Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/12**

Paper 1 Multiple Choice (Core) **February/March 2020**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m / s^2).

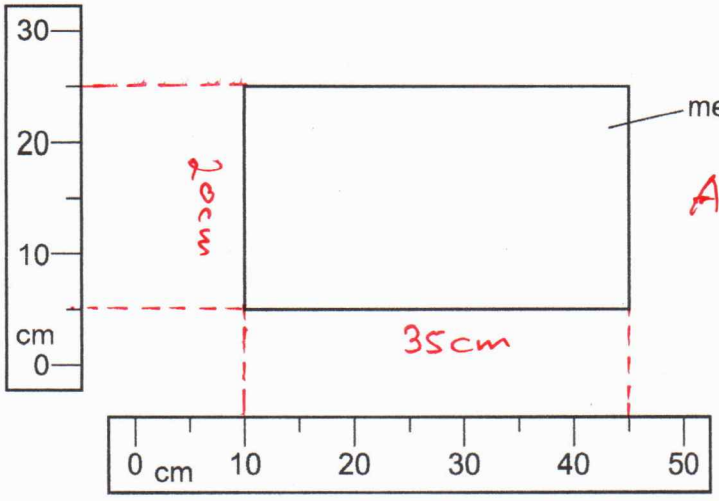
INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
- Any rough working should be done on this question paper.

This document has **20** pages. Blank pages are indicated.

[Turn over

1 The diagram shows a rectangular metal sheet close to two rulers.

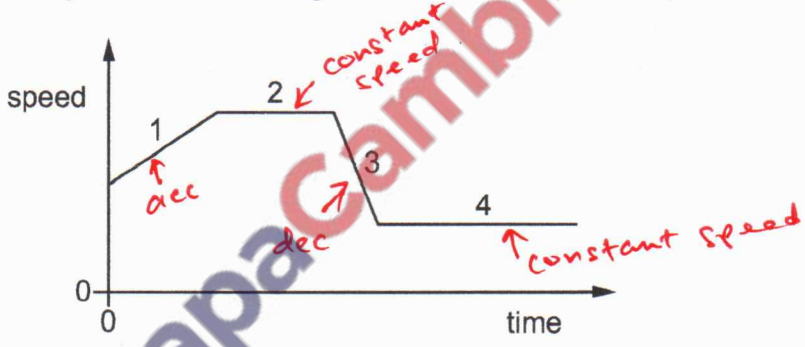


Area = l x w
= 35cm x 20cm
= 700cm²

What is the area of the metal sheet?

A 700 cm² B 875 cm² C 900 cm² D 1125 cm²

2 The graph shows how the speed of a car changes with time over part of a journey.



Which section of the graph shows acceleration and which section of the graph shows deceleration?

	acceleration	deceleration
A	1	2
B	1	3
C	2	4
D	3	1

3 A steel ball is dropped from the top floor of a building. Air resistance can be ignored.

Which statement describes the motion of the ball?

- The ball is acted upon by gravity.
- So it has a resultant force

A The ball falls with constant acceleration.

B The ball falls with constant speed.

C The ball falls with decreasing speed

D The ball falls with increasing acceleration.

$R = f = m \times g$

$g = 9.81\ m/s^2$.

4 Diagram 1 shows a piece of flexible material that contains many pockets of air. Diagram 2 shows the same piece of flexible material after it has been compressed so that its volume decreases.

diagram 1
(before compression)

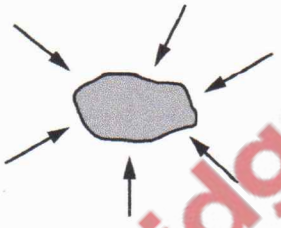


diagram 2
(after compression)

What happens to the mass and to the weight of the flexible material when it is compressed?

	mass	weight
A	increases	increases
B	increases	no change
C	no change	increases
D	no change	no change

- Mass is amount matter in a substance.
- Compressing does not change amount of matter in the material.
- So mass does not change
- Since $W = m \times g$
  so weight also remains same.

5 On the Moon, the gravitational field strength g is 1.6 N/kg.

An object has a mass of 2.0 kg.

What is the weight of the object on the Moon?

$W = m \times g$

$= 2.0\,kg \times 1.6\,N/kg$

$= 3.2\,N$

A 0 N B 1.3 N C 3.2 N D 20.0 N

6 A measuring cylinder contains 40 cm^3 of water.

$\rho = \frac{m}{V}$

A solid metal ball is dropped into the water and the water level rises to 56 cm^3.

$Vol = 56 - 40 = 16\ cm^3$

The mass of the ball is 80 g.

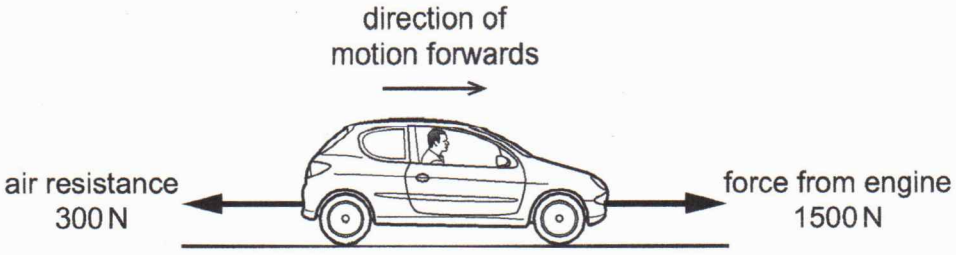
$m = 80\ g$

What is the density of the metal from which the ball is made?

$\rho = \frac{80\ g}{16\ cm^3} = 5\ g/cm^3$

A 0.20 g/cm^3 B 1.4 g/cm^3 C 2.0 g/cm^3 D 5.0 g/cm^3

7 A car travels along a horizontal road at constant speed. Three horizontal forces act on the car. The diagram shows two of these forces.



