Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

SOLVED BY SMART EXAM RESOURCES-SMART EDU HUB

PHYSICS	**0625/22**
Paper 2 Multiple Choice (Extended)	**May/June 2017**
	45 minutes

Additional Materials: Multiple Choice Answer Sheet
                             Soft clean eraser
                             Soft pencil (type B or HB 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.
Electronic calculators may be used.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m/s^2).

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

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[Turn over

1 What is the most accurate and precise method to measure the thickness of a coin?

✓**A** Use a micrometer screw gauge.

B Use a ruler and look at the scale perpendicularly.

C Use a top pan balance.

D Use the displacement method with water in a measuring cylinder.

Reason:
- **Range of a micrometer is between 25mm and 1 inch and a standard coin is usually 2 mm thick and it is always used to measure small lengths accurately**
- **The method B is used to record readings from a scale**
- **The method C is used to find the mass or weight of objects**
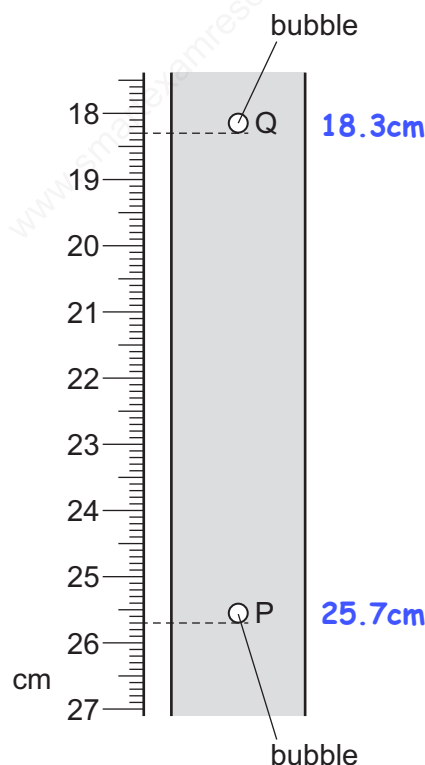- **The method D is used to find the objects**

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2 A student determines the average speed of a bubble rising through a liquid at constant speed.

When the student starts the stopwatch the bubble is at position P.

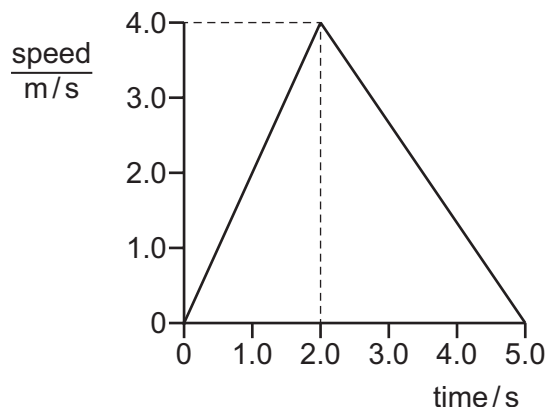After 2.0 s the bubble is at position Q.

18.3cm

25.7cm

Reason:
Average speed
= Total distance/ Total time
= (25.7-18.3)/2
=3.7cm/s

What is the speed of the bubble between P and Q?

A 3.2 cm / s ✓**B** 3.7 cm / s **C** 6.4 cm / s **D** 7.4 cm / s

3 The diagram shows the speed-time graph for a toy car travelling in a straight line.

What is the acceleration of the car during the first two seconds and what is the total distance that it travels?

	acceleration m/s^2	total distance/m
A	0.50	10
B	0.50	20
C	2.0	10
D	2.0	20

Reason:
- Acceleration = Slope=Rise/Run=4/2=2m/s^2
- Total distance traveled= Area under the graph =0.5 × base × height
= 0.5 × 5 × 4
=10m
Note that area = area of the triangle with a base of 5 and height of 4

4 In which pair are both quantities measured in newtons?

A force and pressure

B force and weight

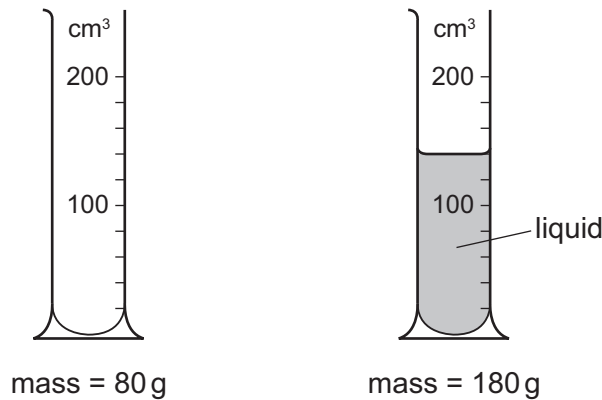**C** mass and pressure

D mass and weight

Reason:
- Weight is also a kind of force(force due to gravity) and we know that force is measured in newtons. So both force and weight are measured in newtons.

