

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS
PAPER 1 Multiple Choice

0625/1

Tuesday 4 NOVEMBER 1997

Morning 45 minutes

Additional materials:

Electronic calculator and/or Mathematical tables

Multiple Choice answer sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

TIME 45 minutes

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are forty questions in 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 very carefully the instructions on the answer sheet.

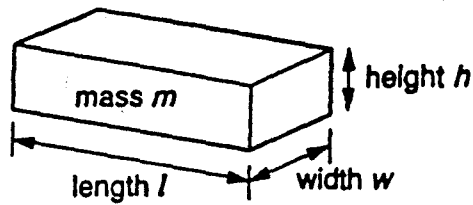
INFORMATION FOR CANDIDATES

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.

This question paper consists of 20 printed pages.

- 1 The diagram shows a rectangular block.



Which quantities are needed to calculate the volume of the block?

	<i>length l</i>	<i>width w</i>	<i>height h</i>	<i>mass m</i>
A	✓	✓	✗	✗
B	✗	✓	✓	✓
C	✓	✓	✓	✗
D	✓	✓	✓	✓

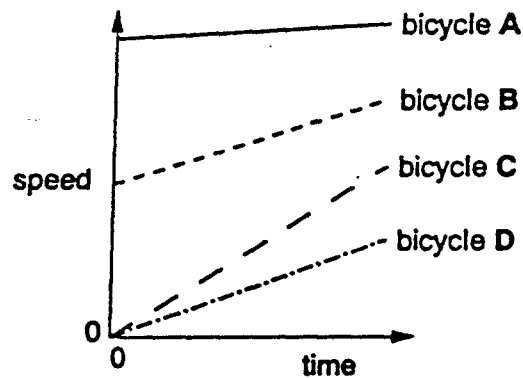
key

✓ = needed

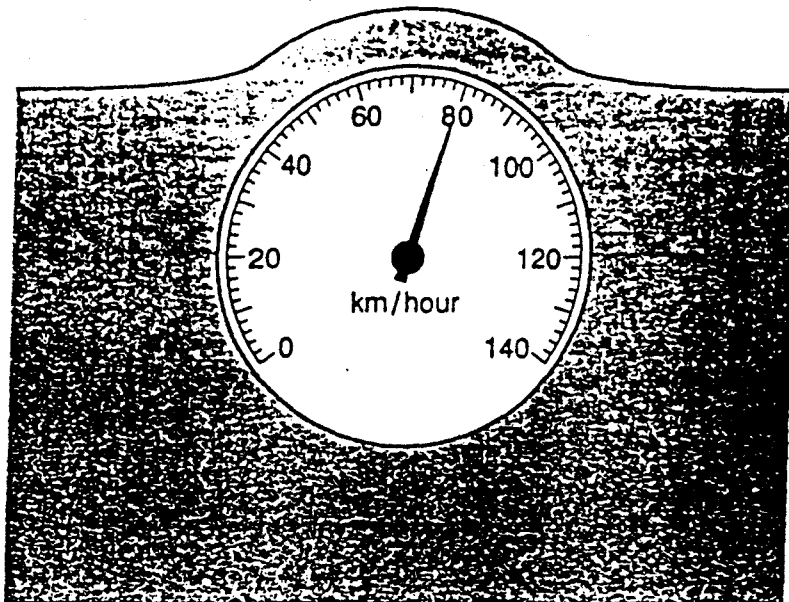
✗ = not needed

- 2 The diagram shows speed-time graphs for four bicycles.

Which bicycle has the greatest acceleration?



- 3 The picture shows the speedometer in a car. A speedometer tells the driver how fast the car is travelling.



How far would this car travel in two hours at the speed shown?

- A 40 km B 80 km C 140 km D 160 km
- 4 The table shows the density of various substances.

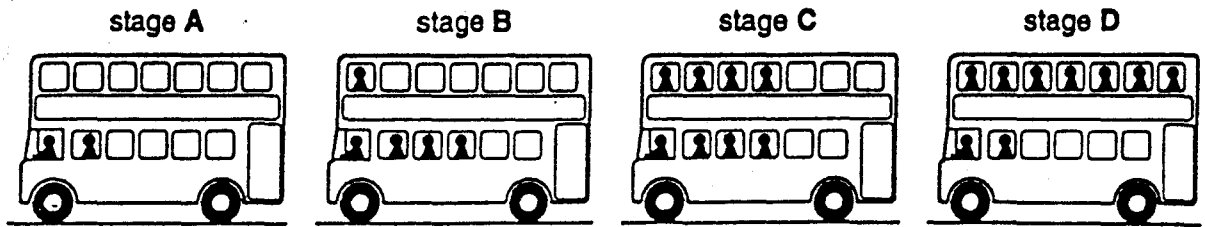
<i>substance</i>	<i>density/ g/cm³</i>
copper	8.9
iron	7.9
kerosene	0.87
mercury	13.6
water	1.0

Which statement is correct?

- A 1 cm³ of mercury has a greater mass than 1 cm³ of any other substance in this table.
- B 1 cm³ of water has a smaller mass than 1 cm³ of any other substance in this table.
- C 1 g of iron has a smaller volume than 1 g of copper.
- D 1 g of mercury has a greater mass than 1 g of copper.

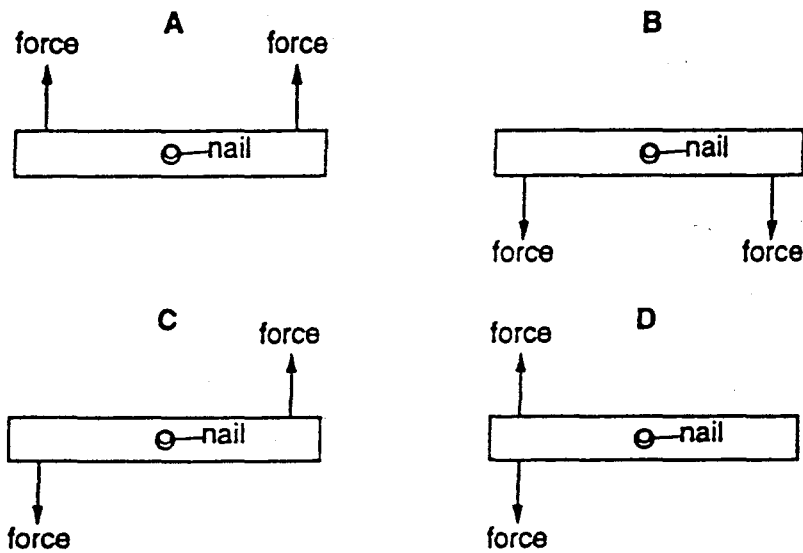
5 The diagrams show a bus at four different stages of a journey.