What is the size and the direction of the third horizontal force acting on the car?

- At constant speed, forward force = backward force.

$300 + x = 1500$

$x = 1500 - 300$

$= 1200$

backward direction

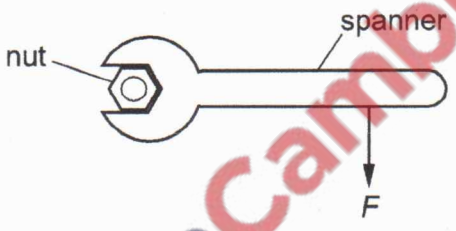
A 1200 N backwards ✓

B 1200 N forwards

C 1800 N backwards

D 1800 N forwards

8 A force *F* is applied to a spanner, as shown.



moment = F × d.

moment depends on
1. size of force
2. distance from the pivot

Which action increases the moment of *F* about the centre of the nut?

A apply the force *F* to the end of the spanner handle ✓

B apply the force *F* parallel to the spanner handle ✗

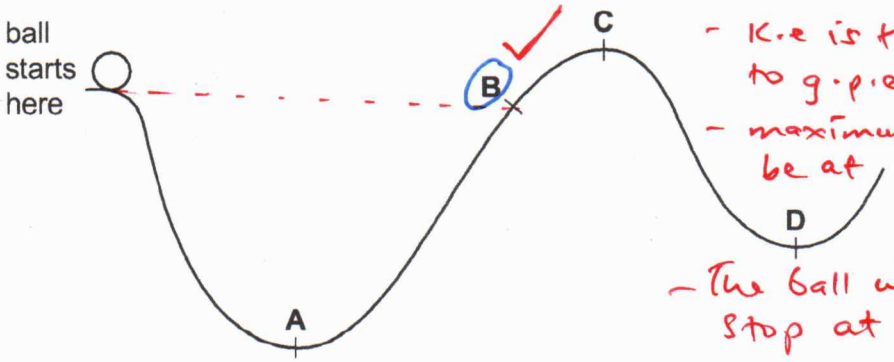
C spray oil on the nut ✗

D use a shorter spanner ✗

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

What is the furthest position that it is possible for the ball to reach?

- g.p.e is converted to k.e at A.
- k.e is then converted to g.p.e
- maximum g.p.e will be at B.
- The ball will come to stop at B.

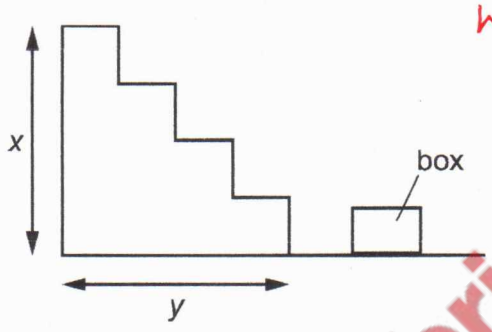


10 Which row describes an advantage and a disadvantage of wind turbines?

	advantage	disadvantage
A	no fuel needed	harmful gases released
B	variable supply	fuel needed
C	no harmful gases released	variable supply
D	constant supply	noisy

11 A box of mass *m* and weight *W* is carried up some stairs of total height *x* and total width *y*.

Work = Force × distance in the direction of force.



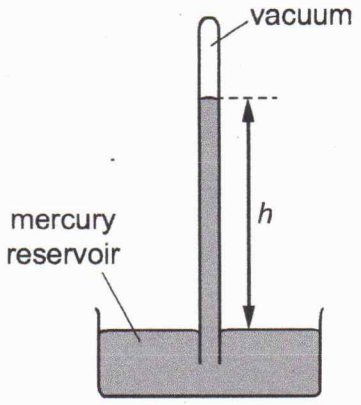
Work = gravity × x
= W × x

On which quantities does the work done against gravity on the box depend?

A *m* and *y** **B** *W* and *x** **C** *W* and *y** **D** *x* and *y*

12 Diagram 1 shows a tube sealed at one end and partly immersed in mercury. The tube has a diameter *d*. The top of the mercury in the tube is a height *h* above the mercury reservoir.

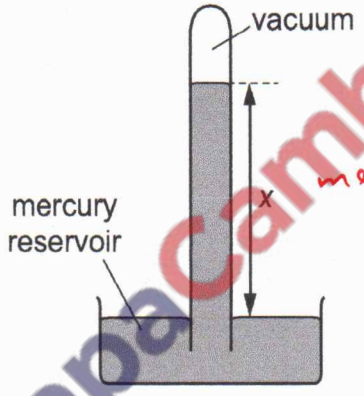
diagram 1



mercury barometer 1

Diagram 2 shows a similar arrangement with a tube that has a diameter 2*d*.

diagram 2



mercury barometer 2

What is the relationship between *h* and *x*?

A $x = 2h$

B $x = h$

C $x = \frac{h}{2}$

D $x = \frac{h}{4}$

- mercury barometer measures the atmospheric pressure.

$P = \rho \times g \times h$.

ρ - density of mercury
g - gravity
h - height.

- Pressure does not depend on the diameter of the tube, but on the height of the tube.

- So for both barometers, the height will be the same

$h = x$

13 A skier is standing still on a flat area of snow.

W = 550N (Force)
A = 0.015 m²

Pressure = Force / Area.

P = 550N / 0.015 m²
= 36,666 N/m²
≈ 37,000 N/m². (2 s.f)

The weight of the skier is 550 N. The total area of his skis in contact with the ground is 0.015 m².

What is the pressure exerted on the ground by the skier?