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5 The masses of a measuring cylinder before and after pouring some liquid into it are shown in the diagram.

```
cm³                        cm³
200 -                      200 -

100 -                      100 -           — liquid

mass = 80 g                mass = 180 g
```

Reason:
Density=Mass/Volume
=(180-80=100)/140
=100/140g/cm³

What is the density of the liquid?

A $\frac{100}{120}$ g/cm³   **B** $\frac{100}{140}$ g/cm³ ✓   **C** $\frac{180}{120}$ g/cm³   **D** $\frac{180}{140}$ g/cm³

6 A spring which obeys Hooke's Law has an unstretched length of 10 cm.

A load of 20 N is hung from the spring.

The new length of the spring is 36 cm.

Reason:
F=k(x)
20= k(36-10)
k=20/16=0.769=0.77N/cm

What is the spring constant k of the spring?

A 0.56 N/cm   **B** 0.77 N/cm ✓   **C** 1.3 N/cm   **D** 1.8 N/cm

7 A car travels forwards along a straight horizontal road. Only the horizontal forces acting on it are shown.

driving force ← (car) → air resistance and friction

The length of each arrow represents the size of each force.

How do these forces affect the motion of the car?

A The car moves at constant speed.

B The car moves backwards.

C The car slows down. ✓

D The car's forward speed increases.
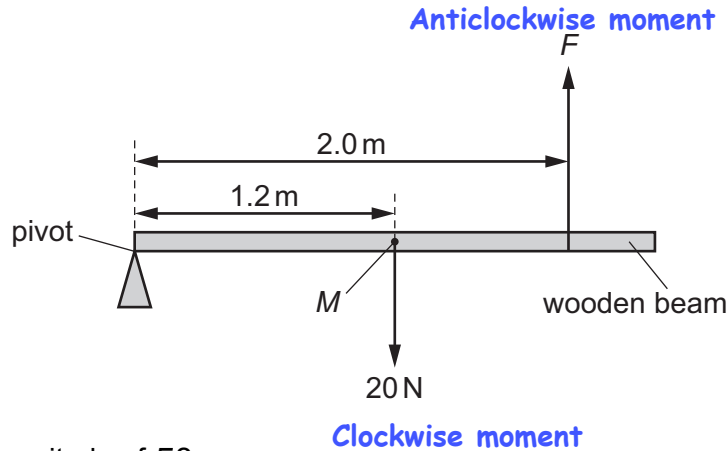
Reason:
- **The car slows down because the magnitude and direction of the resultant force is backwards.**
- **Note that the forces shown are the ones, acting on a car that is already moving forwards**

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8 The diagram shows a wooden beam of weight 20 N. The centre of mass of the beam is labelled *M*.

There is a pivot at one end of the beam. The beam is kept horizontal by an upward force, *F*.

Anticlockwise moment

2.0 m

1.2 m

pivot

M

20 N

wooden beam

Clockwise moment

Reason:
- The beam is balance.
- Hence: CM=ACM
- 1.2 x 20= 2F
- F=1.2 x 20/2=12N
- Note: Since the beam has a weight, it cannot be ignored while calculating moments

What is the magnitude of *F*?

A 12 N   **B** 20 N   **C** 30 N   **D** 33 N

9 A ball of mass 2.0 kg is travelling at a speed of 12 m/s. It moves towards an object of mass 3.0 kg which is at rest.

12 m/s

2.0 kg

3.0 kg at rest

The ball hits the object and sticks to it.

Which row gives the total momentum, and the speed of both objects immediately after the collision?

	total momentum kg m/s	speed m/s
A	0	4.8
B	0	8.0
C	24	4.8
D	24	8.0

Reason:
- Total momentum before impact= momentum of ball + object =(2 x 12) + 0=24kgm/s
- According to the law of conservation of momentum, momentum is conserved. Hence after impact momentum= 24kgm/s
- After collision Momentum = mass x velocity
=24= (2+3) x v
=v= 24/5=4.8
Note: since after collision, the bodies travel together, we have taken their combined masses.

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[Turn over

10 An object falls from a height of 5.0 m.

Air resistance can be ignored.

As it hits the ground the object has 750 J of kinetic energy.

What is its mass?

✓ **A** 15 kg   **B** 50 kg   **C** 75 kg   **D** 150 kg

6 Reason:
P.E = mgh= m x 10 x 5 and K.E= 750
Energy is conserved.
Hence:
750=mgh=m(10x 5). hence m= 750/50=15kg

11 An electric generator produces an electromotive force (e.m.f.) of 200 V and produces a current of 3.0 A in a circuit. The generator is driven by an engine with a power of 2.4 kW.

What is the efficiency of the generator?

A 2.8%   ✓ **B** 25%   **C** 28%   **D** 36%

Reason:
Output power= Power of the generator=P=I x V=3 x 200=600W
Input power=Power of the engine=2.4kW=2400W
Hence Efficiency=(Output power/Input power) x 100
=(600/2400) x 100=0.25 x 100=25%

12 The diagrams show athletes training by stretching springs.

Each spring has the same stiffness.

Which athlete does the most work?

