



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

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**PHYSICS**

**5054/01**

Paper 1 Multiple Choice

**October/November 2007**

**1 hour**

Additional Materials:      Multiple Choice Answer Sheet  
   Soft clean eraser  
   Soft pencil (type B or HB is recommended)



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**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

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

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

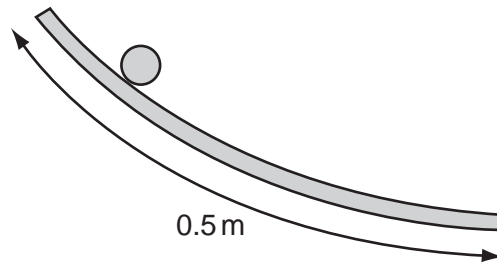
Any rough working should be done in this booklet.

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



- 1 In an experiment, a ball is rolled down a curved track that is about half a metre long.



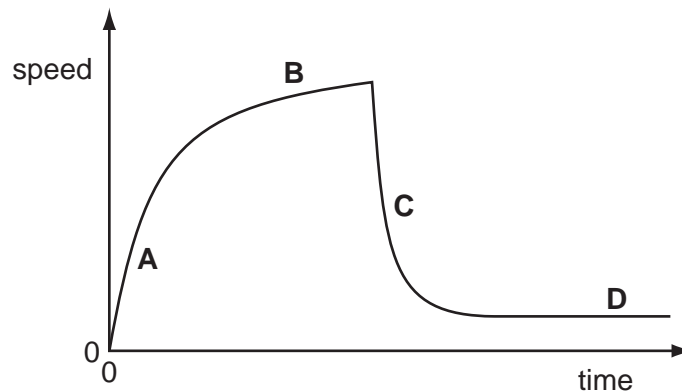
Which measuring device should be used to measure the length accurately?

- A metre rule
  - B micrometer
  - C tape measure
  - D vernier calipers
- 2 Forces of 30 N and 50 N act on the same body, but in different directions.

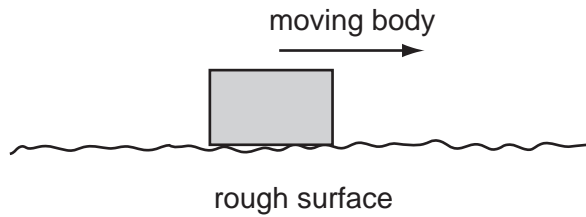
Which value could **not** be the resultant force on the body?

- A 10 N
  - B 30 N
  - C 50 N
  - D 70 N
- 3 The speed-time graph for a falling skydiver is shown below. The skydiver alters his fall first by spreading his arms and legs and then by using a parachute.

Which part of the graph shows the diver falling with terminal velocity?



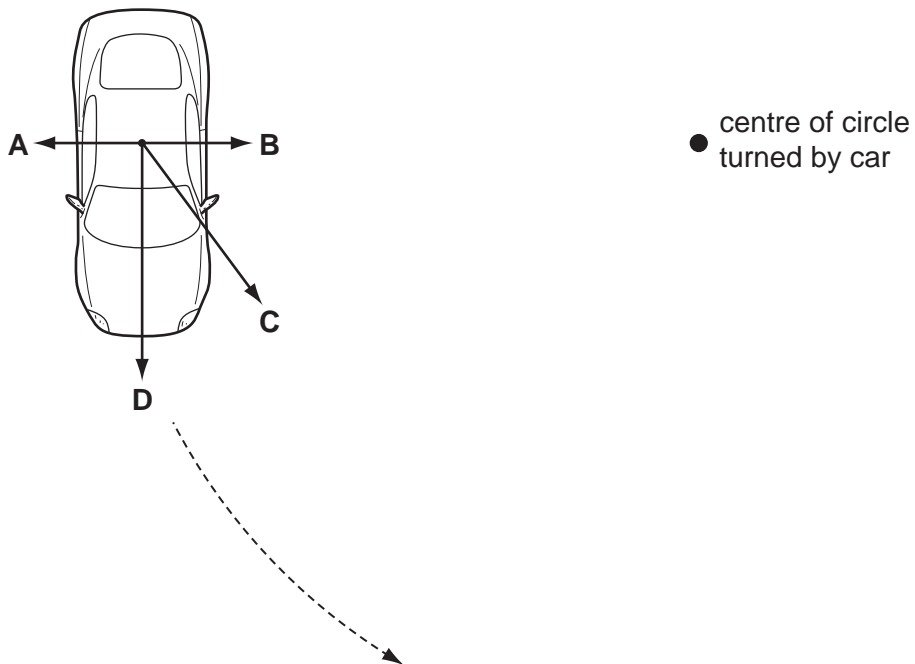
- 4 When a body moves across a rough surface, a frictional force is produced.