At which stage does the bus with its passengers have the lowest centre of gravity?



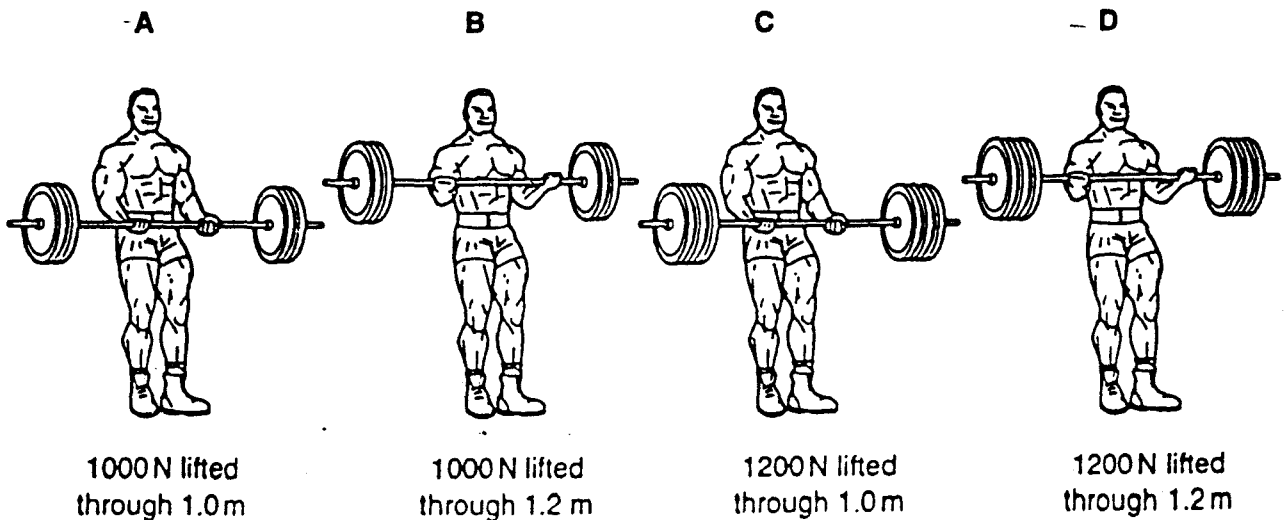
6 A metre rule is pivoted about a nail through a hole at its centre. Equal forces are applied at different places as shown.

Which diagram shows an arrangement in which the rule will turn?



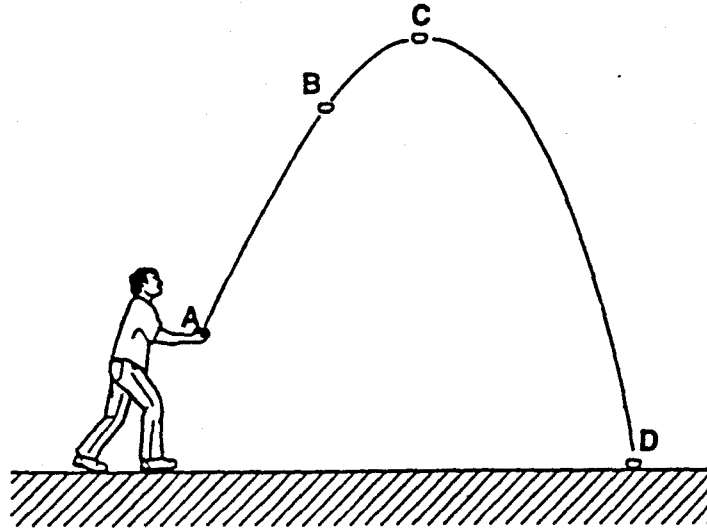
7 Four weightlifters lift weights to different heights.

Which weightlifter does the most work?

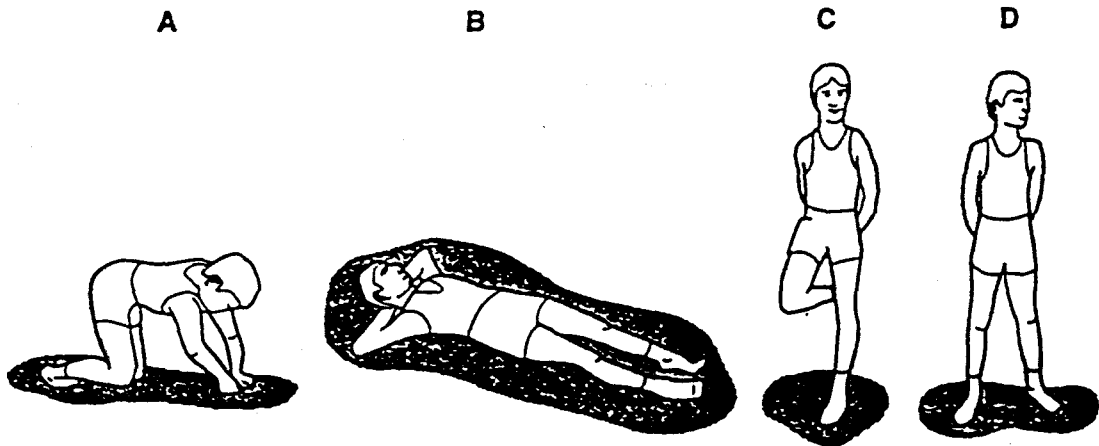


- 8 A stone is thrown into the air. The diagram shows the path of the stone through the air.

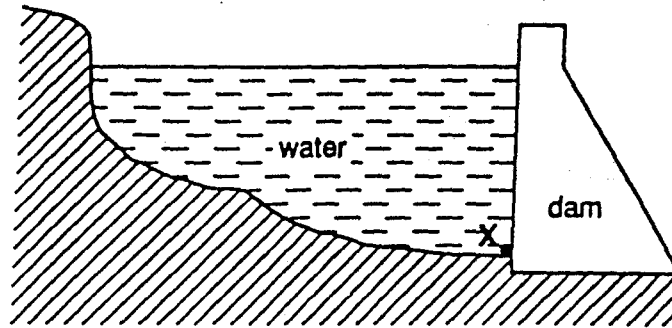
At which position is the gravitational (potential) energy of the stone greatest?