A 0.83 N/m² **B** 8.3 N/m² **C** 3700 N/m² **D** 37 000 N/m²

14 The molecules of a substance in a particular state of matter move freely with random motion. The average speed of the molecules is increasing.

What is being described?

A a gas being heated
B a liquid evaporating
C a solid being heated
D a solid melting

3 states of matter, solid, liquid & gas
- Solids have particles close packed and only vibrate on fixed position
- Liquids have molecules that are apart and move randomly but not freely since they exert attraction on each other
- In gas, the molecules move freely and randomly.

15 A student measures the mass of warm water in an open container over two minutes. The container is kept at a constant temperature. The results are in the table.

time / minutes	mass / g
0.0	33.9
0.5	30.6
1.0	27.6
1.5	24.9
2.0	22.5

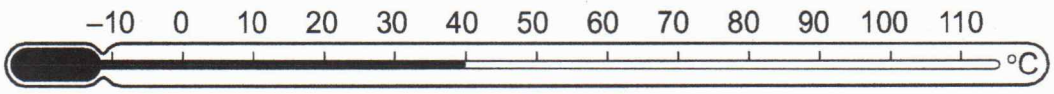
Why does the mass of the water change?

A The water evaporates.
B The water freezes.
C The water condenses.
D The water boils.

- During evaporation, water changes to vapour.
- This decreases mass of water left in the container.
- Freezing does not loss mass since no water is lost.

← This is not happening since the water in the container is only warm and not hot.

16 Which points are the fixed points of the liquid-in-glass thermometer shown?



A the beginning and end points of the column of liquid

B the points marked –10 °C and 110 °C

C the points marked 0 °C and 100 °C

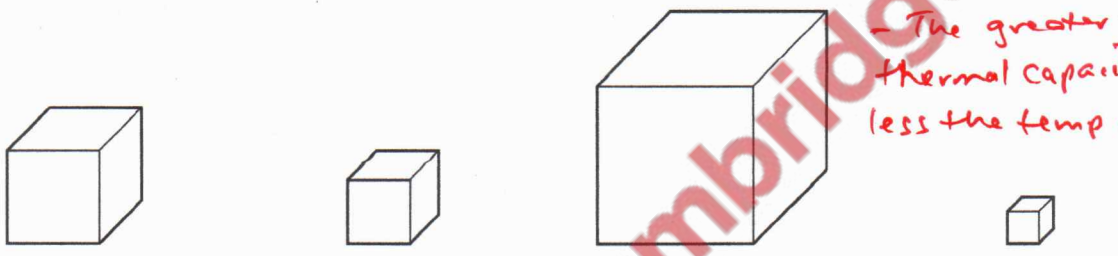
D the top and bottom points of the thermometer bulb

– Two fixed points are
1. Freezing point of water, 0°C.
2. Boiling point of water, 100°C.

17 Four different metal blocks are given the same quantity of thermal energy.

Which block has the greatest thermal capacity? ← is heat required to raise temp by 1°C.

A **B** **C** **D**



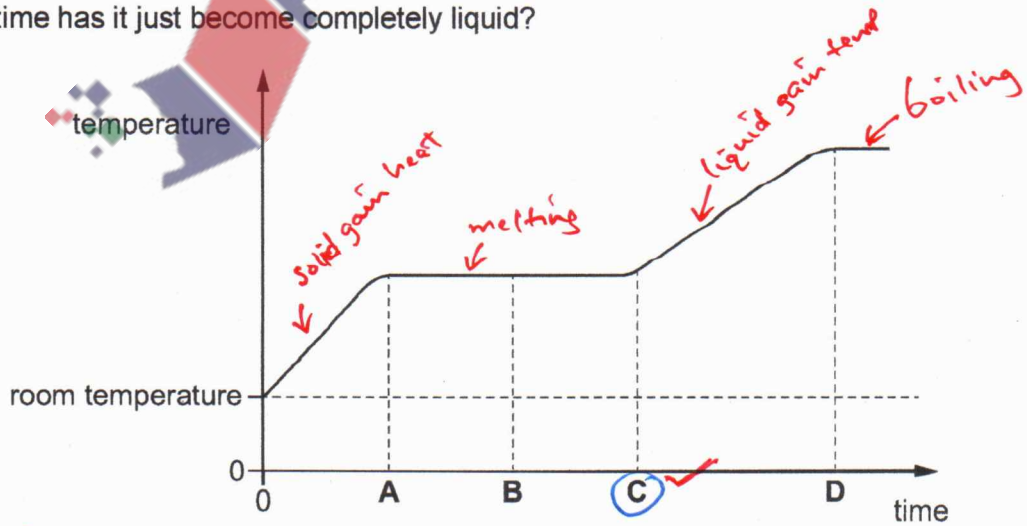
– The greater the thermal capacity, the less the temp rise

– All blocks are heated by same amount.

18 A solid is heated from room temperature.

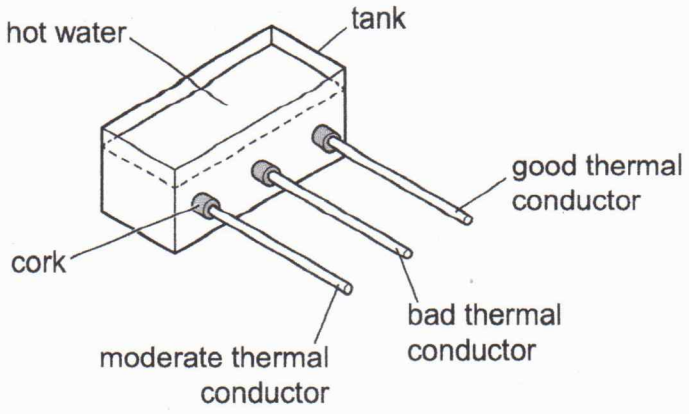
The graph shows how its temperature changes with time as it is heated constantly.