A
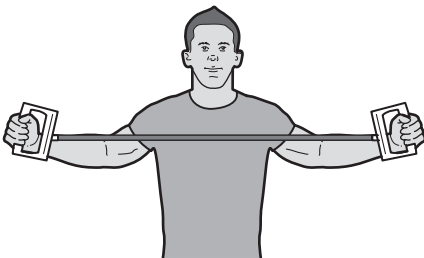
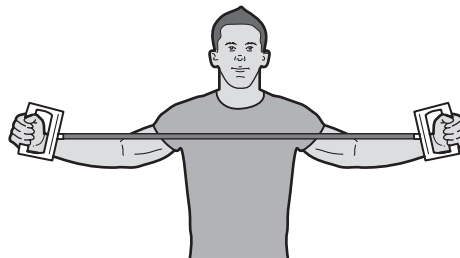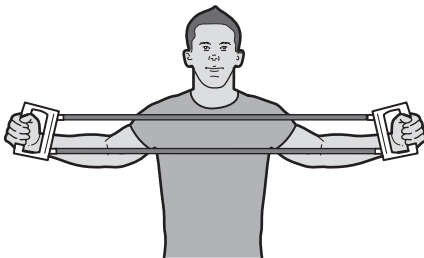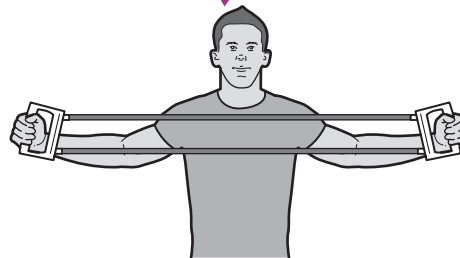one spring stretched
by 0.60 m

B

one spring stretched
by 0.80 m

C

two springs stretched
by 0.60 m

✓ **D**

two springs stretched
by 0.80 m

Reason:
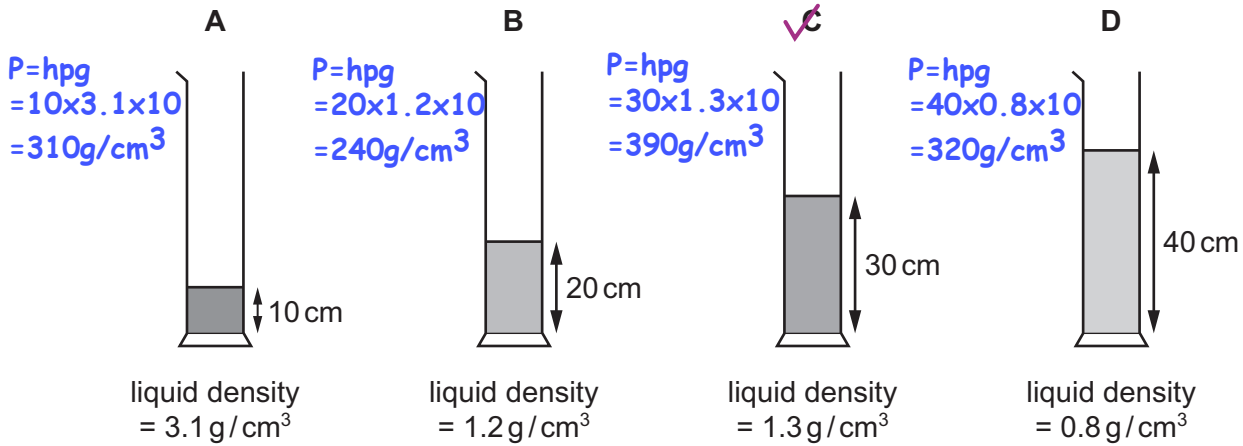Work=
Force x displacement.
- Work will be greater when the value of F and d will be greater.
- The distance is greater for B and D. as compared to A and B, but the person in D applies more force to pull the two springs.
- Hence for D, the value of F as well as d is greater than B and so , the work done by him is the greatest of all

13 Four different liquids are poured into four containers.

The diagrams show the depth and the density of liquid in each container.

In which container is the pressure on its base the greatest?

Reason: The pressure-calculations shown below

A

P=hpg
=10x3.1x10
=310g/cm³

10 cm

liquid density
= 3.1 g/cm³

B

P=hpg
=20x1.2x10
=240g/cm³

20 cm

liquid density
= 1.2 g/cm³

✓ C

P=hpg
=30x1.3x10
=390g/cm³

30 cm

liquid density
= 1.3 g/cm³

D

P=hpg
=40x0.8x10
=320g/cm³

40 cm

liquid density
= 0.8 g/cm³

14 Brownian motion is observed when using a microscope to look at smoke particles in air.

What causes the smoke particles to move at random?

Reason: Larger and lighter molecules move randomly when hit by smaller and faster moving molecules[Brownian motion]

✓ **A** Smoke particles are hit by air molecules.

B Smoke particles are moved by convection currents in the air.

C Smoke particles have different weights and fall at different speeds.

D Smoke particles hit the walls of the container.

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15 A student blows air through a liquid using a straw. This causes the liquid to evaporate quickly and therefore to cool.

Which statement explains why the remaining liquid cools?

