**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

**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)

* 7 4 7 8 9 4 7 6 7 0 *

**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 / $s^2$).

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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


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**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.

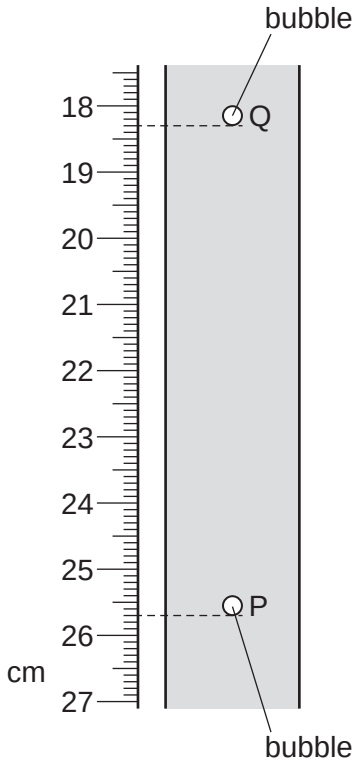
**C** Use a top pan balance.

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

**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.

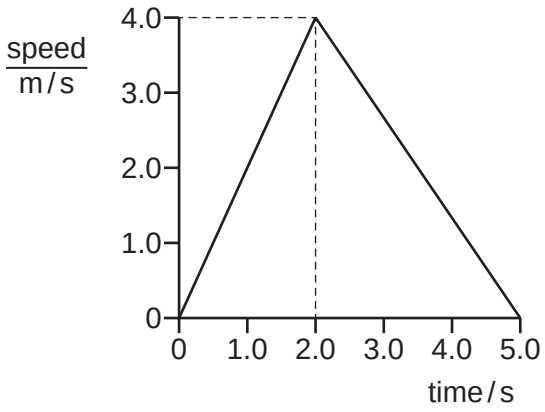



What is the speed of the bubble between P and Q?

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

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**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 |

**4** In which pair are both quantities measured in newtons?

**A** force and pressure

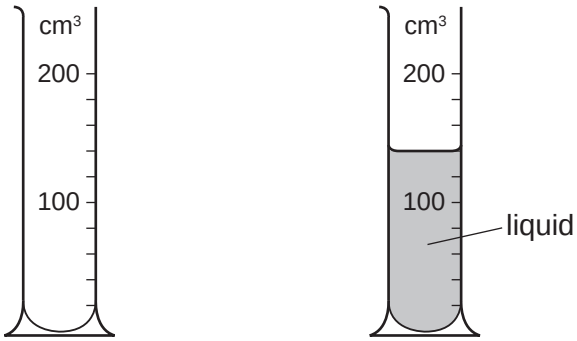
**B** force and weight

**C** mass and pressure

**D** mass and weight

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




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.

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.




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.

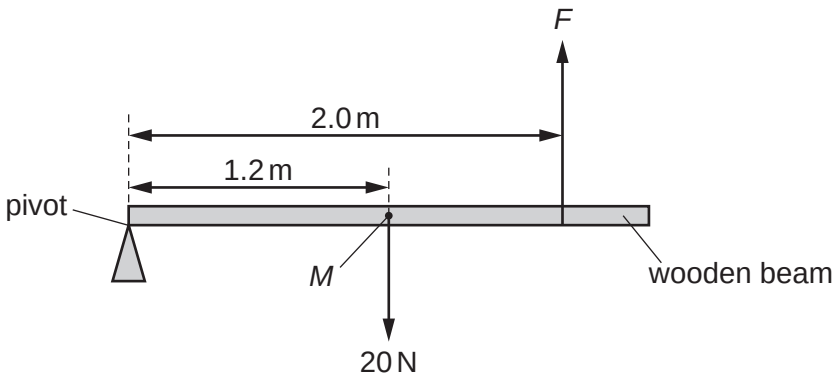
**C** The car slows down.

**D** The car's forward speed increases.

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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*.




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.




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<br>kg m/s | speed<br>m/s |
|---|---|---|
| **A** | 0 | 4.8 |
| **B** | 0 | 8.0 |
| **C** | 24 | 4.8 |
| **D** | 24 | 8.0 |

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**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

**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?

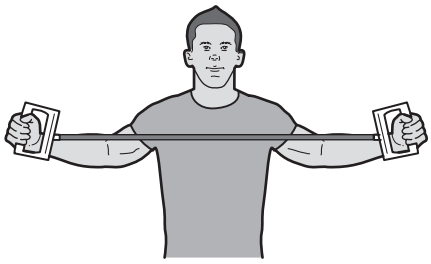
**A** 2.8% **B** 25% **C** 28% **D** 36%

**12** The diagrams show athletes training by stretching springs.

Each spring has the same stiffness.