At which time has it just become completely liquid?



– Change of state occurs at constant temperature
– Temperature only start rising when all has change from one state to the other.
– Otherwise the heat absorbed goes to breaking the forces of attraction btw particles.

19 Rods of the same shape and size are inserted through corks into a tank of hot water. Each rod is covered with a layer of solid wax that has a low melting point. After a period of time, some wax melts.



On which rod will the wax melt first?

- The rods are all heated at the same temp of water
- The good conductor passes heat faster from the hot water to melt the wax.

A all at the same time

B good thermal conductor

C bad thermal conductor

D moderate thermal conductor

20 A boy jumps into an indoor swimming pool. He notices that the water appears to get colder as he goes deeper underwater. This is due to convection.

Which statement is correct?

A Cold water is more dense than warm water so it sinks to the bottom of the pool.

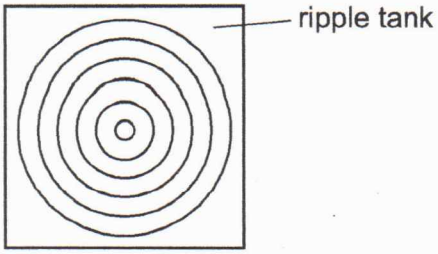
B Warm water is more dense than cold water so it rises to the surface of the pool.

C The molecules in cold water have more kinetic energy than the molecules in warm water so they move to the bottom of the pool faster.

D The molecules in warm water are closer together than the molecules in cold water so they rise to the surface of the pool.

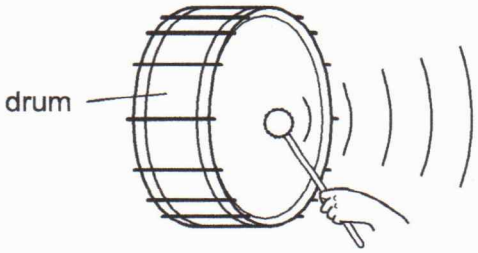
21 The diagrams show examples of wave motion.

1



waves on water

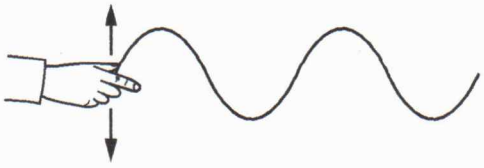
2



waves in air

Sound

3



waves on a rope

4

waves in a spring

Which waves are longitudinal?

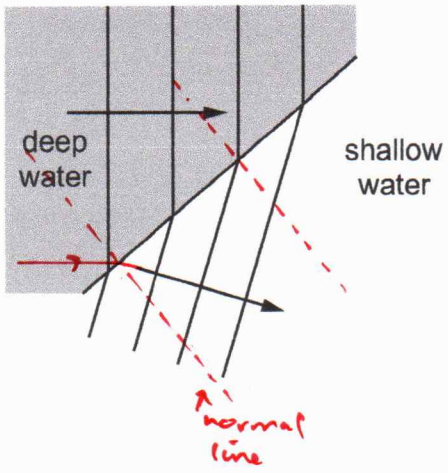
A 1 only **B** 2 and 3 only **C** 2, 3 and 4 **D** 2 and 4 only

- Sound wave is longitudinal
- Water wave is transverse
- Rope wave is transverse
- Spring waves are longitudinal since the spring vibrates parallel to the direction in which the wave in the spring is moving

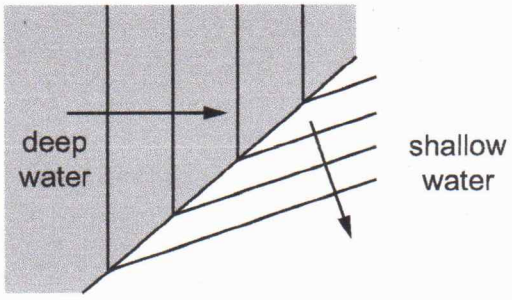
22 Waves on the surface of water travel from deep to shallow water.

Which diagram shows the correct path of the waves in the shallow water?