Which statement about this force is **always** true?

- A It acts in the direction of the motion.
  - B It is equal in value to the force producing the motion.
  - C It makes the body recoil in the opposite direction after stopping it.
  - D It opposes the motion across the surface.
- 5 A car moves in a circle at a constant speed.

What is the direction of the resultant force acting on the car?

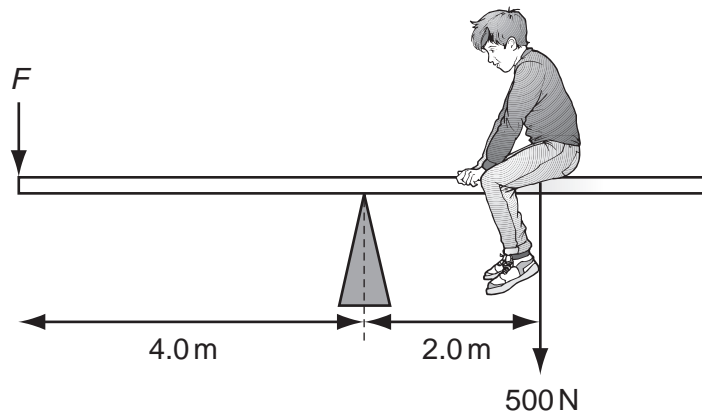


- 6 A body of mass 10 kg falling freely in the gravitational field close to the Moon's surface has an acceleration of  $1.6 \text{ m/s}^2$ .

What is the gravitational field strength on the Moon?

- A 0 N/kg
- B 1.6 N/kg
- C 10 N/kg
- D 16 N/kg

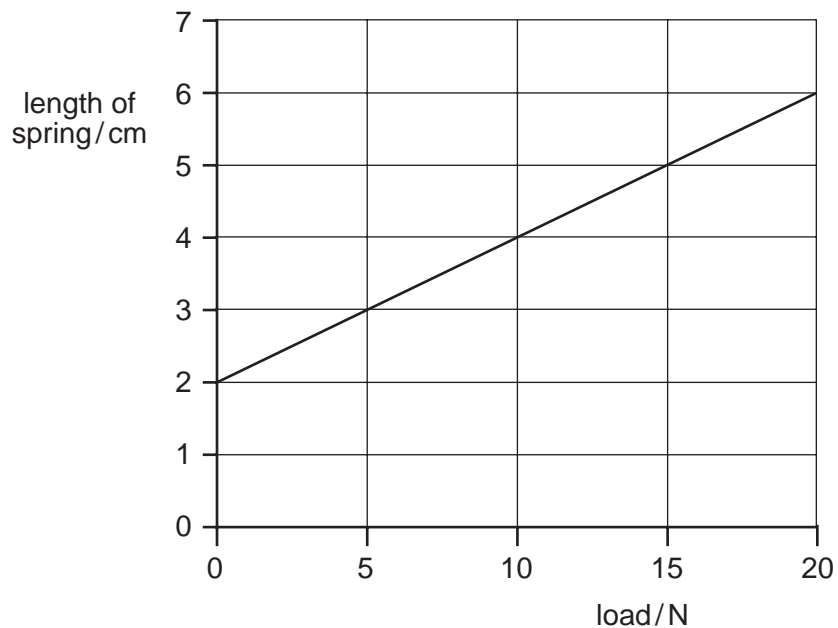
- 7 The diagram shows a boy of weight 500 N sitting on a see-saw. He sits 2.0 m from the pivot.



What is the force  $F$  needed to balance the see-saw?

- A 250 N      B 750 N      C 1000 N      D 3000 N
- 8 A spring balance is calibrated to give readings in newtons.

The graph shows how the length of the spring varies with the load.



A load causes the spring of the balance to extend by 3 cm.

What is the balance reading?

- A 3 N      B 5 N      C 10 N      D 15 N

- 9 A 2 kg mass is moving at constant speed.