- 9 Which diagram shows a child exerting least pressure on the ground?



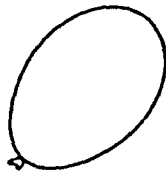
- 10 The diagram shows a deep reservoir formed by a dam.



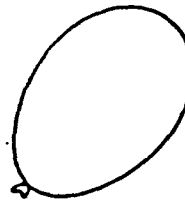
On what does the pressure at X depend?

- A the depth of the water in the reservoir
 - B the length of the reservoir
 - C the surface area of the water
 - D the thickness of the dam wall
- 11 The size of a balloon increases if the pressure inside it increases.
The balloon gets bigger when it is left in the heat from the Sun.

cool balloon



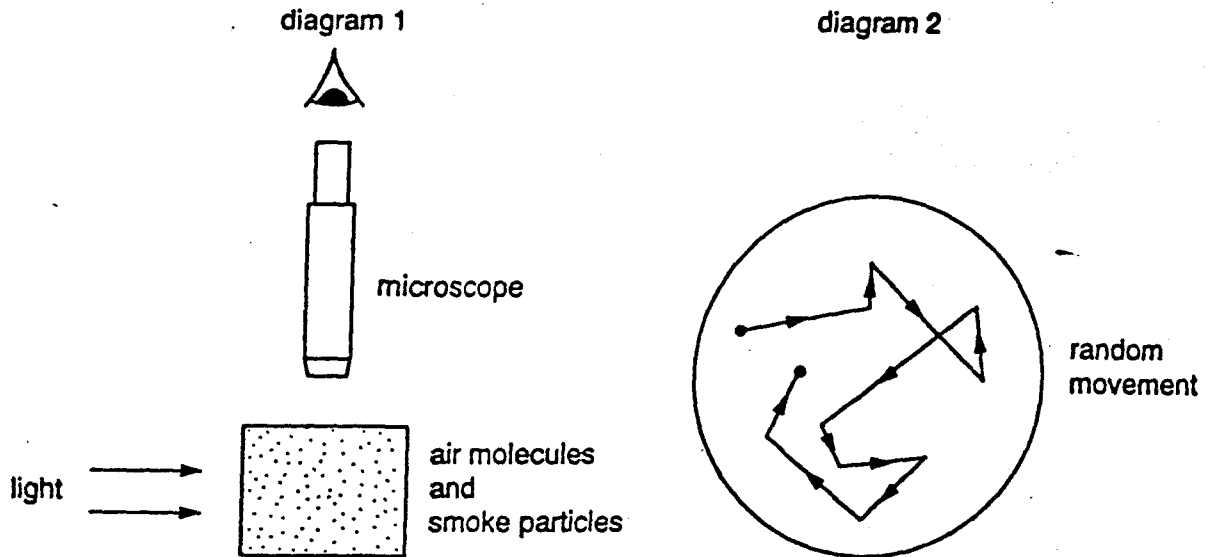
hot balloon



Why does this happen?

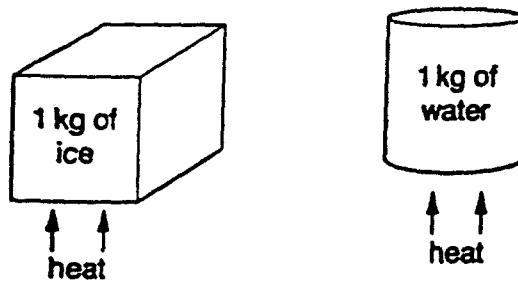
- A The air molecules inside it are all moving outwards.
- B The air molecules inside it are bigger when they are heated.
- C The air molecules inside it move faster when they are heated.
- D The number of air molecules inside it increases.

- 12 Diagram 1 shows apparatus being used to observe smoke particles. Diagram 2 shows how the particles move randomly.



Why do the smoke particles move randomly?

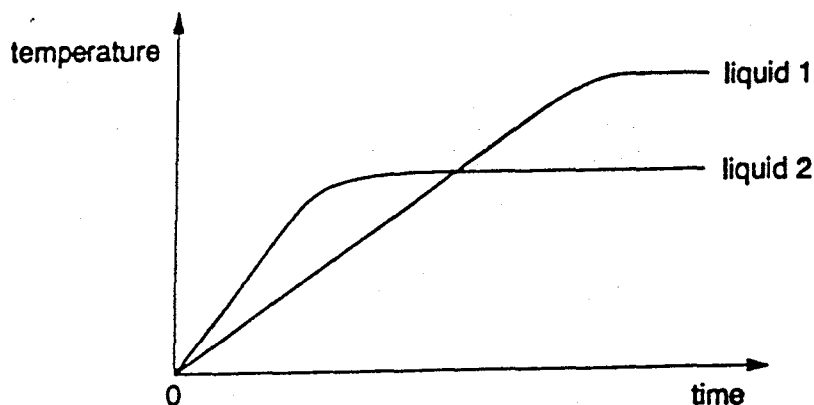
- A They are hit by air molecules.
 - B They are less dense than air.
 - C They are moved by convection currents.
 - D They gain energy from the light.
- 13 A 1 kg sample of ice and 1 kg of water, each initially at 0°C , are given a small amount of heat energy.



What happens to the temperatures of the ice and of the water?

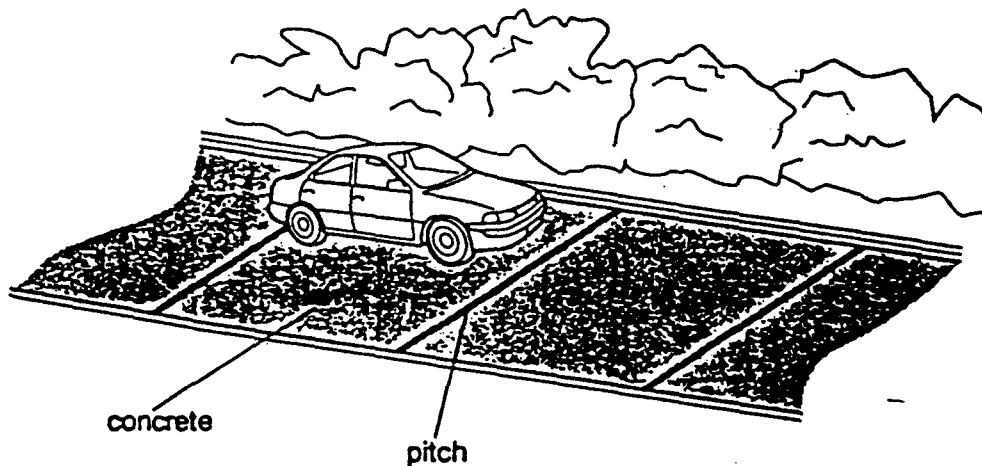
- | <i>temperature
of ice</i> | <i>temperature
of water</i> |
|-------------------------------|---------------------------------|
| A increases | stays the same |
| B increases | increases |
| C stays the same | stays the same |
| D stays the same | increases |

- 14 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?