Reason:
- *During evaporation, the molecules with the maximum kinetic energy escape.*
- *The molecules left behind are the ones with low kinetic energy.*
- *As temperature is defined as the average kinetic energy of molecules, this means that the temperature of the remaining liquid decreases [it cools]*

A Slower-moving molecules are carried away by the air bubbles.

B The air molecules conduct heat from the liquid.

C The air sets up convection currents in the liquid.

✓ **D** The molecules with most energy leave the liquid.

**16** What is meant by the specific latent heat of fusion of ice?

✓ **A** the energy needed to change unit mass of ice into water at constant temperature

B the energy needed to change unit volume of ice into water at constant temperature

C the energy needed to produce unit temperature increase of unit mass of ice

D the energy needed to produce unit temperature increase of unit volume of ice

Reason: Specific latent heat of fusion is defined as the energy needed to change unit mass of ice into water at constant temperature

17 Equal masses of two different liquids are put into identical beakers.

Liquid 1 is heated for 100 s and liquid 2 is heated for 200 s by heaters of the **same power**.

Each liquid has the same rise in temperature.

liquid 1 —

different liquids of same mass

liquid 2

heating time = 100 s   heating time = 200 s
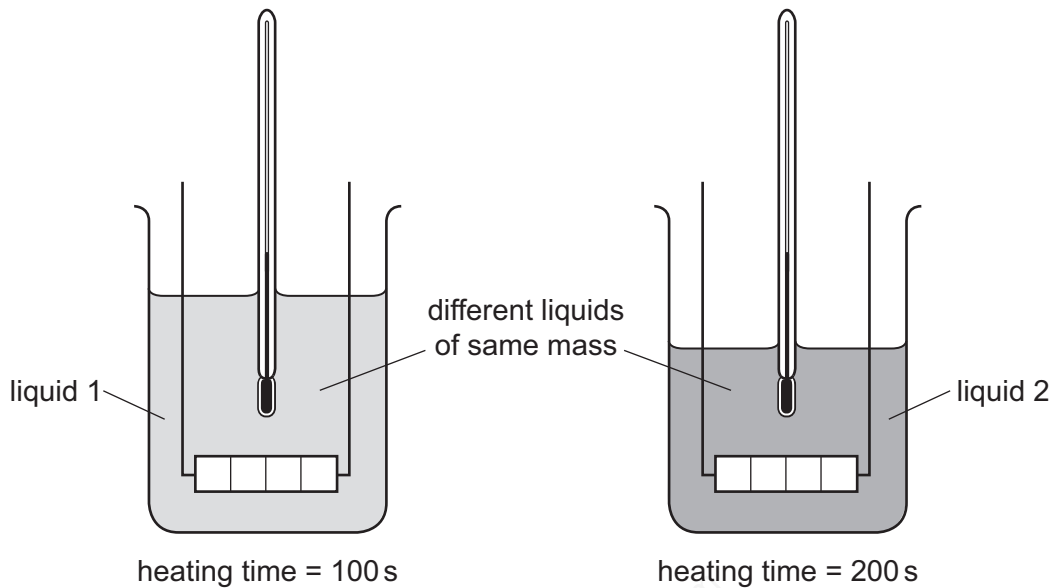
Which statement is correct?

A submarine is in water of density 1.0×10^3 kg/m3. The submarine changes its depth. This causes the

A   Each beaker of liquid has the sa

B   Each beaker of liquid receives th

C   Liquid 1 receives more energy t

D   The thermal capacity of liquid 1 | causes the   nal capacity of liquid 2.

17 Reason: Because liquid 1 takes less time to show the same temperature rise for the same power supplied as compared to liquid 2.
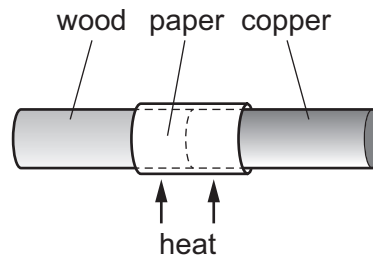
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18 A copper bar and a wooden bar are joined. A piece of paper is wrapped tightly around the join.

The bar is heated strongly at the centre for a short time, and the paper goes brown on one side only.

wood paper copper

heat

Which side goes brown, and what does this show about wood and copper?

	brown side	wood	copper
A	copper	conductor	insulator
B	copper	insulator	conductor
C	wood	conductor	insulator
D	wood	insulator	conductor