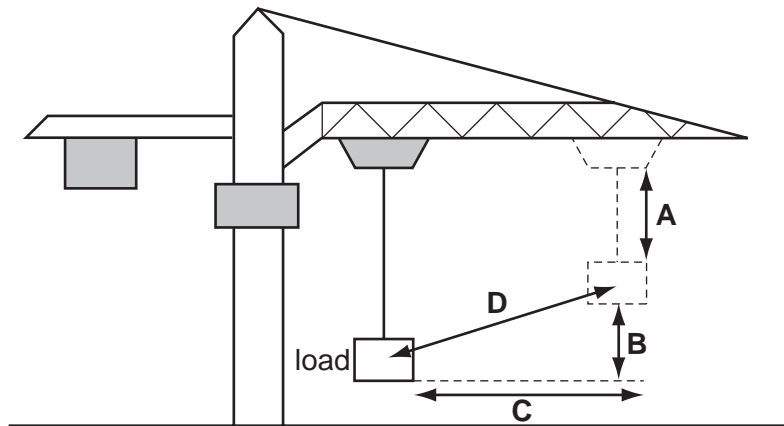
The kinetic energy of the mass is 400 J.

What is the speed of the mass?

- A 0.4 m/s      B 20 m/s      C 200 m/s      D 400 m/s

- 10 A crane moves its load diagonally, as shown.

By what distance is the weight of the load multiplied in order to calculate the increase in gravitational potential energy of the load?



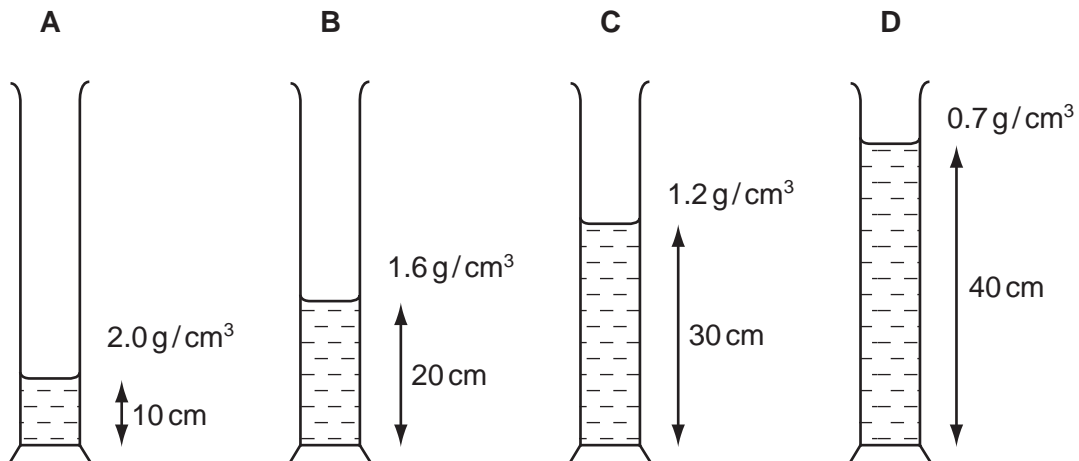
- 11 The efficiency of an electrical generator is 65 %.

Which useful output can be expected if the energy input to the generator is 12 kJ?

- A 4.2 kJ      B 7.8 kJ      C 19 kJ      D 780 kJ

- 12 Four different liquids are poured into identical measuring cylinders. The diagrams show the depths of the liquids and their densities.

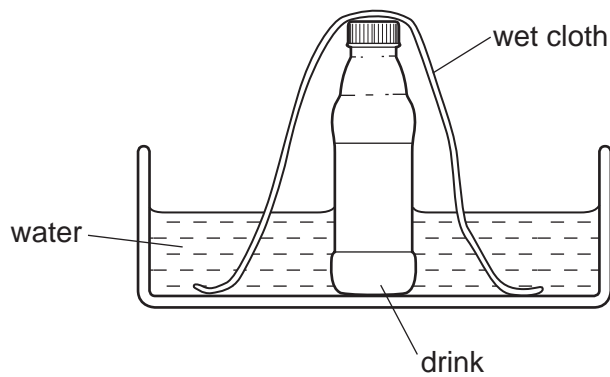
Which liquid causes the largest pressure on the base of its measuring cylinder?