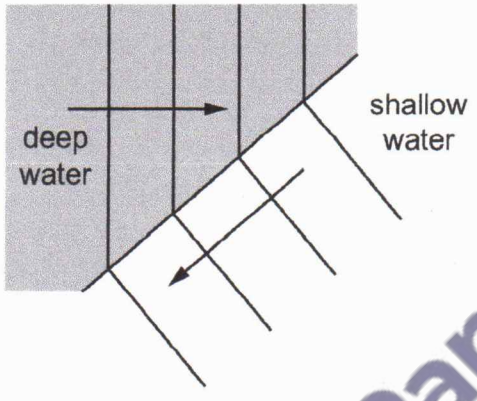
A ✓



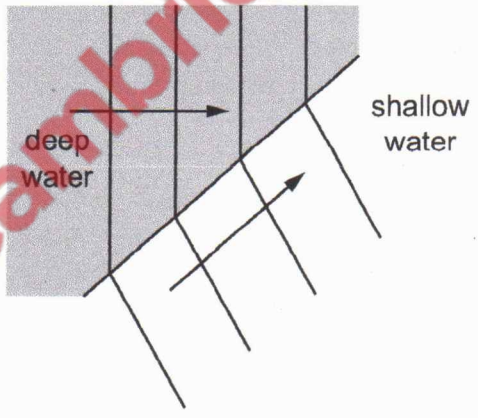
B



C



D



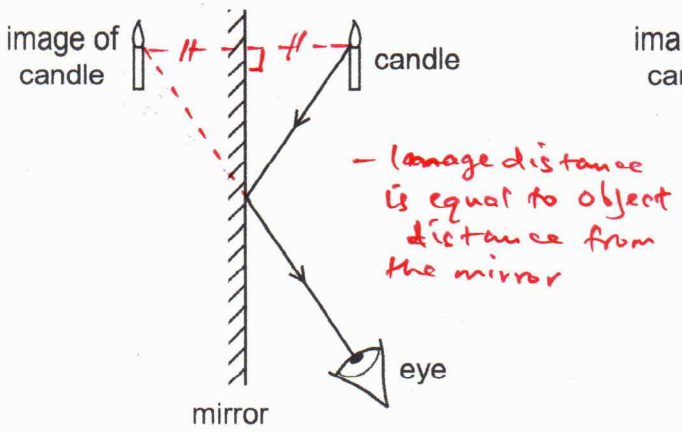
- Deep is less dense
- Shallow is more dense than deep.
- From deep to shallow, the speed of water wave decreases, so the wave bends towards the normal
- In deep the wavelength is longer than in shallow but frequency is same.

$v = f \times \lambda$ ← wavelength

- So if λ in shallow decreases, the speed, v also decreases.

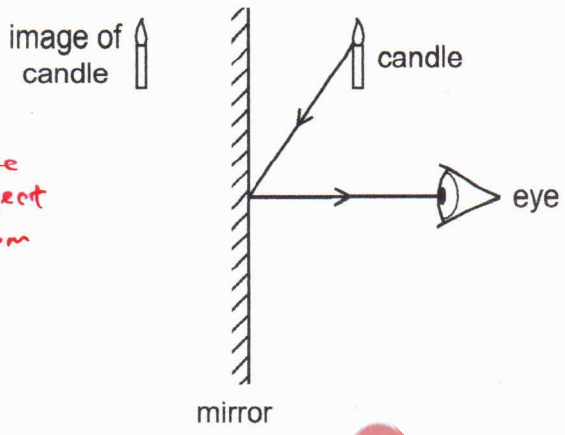
23 Which diagram shows how the light from a candle is reflected by a mirror, and shows the position of the image formed?

A ✓

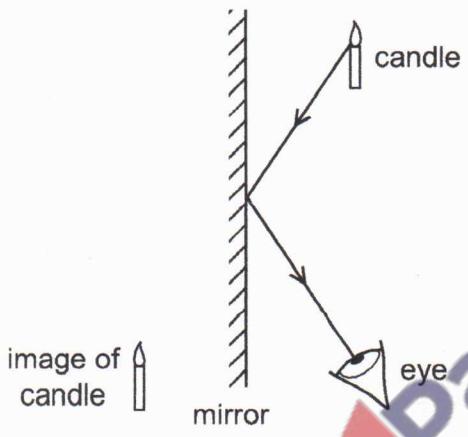


– Image distance is equal to object distance from the mirror

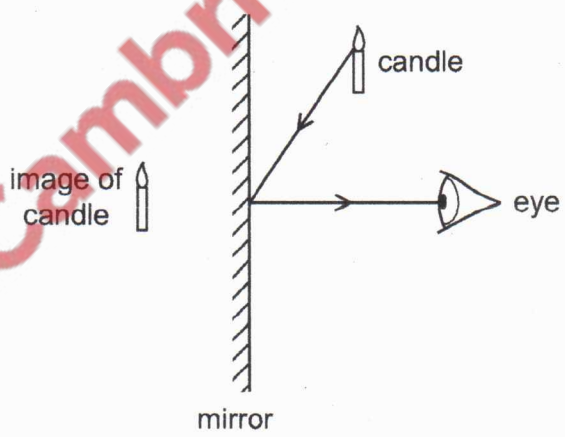
B



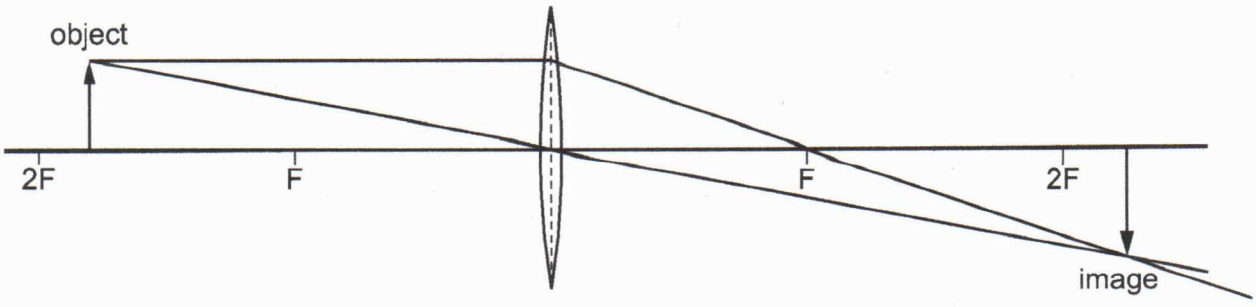
C



D



24 The diagram shows an image being formed by a converging lens.



Which description of the image formed is correct?

- inverted
- enlarged
- real

A enlarged and inverted

B enlarged and upright

C diminished and inverted

D diminished and upright

- Inverted - upside down.
- enlarged - larger than object
- real - can be formed on a screen.

25 The horn on a ship makes a sound. The captain on the ship hears an echo from a cliff 4.0 s later.

The speed of sound is 340 m/s.

How far away is the cliff from the ship?

$d = s \times t$

$= 340 \times 2$

$= 680\ m$

$t = \frac{4}{2} = 2\ s$ ← from the ship to the cliff.

A 170 m **B** 340 m **C** 680 m **D** 1360 m

26 Bats produce ultrasound waves to navigate.

What is a possible frequency range for these waves?

kHz - means 1000 Hz

↑ prefix $10^3 = 1000$

A 0–20 Hz ← infrasound.