Reason:Wood is a bad conductor. When heat is supplied, a sufficient amount of heat gets stored in the paper, and the paper is unable to conduct the heat away gets burnt. On the other hand,copper is a good conductor of heat and hence conducts the heat supplied to the paper instantly into the interior of the metal and hence the paper over it does not get burnt
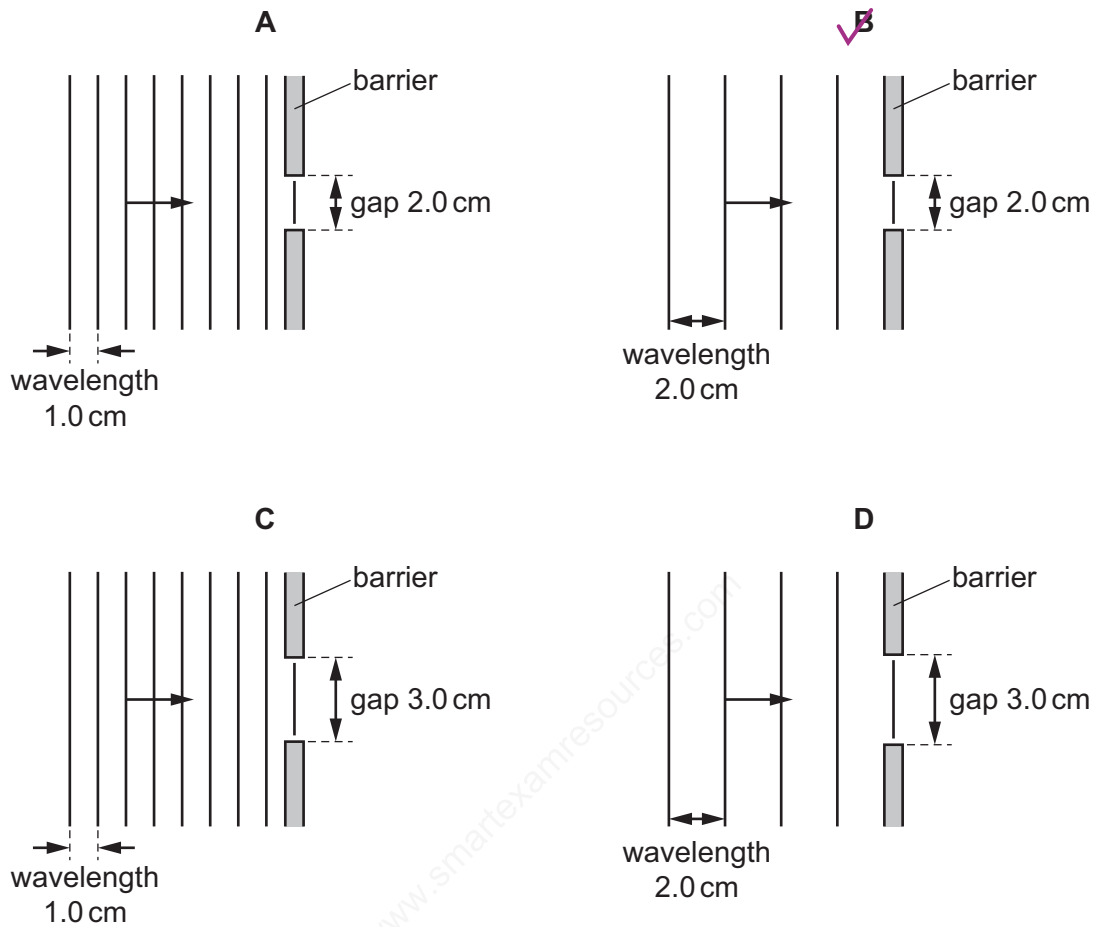
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19 Different waves hit barriers with different sized gaps.

The waves will diffract.

In which diagram does the greatest spreading occur?

A

barrier

gap 2.0 cm

wavelength
1.0 cm

B ✓

barrier

gap 2.0 cm

wavelength
2.0 cm

C

barrier

gap 3.0 cm

wavelength
1.0 cm

D

barrier

gap 3.0 cm

wavelength
2.0 cm

Reason: if the slit width is small and at the same time the wavelength of the incoming waves is large, then the diffraction is the greatest

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20 The incomplete ray diagram shows two rays of light that have passed from one point on an object through a thin converging lens.
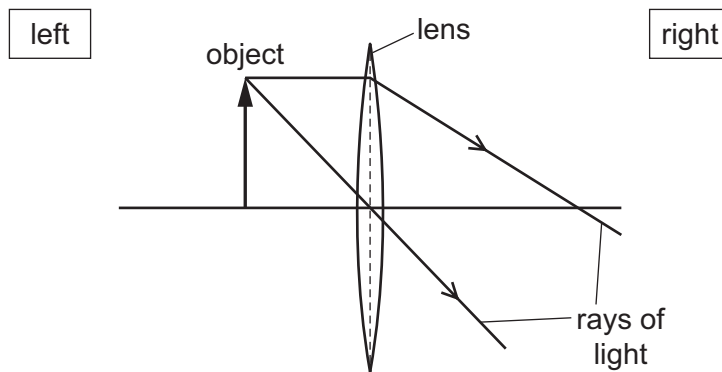
Which type of image is formed, and on which side of the lens is it formed?

	type of image	which side of lens
A	real	on the left
B	real	on the right
C ✓	virtual	on the left
D	virtual	on the right

Reason: The convex lens forms a virtual and a magnified image behind the object, when the object is placed between F and the lens. The image is virtual because the rays of light appear to meet.

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21 Which diagram shows what happens when a ray of white light passes through a prism?