- 13 Which of the following correctly compares the forces between the molecules in steam, water and ice?

	weakest forces	→	strongest forces
<b>A</b>	ice	steam	water
<b>B</b>	ice	water	steam
<b>C</b>	steam	water	ice
<b>D</b>	water	steam	ice

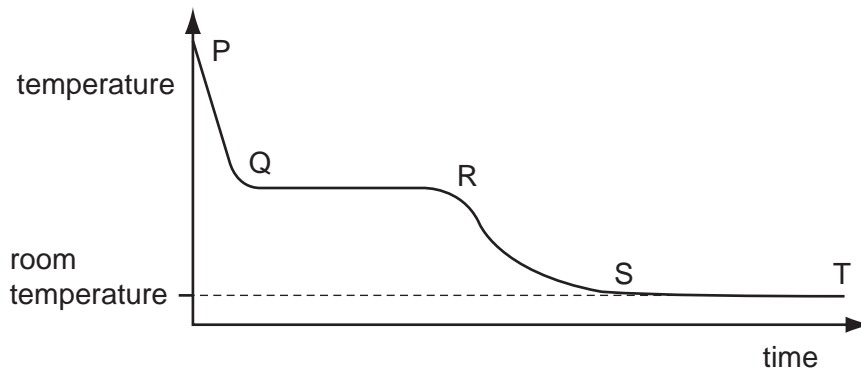
- 14 On a hot day, a drink in a bottle can be kept cool by standing it in a bowl of water and placing a wet cloth over it.



Why is the drink kept cool?

- A** Hot air cannot escape from the bottle.
  - B** The cloth conducts heat from the bottle into the water.
  - C** The drink cannot evaporate from the bottle.
  - D** Water evaporating from the cloth cools the drink.
- 15 Which instrument is most suitable for measuring a rapidly changing temperature?
- A** alcohol-in-glass thermometer
  - B** clinical thermometer
  - C** mercury-in-glass thermometer
  - D** thermocouple

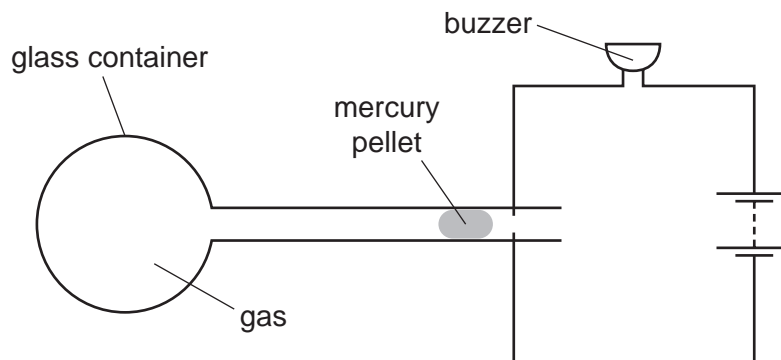
16 The graph shows the cooling curve of a hot substance.



In which part of the curve is latent heat released?

- A** PQ                      **B** QR                      **C** RS                      **D** ST

17 The diagram shows the design for an alarm.

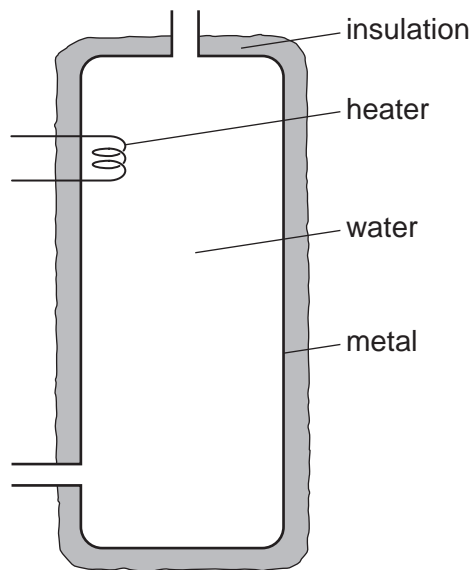


The mercury pellet moves and completes the circuit.

Why does this happen?

	temperature	gas
<b>A</b>	falls	contracts
<b>B</b>	falls	expands
<b>C</b>	rises	contracts
<b>D</b>	rises	expands

- 18 Water at the top of a hot-water tank is heated and the water becomes hot. No water enters or leaves the tank.



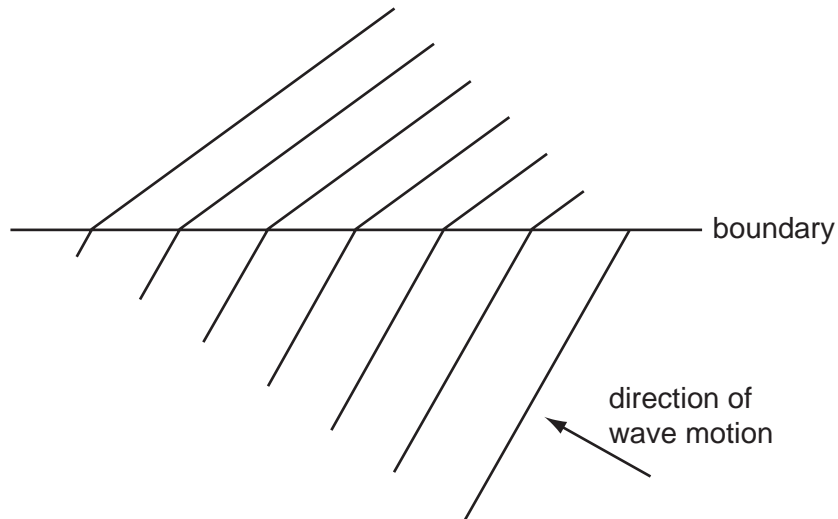
Water at the bottom of the tank stays cold for some time.