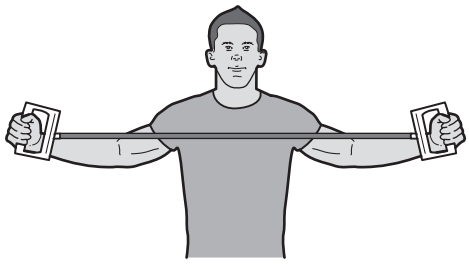
Which athlete does the most work?

**A**



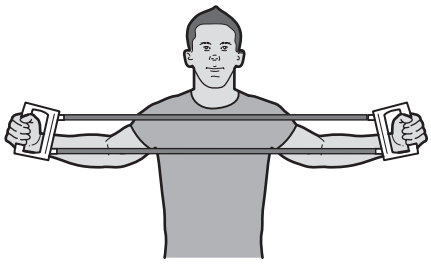
one spring stretched
by 0.60 m

**B**



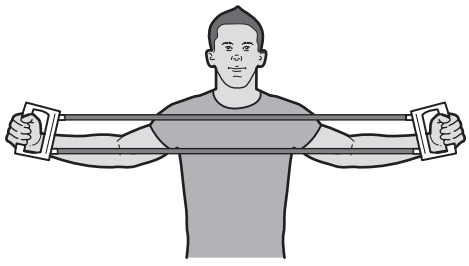
one spring stretched
by 0.80 m

**C**



two springs stretched
by 0.60 m

**D**



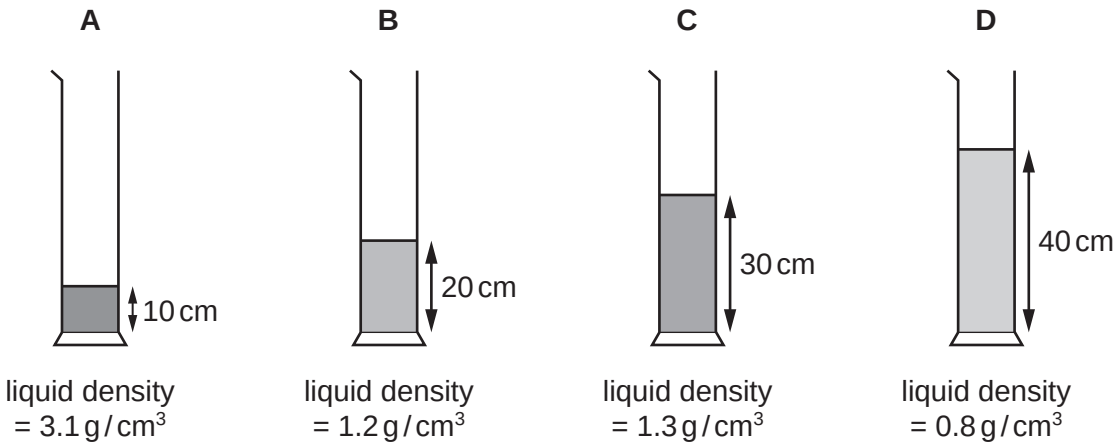
two springs stretched
by 0.80 m

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**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?




**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?

**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.

**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?

**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

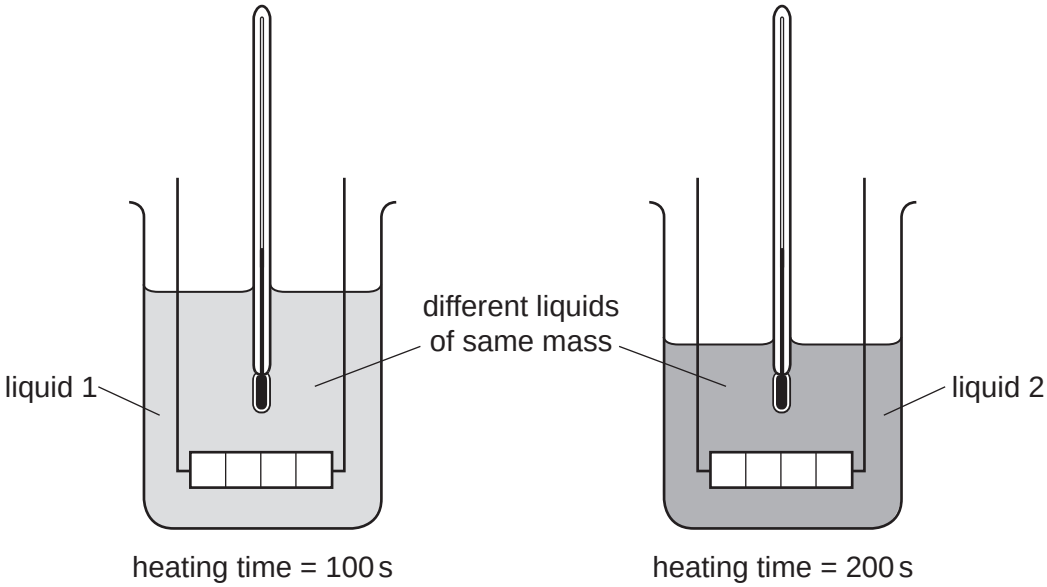
**D** the energy needed to produce unit temperature increase of unit volume of ice