D ✓
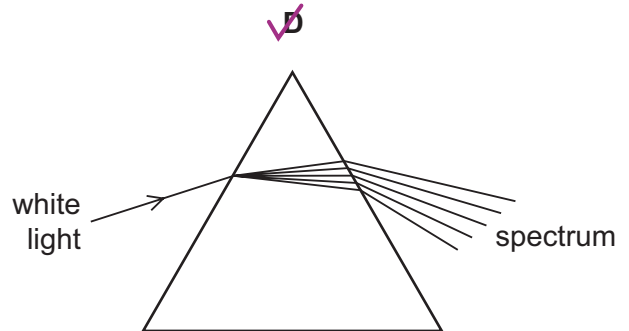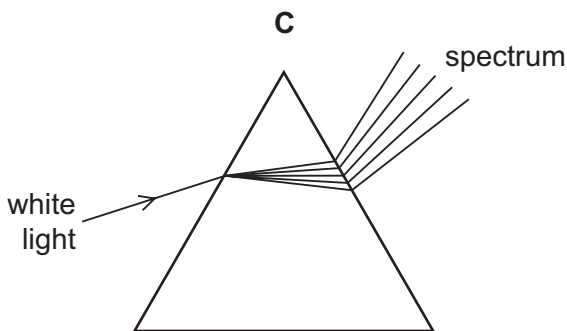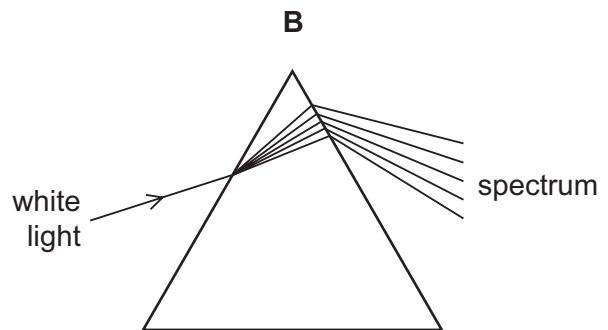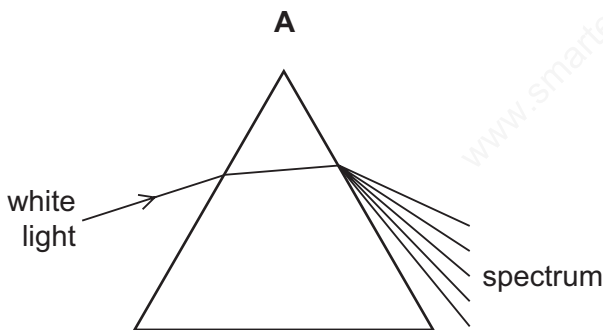
Reason: The ray of white light will bend towards the normal when it enters the prism and bend away from the normal when it leaves the prism.

 0625/22/M/J/17 **[Turn over**

22 Light travels in a vacuum and then enters a glass block. The speed of the light in the glass block is $2.0 \times 10^8\,\text{m/s}$.

Which statement about the speed of light is correct?

A The speed in a vacuum is 1.5 times the speed in the glass. ✓

B The speed in the glass is the same as the speed in a vacuum.

C The speed in the glass is 1.5 times the speed in a vacuum.

D The speed in the glass is 1.0×10^8 times the speed in a vacuum.

Reason: The speed of light always decreases when it enters from a rarer medium to a denser medium . Also, the speed of light is fastest in vacuum.

23 A fire alarm is not loud enough and the pitch is too low. An engineer adjusts the alarm so that it produces a louder note of a higher pitch.

What effect does this have on the amplitude and on the frequency of the sound?

	amplitude	frequency
A ✓	larger	greater
B	larger	smaller
C	smaller	greater
D	smaller	smaller

Reason: A louder sound always has a larger amplitude and a sound with a high pitch has a greater frequency.

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24 A student demagnetises a magnetised steel bar.

He places the bar in a solenoid connected to a power supply. He then removes the bar from the solenoid.

Which row indicates the most effective way of demagnetising the bar?

	type of power supply	speed to remove bar
A	a.c.	fast
B ✓	a.c.	slow
C	d.c.	fast
D	d.c.	slow

Reason: The method of demagnetizing is to connect the solenoid to an a.c. supply and place the magnet inside the solenoid with the a.c. switched on. Withdrawing the magnet slowly in the east-west direction, until it is some distance away from the solenoid, keeping the a.c. current still on, demagnetizes the steel bar.

25 A magnet near a coil of wire is attracted to the coil only when there is a current in the coil.

Which statement explains this force of attraction?

Reason: The coil becomes an electromagnet when a current flows through it .And hence, it attracts a magnet when it is brought close to it.

A The coil of wire has its own gravitational field.

B The coil of wire is made from soft iron.

C The current in the coil of wire creates a magnetic field. ✓

D The current in the coil of wire induces a charge on the magnet.