B 20 Hz–2000 Hz ← audible sound

C 2 kHz–20 kHz ← 2000 Hz – 20,000 Hz – audible sound.

D 20 kHz–120 kHz ← 20,000 Hz – 120,000 Hz ← ultrasound.

27 The table shows the forces that exist between magnetic poles.

Which row is correct?

- Like poles repel
  - N $\not\$$ N → repel
  - S $\not\$$ S → repel
- Unlike poles attract
  - N $\not\$$ S → attract.

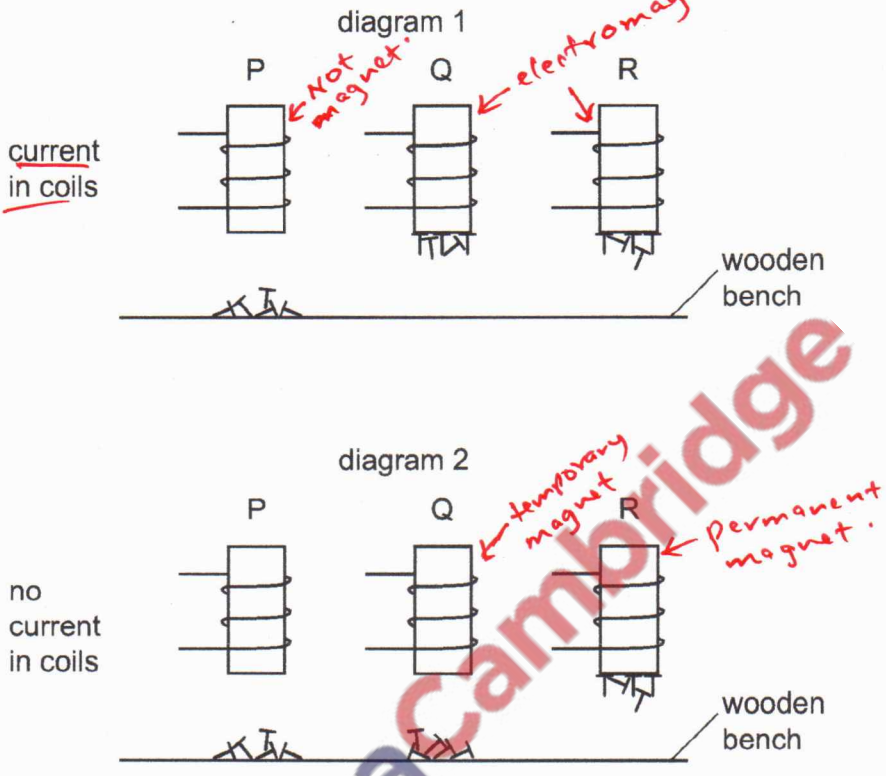
	N pole and N pole	N pole and S pole
A	attraction	attraction
B	attraction	repulsion
C	repulsion	attraction
D	repulsion	repulsion

28 The diagrams show three different metal rods P, Q and R, inside coils of wire.

Small iron nails are placed on a wooden bench under the rods.

Diagram 1 shows the situation when there are electric currents in the wires.

Diagram 2 shows the situation when the currents are switched off.



Which row correctly identifies the metal rods?

	P	Q	R
A	copper	soft iron	steel
B	soft iron	copper	steel
C	steel	soft iron	copper
D	copper	steel	soft iron

- copper - Non-magnetic material
- Iron - Soft magnetic material
- Steel - hard magnetic material.

29 A polythene rod becomes negatively charged when it is rubbed with a cloth.

Which statement explains this?

A The rod gains electrons.

B The rod loses electrons.

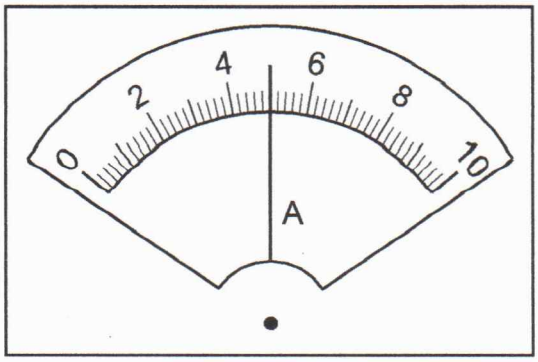
C The rod gains protons.

D The rod loses protons.

Polythene rod - gain electrons to be -vely charged!

Cloth - loses electron and becomes +vely charged.

30 The diagram shows a reading on an ammeter.



Scale:
1 division = 0.2 A.

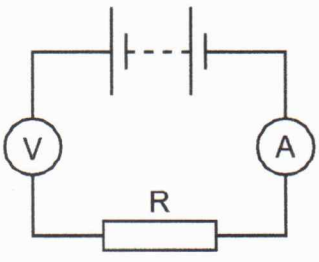
What is the reading?

A 0.45 A **B** 0.50 A **C** 4.5 A **D** 5.0 A ✓

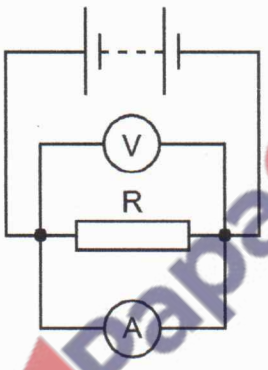
31 A student is to determine the resistance of resistor R. She uses a circuit including a voltmeter and an ammeter.

Which circuit should be used?