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**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.




Which statement is correct?

**A** Each beaker of liquid has the same thermal capacity.

**B** Each beaker of liquid receives the same energy.

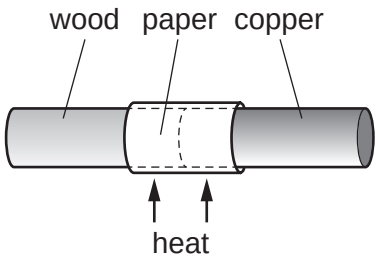
**C** Liquid 1 receives more energy than liquid 2.

**D** The thermal capacity of liquid 1 is less than the thermal capacity of 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.




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

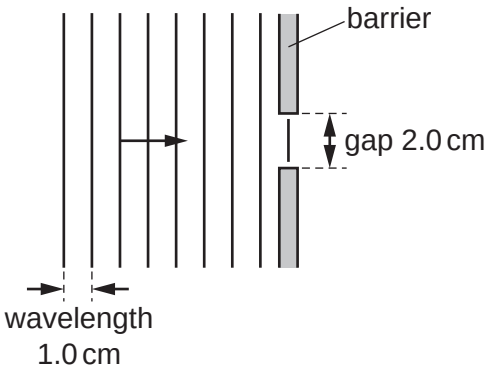
| | brown side | wood | copper |
|---|---|---|---|
| **A** | copper | conductor | insulator |
| **B** | copper | insulator | conductor |
| **C** | wood | conductor | insulator |
| **D** | wood | insulator | conductor |

**19** Different waves hit barriers with different sized gaps.

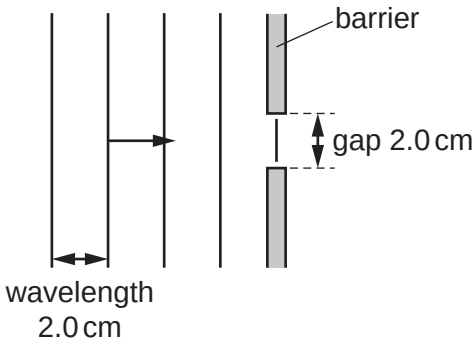
The waves will diffract.

In which diagram does the greatest spreading occur?

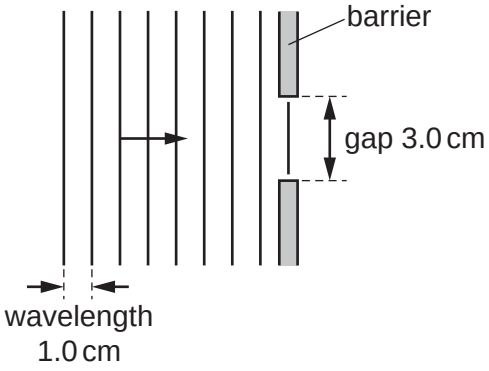
**A**



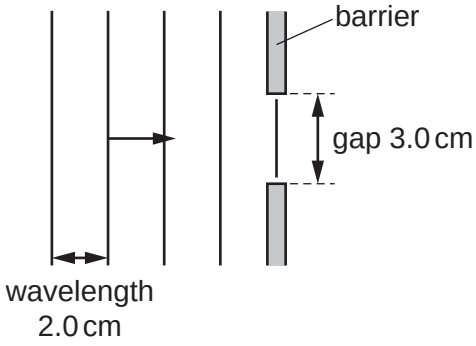

**B**




**C**

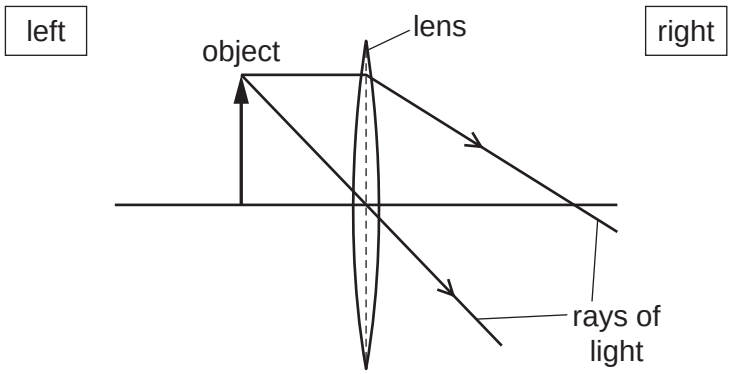



**D**




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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.