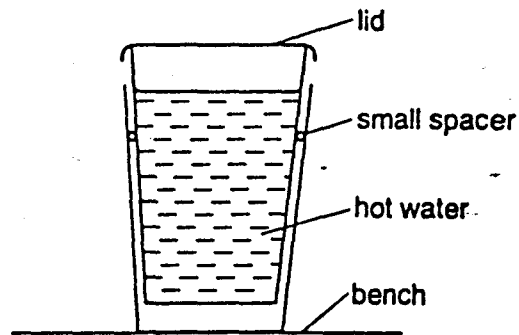
- A Liquid 1 has a higher melting point than liquid 2.
 - B Liquid 1 has a higher boiling point than liquid 2.
 - C Liquid 1 melts sooner than liquid 2.
 - D Liquid 1 boils sooner than liquid 2.
- 15 Concrete roads are laid in sections, and the gaps between sections are filled with soft pitch.



Why is this done?

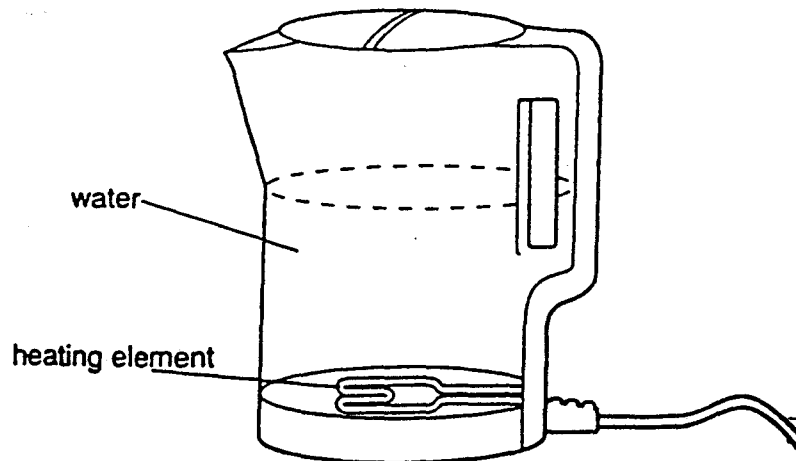
- A to allow for expansion and contraction of the concrete
- B to allow the pitch to radiate heat from the road
- C to increase the strength of the concrete
- D to reduce the mass of concrete used

- 16 Two plastic cups are placed one inside the other. 'Spacers' stop the inner cup touching the outer cup. Hot water is poured into the inner cup and a lid put on top as shown.



Which statement is correct?

- A Heat loss by radiation is prevented by the small air gap.
 - B No heat passes through the sides of either cup.
 - C The bench is heated by convection from the bottom of the outer cup.
 - D The lid is used to reduce heat loss by convection.
- 17 An electric kettle contains a metal heating element.

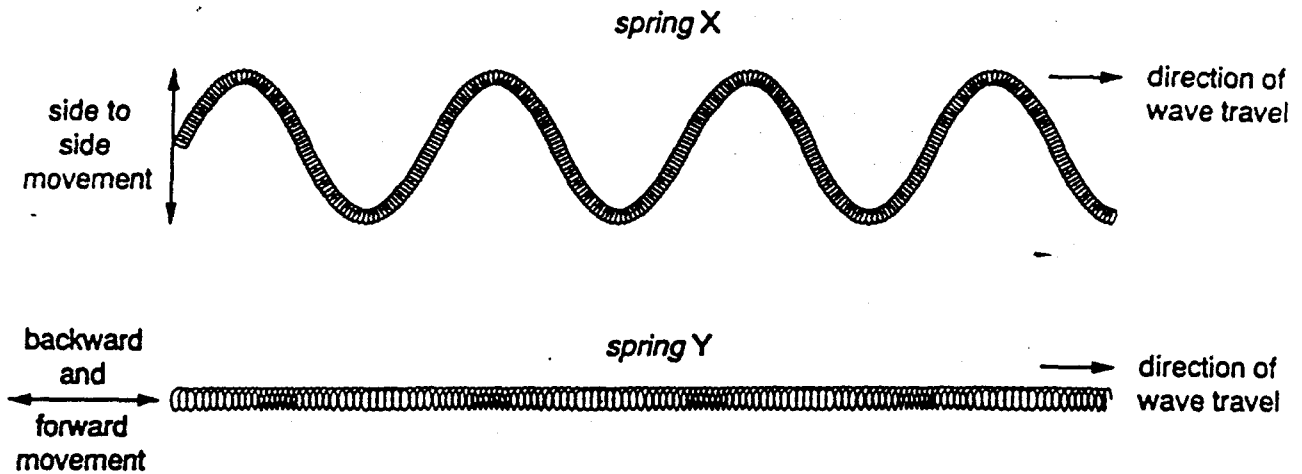


What is the main process by which heat energy is transferred from the element to the water, and throughout the water?

heat transfer process

- | | <i>element to water</i> | <i>throughout water</i> |
|---|-------------------------|-------------------------|
| A | conduction | convection |
| B | convection | radiation |
| C | radiation | conduction |
| D | radiation | convection |

18 Waves are sent along two long springs, X and Y, as shown (viewed from above).



How should the wave motions in X and Y be described?