26 What is wrong with this labelled diagram of a permanent magnet?

iron disc

N   S
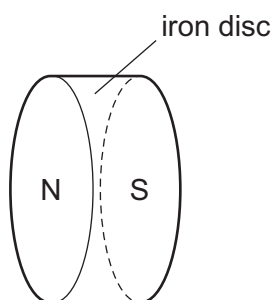
Permanent magnets retain their magnetism in the absence of an external magnetic field. Steel is magnetically hard and hence used to make permanent magnets. Iron is magnetically soft and hence cannot be used to make permanent magnets

A The cross-section should be rectangular.

B The length should be greater than the diameter.

C The magnet should be made of steel. ✓

D The N-pole and the S-pole should be reversed.

27 A student tests the electrical conduction of four materials.

aluminium

iron

plastic

silver

Reason: Metals are good conductors of electricity compared to non-metals.

Which materials conduct electricity?

A aluminium, iron and silver only ✓

B aluminium and silver only

C iron, silver and plastic only

D plastic only

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28 What is the unit of charge?

    A ampere

✓ **B** coulomb

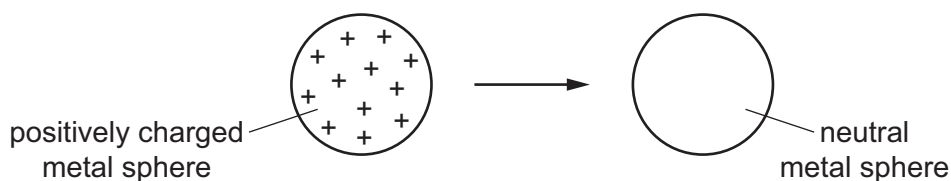   **C** ohm

    D volt

Reason: It is a well-known fact that Coulomb is the unit of charge.

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29 An isolated metal sphere is positively charged.

It is then brought near to another isolated metal sphere that is neutral.

positively charged metal sphere   neutral metal sphere

What happens to the charges on the neutral sphere as the positively charged sphere is brought close to it?

    A Some positive charges move to the left and some negative charges move to the right.

    B Some positive charges move to the right and some negative charges move to the left.

    C Some positive charges move to the right, but the negative charges do not move.

✓ **D** The positive charges do not move, but some negative charges move to the left.

Reason: A charge-separation occurs inside the neutral sphere and the electrons move towards the end of the sphere that is closer to the positively-charged sphere.

30 Which diagram is the current-voltage (I-V) characteristic graph for a metallic conductor at constant temperature?

    A   **B**   **C**   ✓ **D**
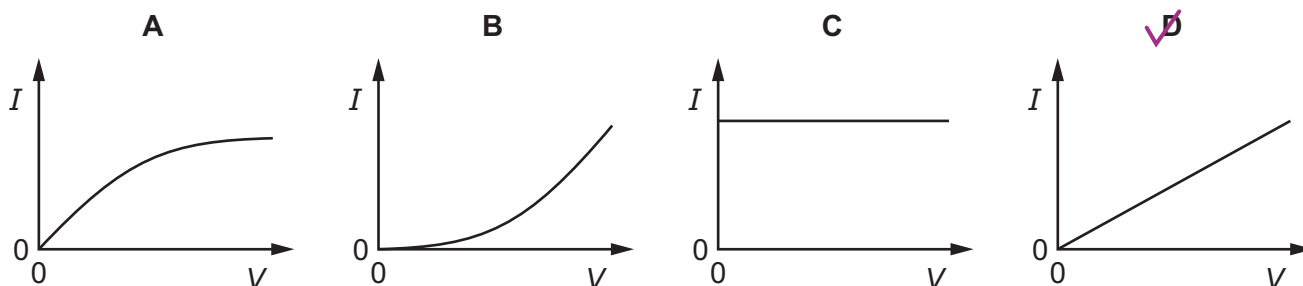
Reason: This is the voltage-current (V-I) graph for an ohmic conductor in which ohms law is followed.

31 Four circuits each contain a 6V battery, a diode, an ammeter and a lamp. None of the components is faulty.

Which circuit shows a possible ammeter reading?

A ✓

reading = 1.0 A

B
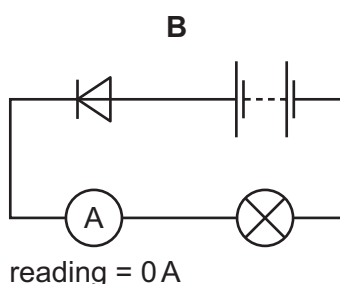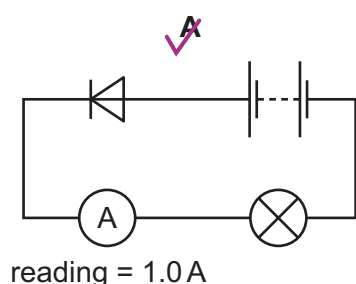
reading = 0 A

Reason: In the circuits C and D, the diode is reverse-biased. There will be no current it and the ammeter reading should be 0A. In circuits A and B, the diode is forward biased and hence, the ammeter reading cannot be 0A.