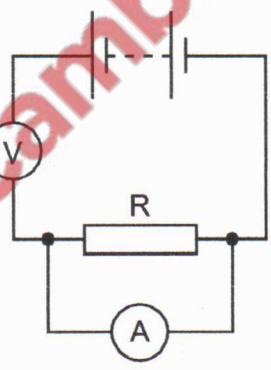
A



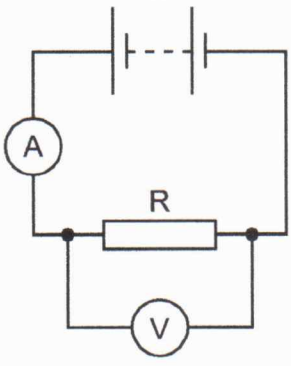
B



C



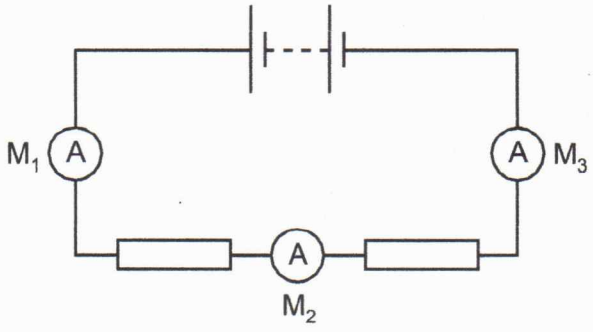
D ✓



- Ammeter is connected in series, to measure current passing through the resistor
- Voltmeter connected across the resistor to measure voltage across resistor

$$R = \frac{V}{I}.$$

32 The diagram shows a battery connected to two resistors. Three ammeters M_1, M_2 and M_3 are connected in the circuit.



Ammeter M_1 reads 1.0 A.

What are the readings on M_2 and on M_3?

- This is a series circuit
- Current is the same at all point.
- So current is same in the 3 ammeters

$M_1 = 1.0\,A$
$M_2 = 1.0\,A$
$M_3 = 1.0\,A$.

	reading on M_2/A	reading on M_3/A
A	0.0	0.0
B	0.5	0.5
C	0.5	1.0
D ✓	1.0	1.0

33 Lamps in a circuit are connected in parallel.

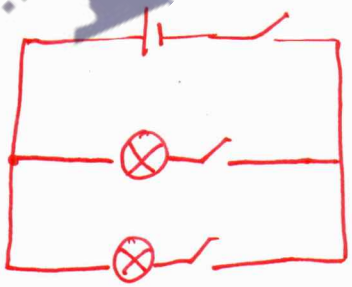
What is the advantage of this?

A If one lamp breaks, the others remain lit. ✓

B Less current is taken from the power supply.

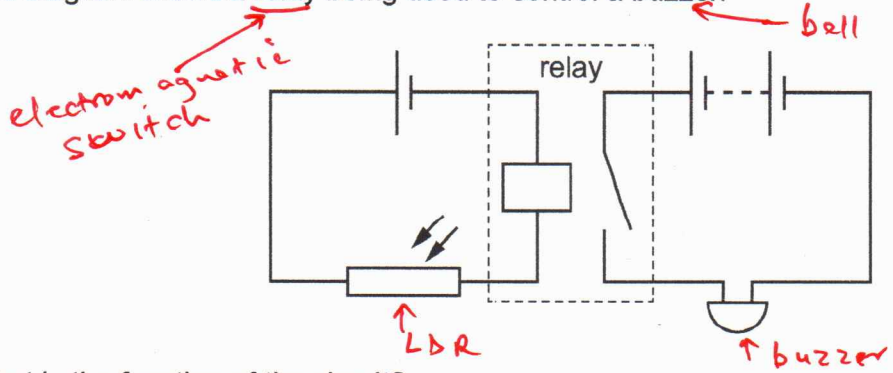
C The lamps use less power than if they were connected in series.

D The potential difference across each lamp is less than that of the power supply.



- Each lamp is in a complete circuit of its own.
- Advantages:
  1. Each lamp can be switched on/off independently
  2. One lamp not working does not affect the other.

34 The diagram shows a relay being used to control a buzzer.



What is the function of the circuit?

A The buzzer switches off when the circuit becomes cold.

B The buzzer switches off when the circuit becomes light.

C The buzzer switches on when the circuit becomes cold.

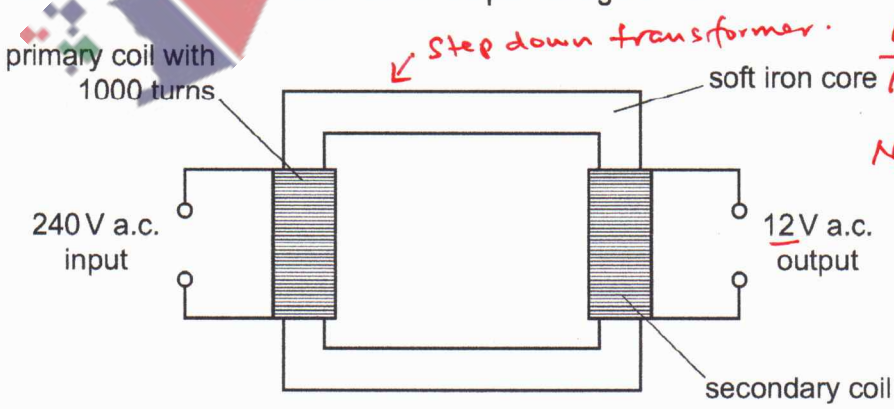
D The buzzer switches on when the circuit becomes light.