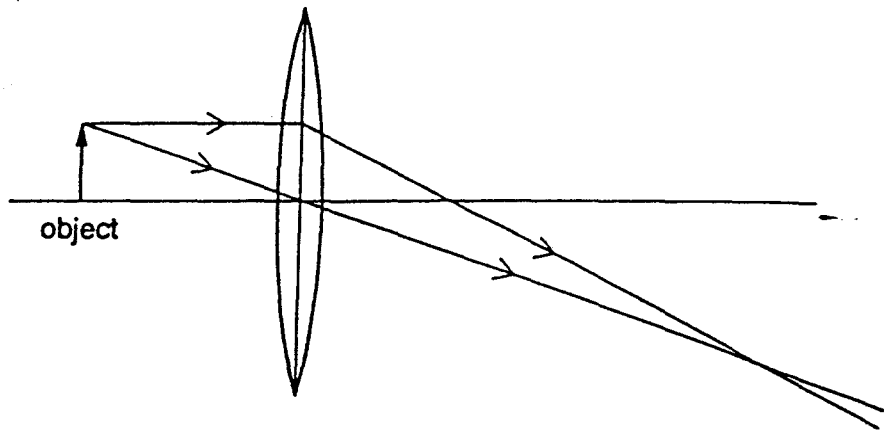
- | | <i>spring X</i> | <i>spring Y</i> |
|---|-----------------|-----------------|
| A | longitudinal | longitudinal |
| B | longitudinal | transverse |
| C | transverse | longitudinal |
| D | transverse | transverse |

19 Which statement about infra-red waves is true?

Infra-red waves in the electromagnetic spectrum

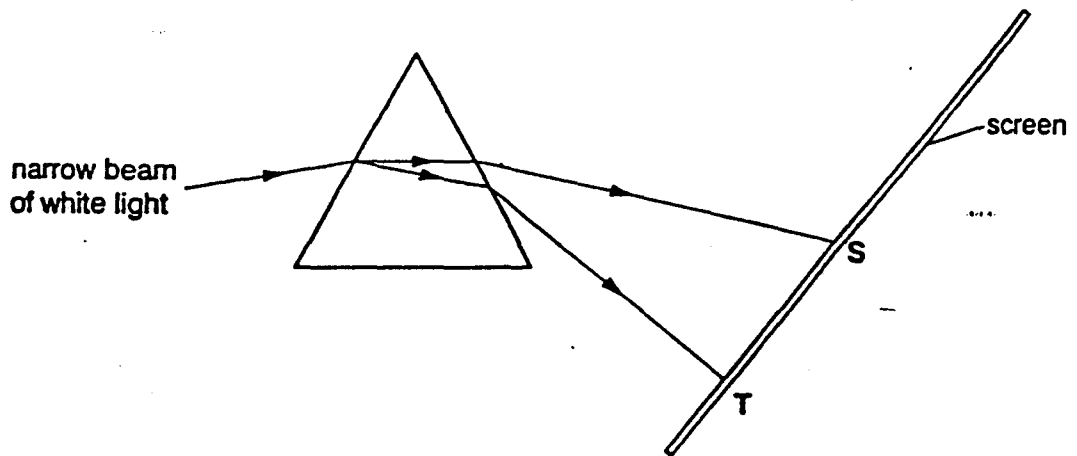
- A can be seen by the human eye.
- B cannot travel through a vacuum.
- C have the same speed as radio waves when in a vacuum.
- D travel as longitudinal waves.

- 20 The diagram illustrates two rays of light passing through a converging lens.



What type of image is formed?

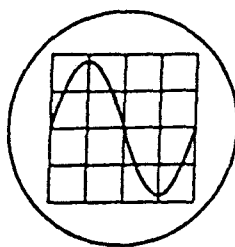
- A upright (erect) and larger than the object
 - B upright (erect) and smaller than the object
 - C inverted and larger than the object
 - D inverted and smaller than the object
- 21 A narrow beam of white light is shone through a prism. A spectrum ST is formed on a white screen as shown.



What is the colour at T?

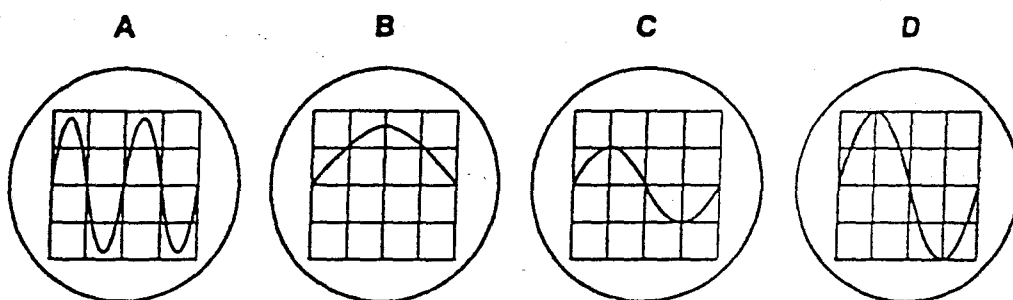
- A orange
- B red
- C violet
- D yellow

- 22 A microphone is connected to a cathode-ray oscilloscope. The diagram shows the trace caused by a sound wave.

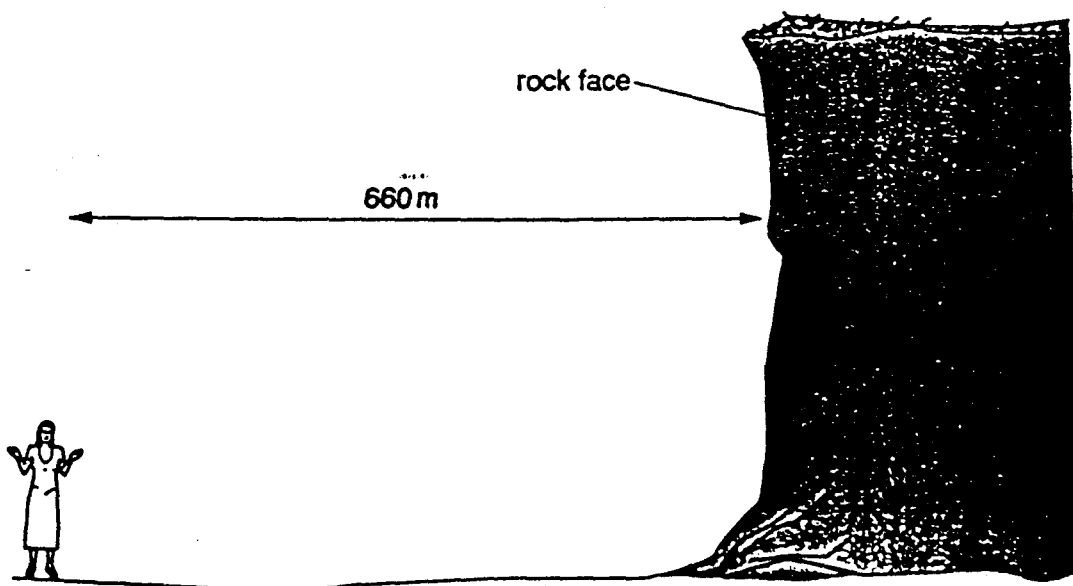


The frequency of the sound is increased but the controls of the cathode-ray oscilloscope are not altered.

