</b> Zinc 30	64 <b>Cu</b> Copper 29	59 <b>Ni</b> Nickel 28	108 <b>Ag</b> Silver 47	106 <b>Pd</b> Palladium 46	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	127 <b>I</b> Iodine 53			209 <b>Po</b> Polonium 84									
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89	204 <b>Tl</b> Thallium 81	201 <b>Hg</b> Mercury 80	197 <b>Au</b> Gold 79	195 <b>Pt</b> Platinum 78	192 <b>Ir</b> Iridium 77	207 <b>Pb</b> Lead 82					86 <b>Rn</b> Radon 86									
<p><b>*58-71 Lanthanoid series</b> <b>90-103 Actinoid series</b></p>																					
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px;">a</td> <td style="border: 1px solid black; padding: 2px;"><b>X</b></td> <td style="padding: 2px;">a = relative atomic mass</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">b</td> <td style="border: 1px solid black; padding: 2px;"><b>X</b></td> <td style="padding: 2px;">X = atomic symbol</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;"></td> <td style="border: 1px solid black; padding: 2px;"><b>X</b></td> <td style="padding: 2px;">b = proton (atomic) number</td> </tr> </table>													a	<b>X</b>	a = relative atomic mass	b	<b>X</b>	X = atomic symbol		<b>X</b>	b = proton (atomic) number
a	<b>X</b>	a = relative atomic mass																			
b	<b>X</b>	X = atomic symbol																			
	<b>X</b>	b = proton (atomic) number																			
140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	150 <b>Sm</b> Samarium 62	157 <b>Gd</b> Gadolinium 64	152 <b>Eu</b> Europium 63	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71											
232 <b>Th</b> Thorium 90	238 <b>Pa</b> Protactinium 91	144 <b>Nd</b> Neodymium 60	141 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70									
<p><b>Key</b></p>																					

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