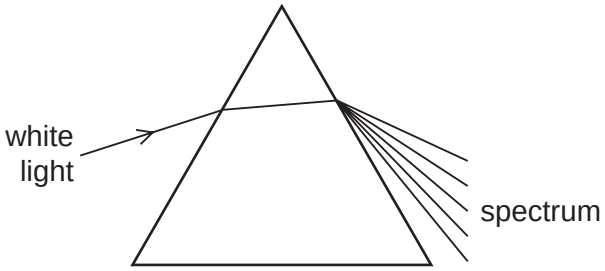



Which type of image is formed, and on which side of the lens is it formed?

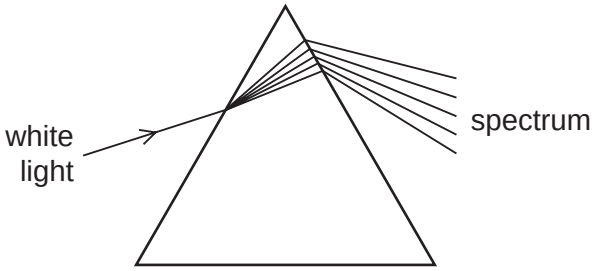
| | type of image | which side of lens |
|---|---|---|
| **A** | real | on the left |
| **B** | real | on the right |
| **C** | virtual | on the left |
| **D** | virtual | on the right |

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

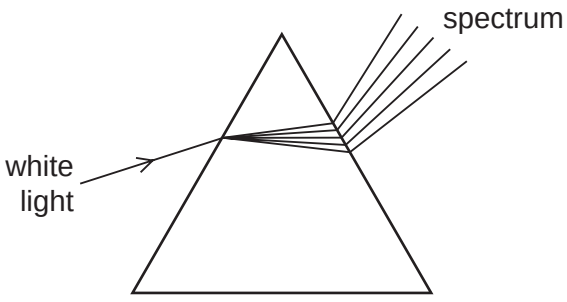
**A**



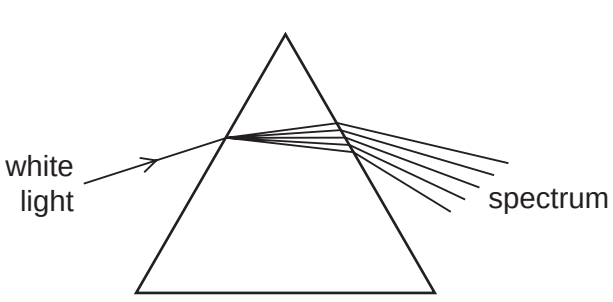

**B**




**C**




**D**



**22** Light travels in a vacuum and then enters a glass block. The speed of the light in the glass block is $2.0 \times 10^8$ 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 $1.0 \times 10^8$ times the speed in a 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 |

**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 |

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**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?

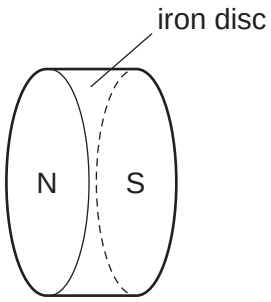
**A** The coil of wire has its own gravitational field.

**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?




**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

Which materials conduct electricity?

**A** aluminium, iron and silver only

**B** aluminium and silver only

**C** iron, silver and plastic only

**D** plastic only

**28** What is the unit of charge?

**A** ampere

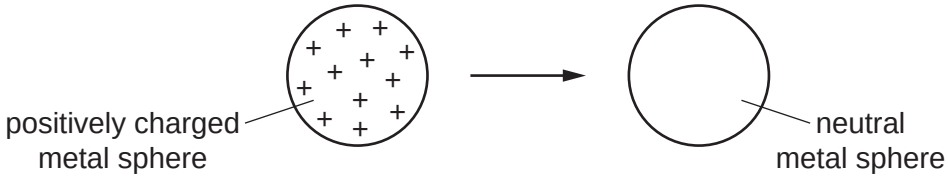
**B** coulomb

**C** ohm

**D** volt

**29** An isolated metal sphere is positively charged.

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




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.