What could be the new trace on the oscilloscope?



- 23 A girl stands in front of a rock-face.

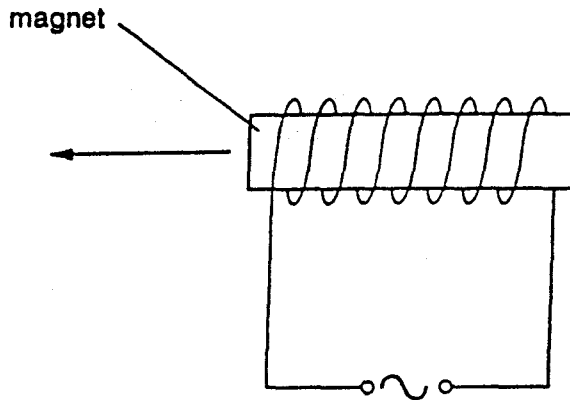


She claps her hands once.

How long is it before she hears the echo? The speed of sound is 330 m/s.

- A $\frac{2 \times 660}{330}$ s B $\frac{660}{330}$ s C $\frac{330}{660}$ s D $\frac{330}{2 \times 660}$ s

24 A magnet is slowly taken out of a coil connected to an alternating current supply.

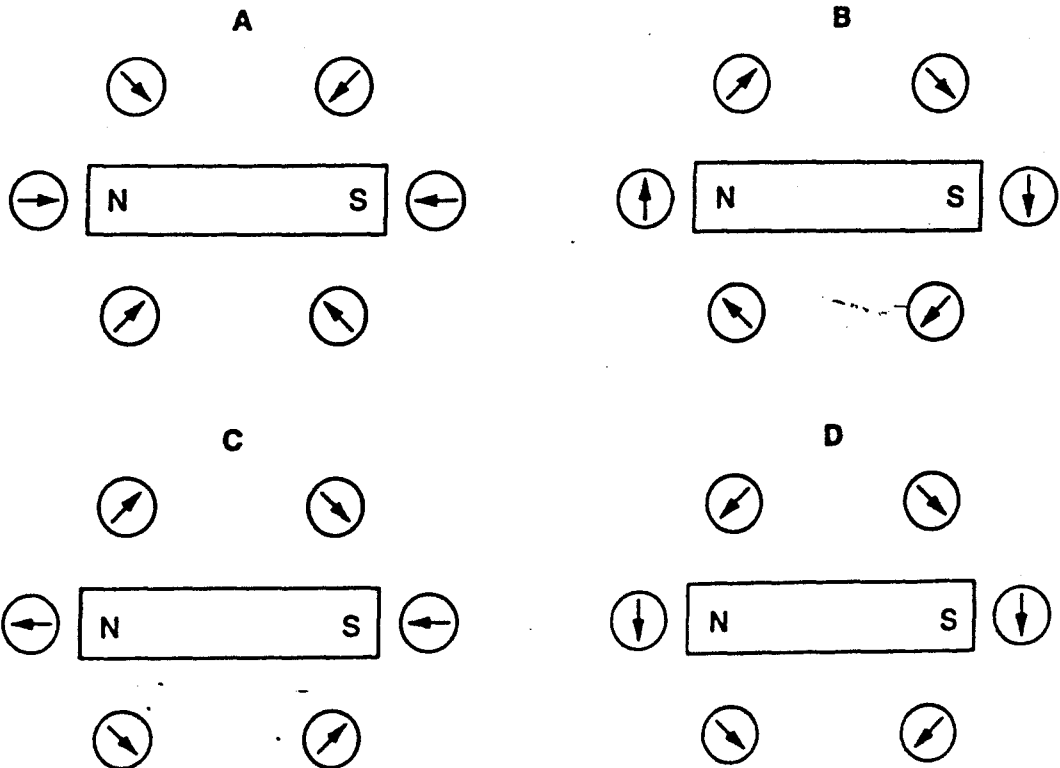


What happens to the magnet?

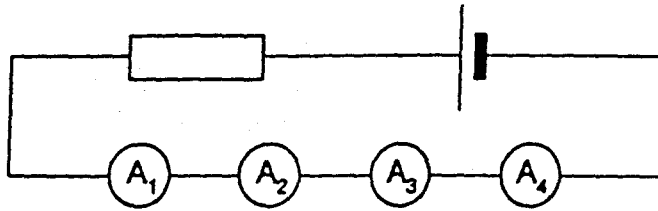
- A It does not change.
- B It is demagnetised.
- C It is more strongly magnetised.
- D Its poles change ends.

25 Six small compasses are placed around a bar magnet.

Which diagram shows the directions in which they point?



- 26 Two faulty ammeters and two perfect ammeters are connected in series in the circuit shown.



The readings on the ammeters are:

$$A_1 \quad 2.9\text{A}$$

$$A_2 \quad 3.1\text{A}$$

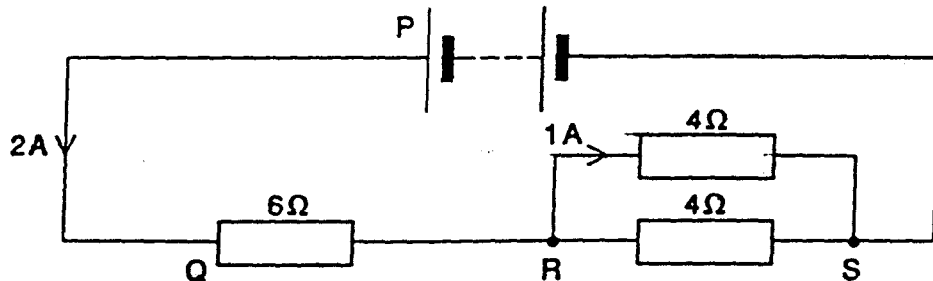
$$A_3 \quad 3.1\text{A}$$

$$A_4 \quad 3.3\text{A}$$

Which two ammeters are faulty?