35 There is a 5 A fuse in the circuit of an appliance.

What is the purpose of the fuse and in which wire is it connected?

	purpose	wire in which it is connected
A	breaks the circuit if the current is greater than 5 A	earth
B	breaks the circuit if the current is greater than 5 A	live
C	breaks the circuit if the current is less than 5 A	earth
D	breaks the circuit if the current is less than 5 A	live

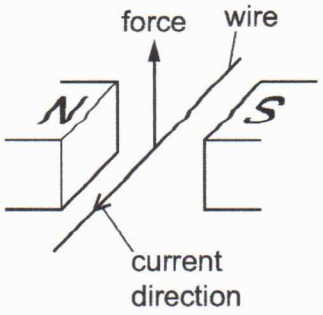
36 The diagram shows a transformer that has an output voltage of 12 V.



How many turns of wire are in the secondary coil?

A 12 **B** 20 **C** 50 **D** 20 000

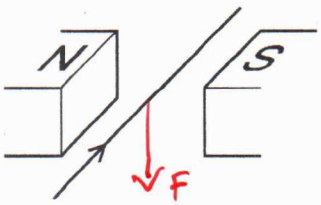
37 A current-carrying conductor is placed between two magnetic poles. The current causes a force to act on the wire.



- Use Fleming's Left hand rule to determine the direction of force
- Thumb – force
- 1st finger – field
- 2nd finger – current.

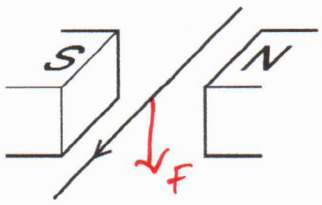
Three other arrangements P, Q and R, of the wire and magnetic poles are set up as shown.

P



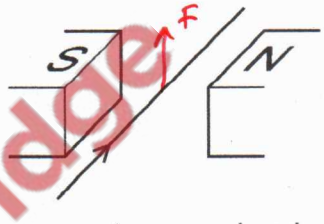
current reversed

Q



magnetic poles switched around

R



current reversed and magnetic poles switched around

Which arrangements will cause a force in the opposite direction to that shown in the top diagram?

A P, Q and R **B** P and Q only **C** P only **D** R only

38 The symbol for a radioactive nuclide of carbon is $^{14}_{6}C$.

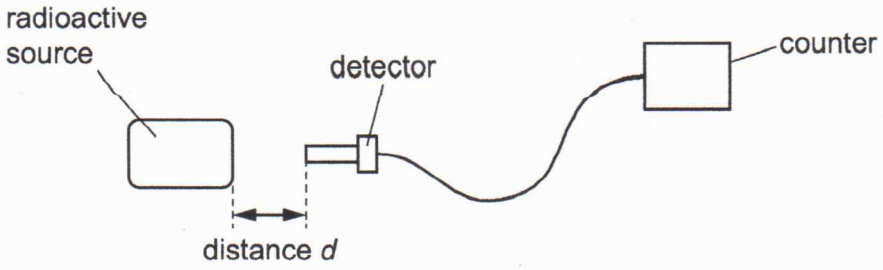
How many neutrons are in its nucleus?

A 6 **B** 8 **C** 14 **D** 20

14 – nucleon number (proton + neutrons)
6 – proton number.
neutrons = 14 – 6
= 8

39 A student measures the rate at which ionising radiation is emitted from a radioactive substance.

He places a detector at different distances from the radioactive source.



The table shows how the reading on the counter varies with distance *d*.

The readings on the counter are corrected for background radiation.

distance *d* / cm	0	2	4	6
counter reading / counts per minute	1250	115	0	0

Which type of ionising radiation is being emitted by the substance?

A α-particles

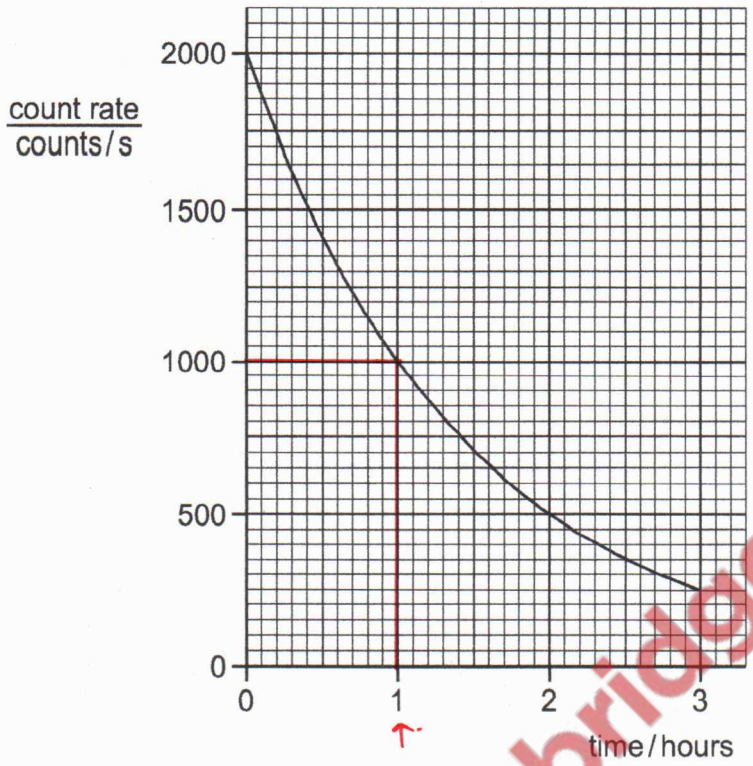
B β-particles

C γ-rays

D X-rays

particle range
α 3 cm.
β 400 cm.
γ infinite

40 The graph shows the count rate from a radioactive source over a period of time.



What is the half-life of the source?

A 0.5 hour **B** 1.0 hour **C** 1.5 hours **D** 3.0 hours

- Time for the initial counter rate to reduce to half

Initial rate = 2000

$\frac{1}{2}$ initial rate = $\frac{2000}{2}$

= 1000