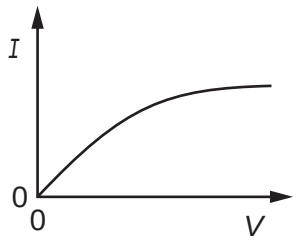
**B** Some positive charges move to the right and some negative charges move to the left.

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

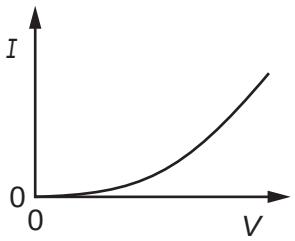
**D** The positive charges do not move, but some negative charges move to the left.

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

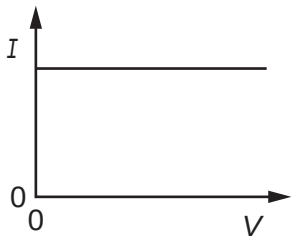
**A**



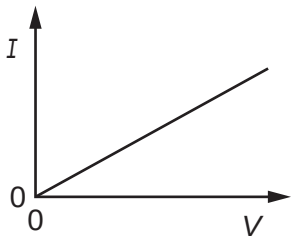

**B**




**C**




**D**

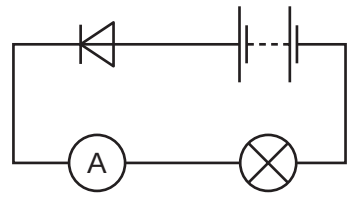



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**31** Four circuits each contain a 6 V battery, a diode, an ammeter and a lamp. None of the components is faulty.

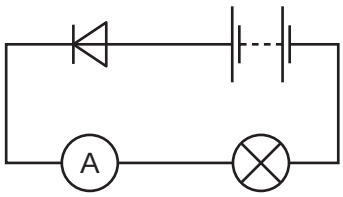
Which circuit shows a possible ammeter reading?

**A**



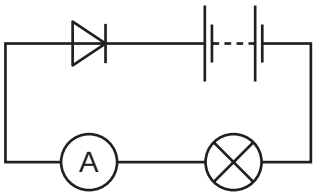

reading = 1.0 A

**B**



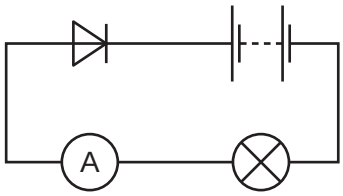

reading = 0 A

**C**



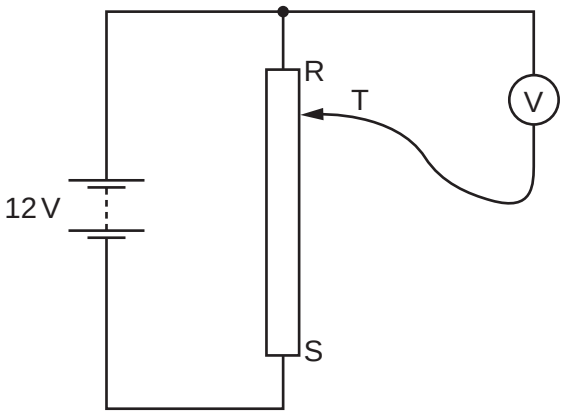

reading = 1.0 A

**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?

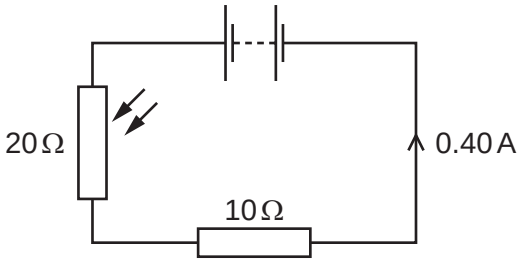
**A** It decreases from 12 V to 0 V.

**B** It increases from 0 V to 12 V.

**C** It remains at 0 V.

**D** It remains at 12 V.

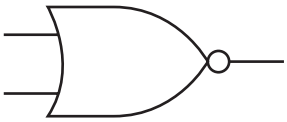
**33** The diagram shows an electric circuit.




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?



**A** an AND gate

**B** a NOR gate

**C** a NOT gate

**D** an OR gate

**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

**36** Which device uses a split-ring commutator?

**A** a d.c. motor

**B** a relay

**C** a transformer

**D** an a.c. generator

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**37** Which particle has a negative charge?

**A** an alpha particle

**B** an electron

**C** a neutron

**D** a proton

**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 |

**39** A sample of radioactive isotope is decaying.

The nuclei of which atoms will decay first?

**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

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