- A A_1 and A_2 B A_1 and A_4 C A_3 and A_2 D A_3 and A_4

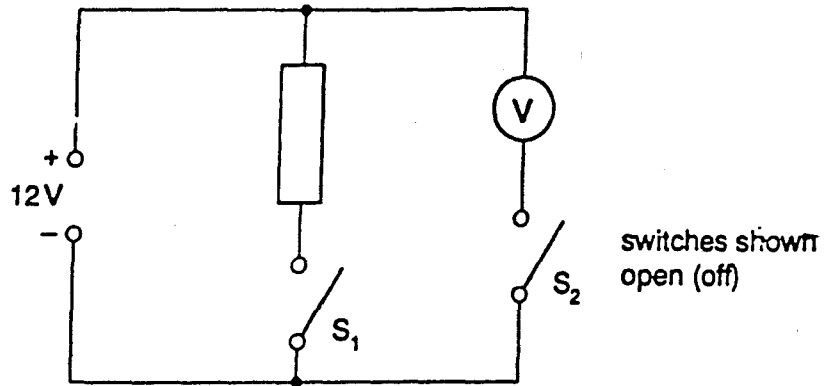
- 27 The circuit shows three resistors connected to a battery.



Given that p.d. = current \times resistance, across which part of the circuit is there a p.d. of 4 V?

- A PR B PS C QR D RS

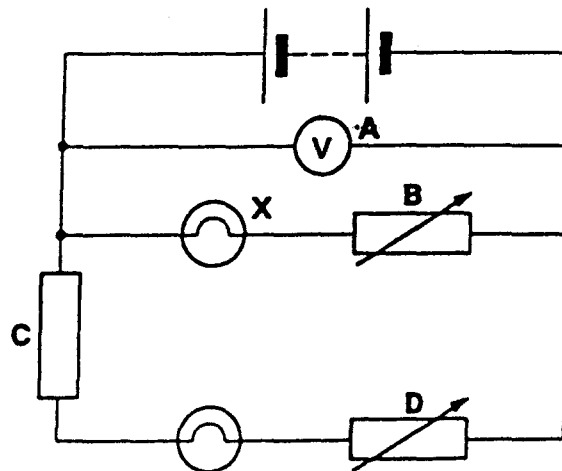
28 In the circuit, the switches S_1 and S_2 may be open (off) or closed (on).



Which line in the table correctly shows the voltmeter reading for the switch positions given?

	S_1	S_2	voltmeter reading/ V
A	open	open	12
B	closed	closed	12
C	open	closed	0
D	closed	open	12

29 Which labelled component in the circuit controls the brightness of the lamp X?



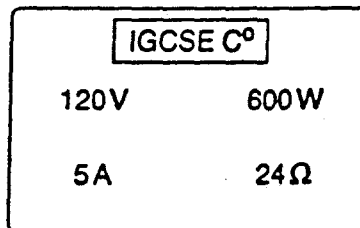
30 A mains circuit can safely supply a current of 40 A.

A hairdryer takes 2 A. It is connected to the circuit by a lead which can carry up to 5 A.

What is the current rating of the fuse which should be put in the plug fitted to the hairdryer lead?

- A 1 A B 3 A C 10 A D 50 A

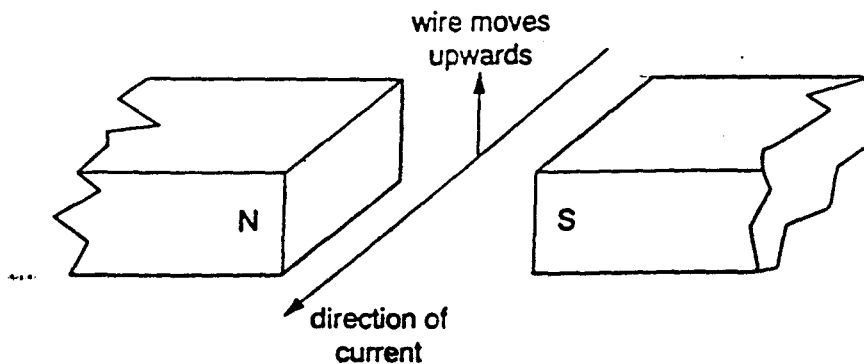
31 The diagram shows a label on a heater.



What is the power of the heater?

- A 5 A B 24 Ω C 120 V D 600 W

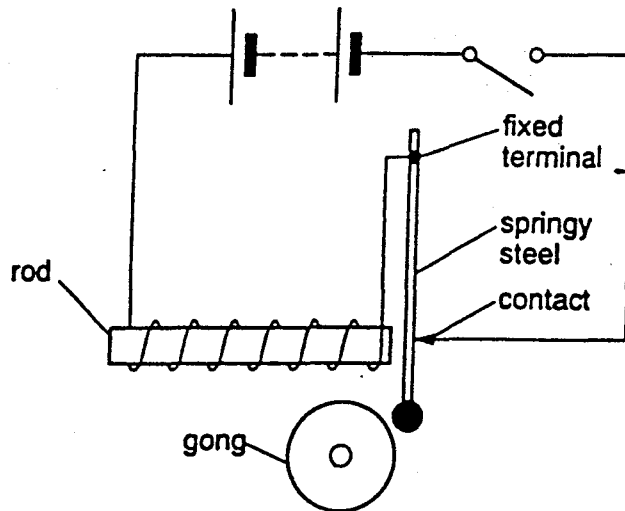
32 A student does an experiment to see the effect of a magnetic field on a wire carrying a current. The wire moves upwards, as shown.



What could the student do to make the wire move downwards?