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C

reading = 1.0 A

D

reading = −1.0 A
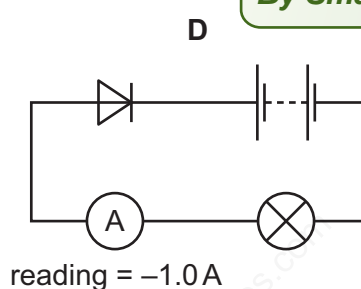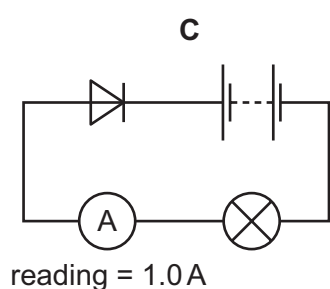
32 A student connects a variable potential divider (potentiometer) circuit.
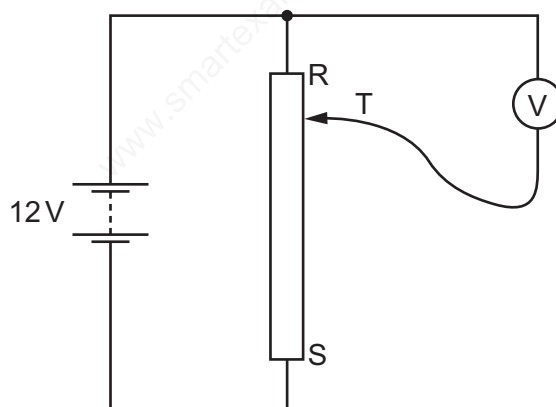
What happens to the reading on the voltmeter as the sliding terminal T is moved from R to S?

A It decreases from 12 V to 0 V.

B ✓ It increases from 0 V to 12 V.

C It remains at 0 V.

D It remains at 12 V.

Reason: As the sliding terminal T is moved from R to S, the resistance is increased. As a result the voltage across it increases and it becomes equal to the battery voltage when the terminal is moved to S.

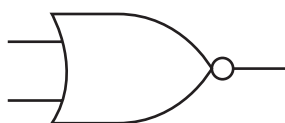**33** The diagram shows an electric circuit.
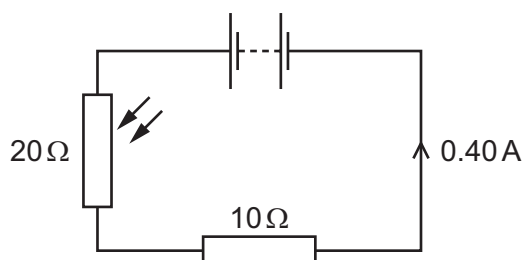
Reason: The LDR and the fixed register are connected in series and hence the same current of 0.40A passes through each of them. Hence, the p.d. across the LDR(V) = IR = 0.40 x 20=8V

What is the potential difference (p.d.) across the LDR?

A   4.0 V   **B**   8.0 V ✓   **C**   25 V   **D**   50 V

34 What does the symbol shown represent?

Reason: This is is a NOR gate symbol. Learn all the gates symbols well.

A   an AND gate

B   a NOR gate ✓

C   a NOT gate

D   an OR gate

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35 What is the purpose of a relay?

A   to change a large voltage into a small voltage

B   to change a small voltage into a large voltage

C   to use a large current to switch on a small current

D   to use a small current to switch on a large current ✓

Reason: The relay is electromagnetic and is used to to create a larger current with the help of a small input current.

36 Which device uses a split-ring commutator?

A   a d.c. motor ✓

B   a relay

C   a transformer

D   an a.c. generator

Reason: A DC motor makes use of a split ring commutator, in order to reverse the direction of the current every half turn.

37 Which particle has a negative charge?

    A   an alpha particle

    ✓**B**   an electron

    C   a neutron

    D   a proton

Reason: An electron has a negative charge of one.

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38 A type of nuclear reaction takes place in stars.

Which row describes this type of reaction?

	nuclear reaction	nuclei formed	energy transfer
A	fission	larger than original nuclei	released
B	fission	smaller than original nuclei	absorbed
✓**C**	fusion	larger than original nuclei	released
D	fusion	smaller than original nuclei	absorbed

Reason: A fusion reaction takes place inside the sun, where hydrogen fuses to form helium with the release of energy.

39 A sample of radioactive isotope is decaying.

The nuclei of which atoms will decay first?

Reason: Radioactive decay is a random process. You can know how many nuclei will decay, but not which one will decay.

    ✓**A**   It is impossible to know because radioactive decay is random.

    B   It is impossible to know unless the age of the material is known.

    C   The atoms near the centre will decay first because they are surrounded by more atoms.

    D   The atoms near the surface will decay first because the radiation can escape more easily.

40 A sample of a radioactive isotope emits particles at a rate of 240 per minute.

After 48 hours the rate of emission has decreased to 15 per minute.

What is the half-life of the radioactive material?

    A   4.0 hours   **B**   8.0 hours   ✓**C**   12 hours   **D**   16 hours

240/2= 120 .... One half life
120/2= 60 ....Second half life
60/2 = 30 ....Third half life
30/2=15 ....Fourth half life
Total time for the above 4 half lives=48 hours. 48/4=12. Hence half life =12 hours.

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