- A change the direction of the current
 B move the poles of the magnet closer
 C send a smaller current through the wire
 D use a weaker magnet

33 A student sets up the apparatus shown in order to make an electric bell.

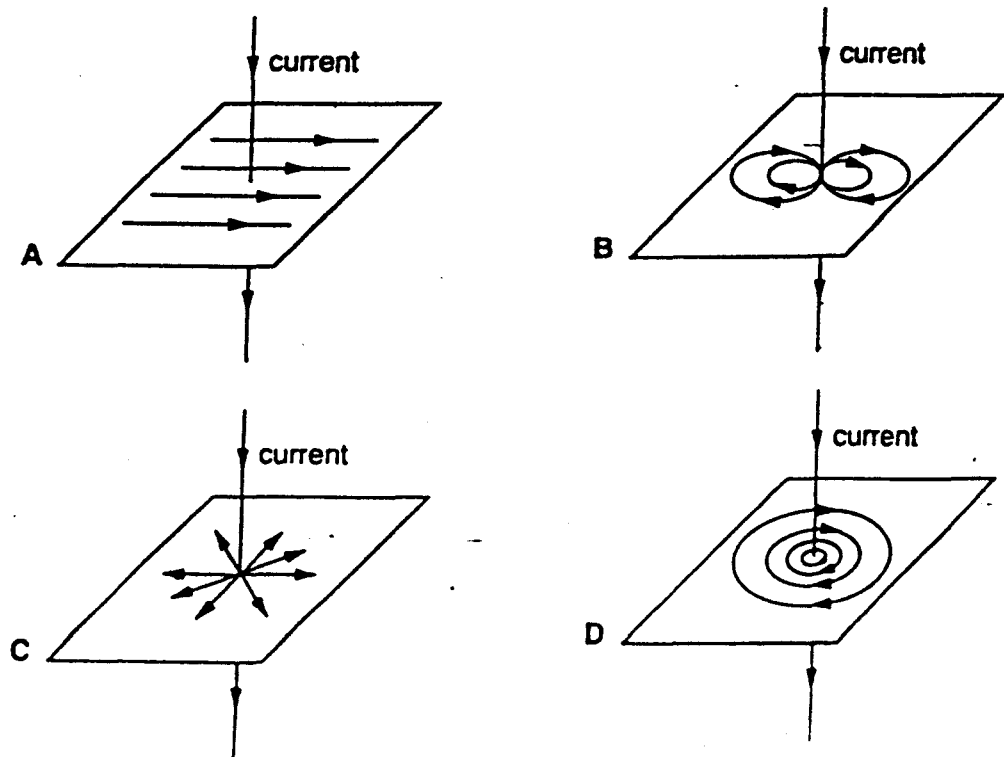


Which metal should be used to make the rod?

- A aluminium
- B copper
- C iron
- D steel

34 A straight wire, carrying a current, produces a magnetic field.

Which diagram shows the correct shape of the field?



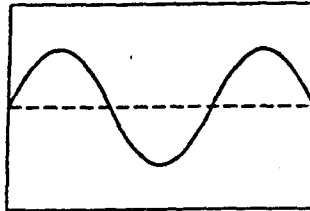
35 When a filament is heated, thermionic emission occurs and particles are emitted.

What are these particles?

- A α -particles
- B electrons
- C neutrons
- D protons

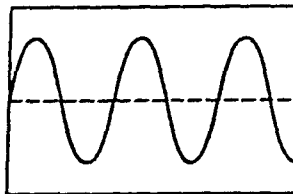
36 A pupil sets up a waveform on an oscilloscope, as shown in diagram 1.

diagram 1



One control on the oscilloscope is then altered to produce the trace shown in diagram 2.

diagram 2



Which control is altered?

- A brightness
- B focus
- C time-base
- D Y-gain (volt/cm)

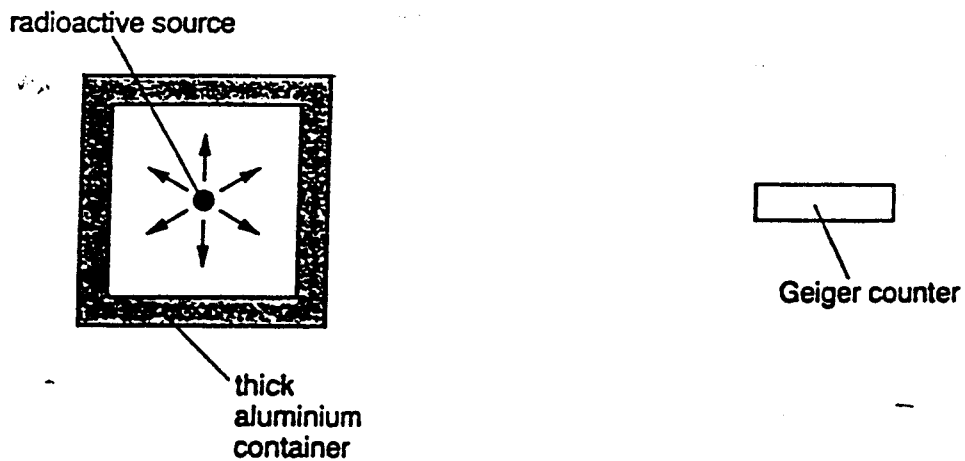
- 37 The count rate of radiation produced by a radioactive sample is measured every minute. The results are recorded in the table.

time/ minutes	count rate/ per second
0	80
1	56
2	40
3	28
4	20
5	14

What is the half-life of the radioactive material?

- A $\frac{1}{2}$ minute B 2 minutes C $2\frac{1}{2}$ minutes D 5 minutes
- 38 A Geiger counter detects radiation from radioactive sources.

A radioactive source is inside a thick aluminium container as shown.



Which type of radiation from this source is being detected?

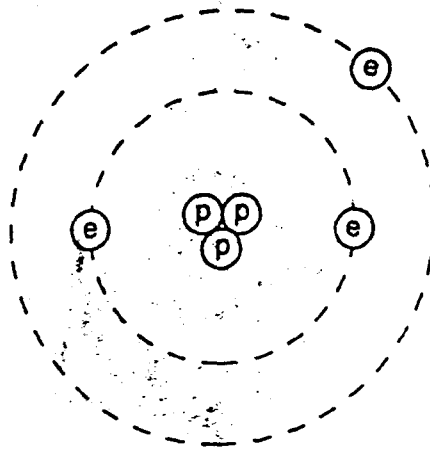
- A α -particles
 B β -particles
 C γ -rays
 D radio waves

- 39 Atoms of a radioactive material have a proton number Z and a nucleon number A . Within a nucleus of this material a neutron changes into a proton and an electron. The electron is emitted and the proton is retained.

Which line describes the changes in Z and A ?

- | Z | A |
|------------------|----------------|
| A increases by 1 | decreases by 1 |
| B increases by 1 | increases by 1 |
| C increases by 1 | stays the same |
| D stays the same | increases by 1 |

- 40 The diagram shows the protons and electrons in an atom of lithium.



The nucleus has a nucleon number (mass number) 7.

How many neutrons are there in the nucleus?

- A 3 B 4 C 7 D 10