Why is this?

- A Cold water at the top of the tank falls to the bottom.
- B Hot water at the bottom of the tank rises to the top.
- C Water is a poor conductor of heat.
- D The insulation is a poor conductor of heat.



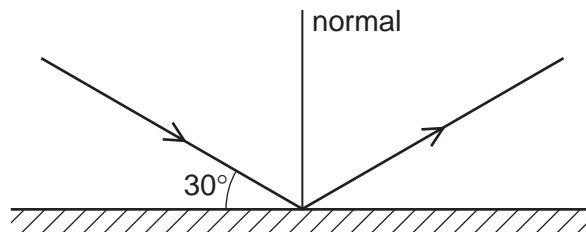
19 The diagram shows the refraction of water waves as they cross a boundary in a ripple tank.



What causes this refraction?

- A a change in frequency due to a change in depth
- B a change in frequency due to a change in wavelength
- C a change in speed due to a change in depth
- D a change in speed due to a change in frequency

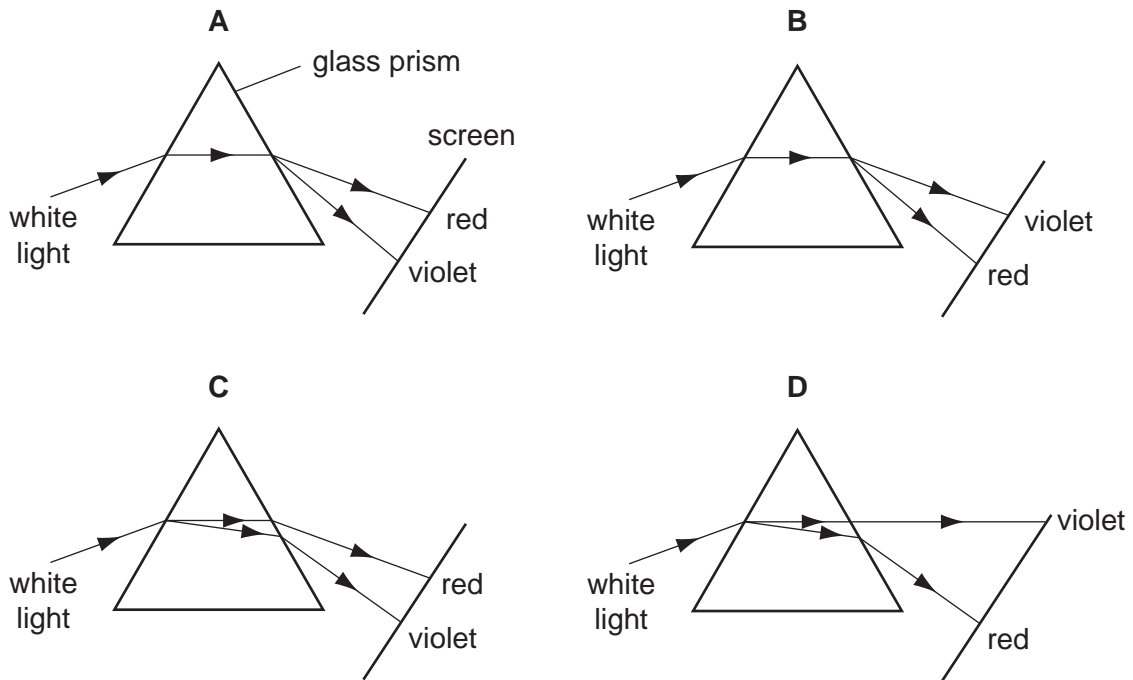
20 The diagram shows a ray of light reflected from a plane mirror.



What is the angle of reflection?

- A  $30^\circ$
- B  $60^\circ$
- C  $90^\circ$
- D  $120^\circ$

21 Which diagram correctly shows the dispersion of white light by a glass prism?



22 Which does **not** normally use infra-red radiation?

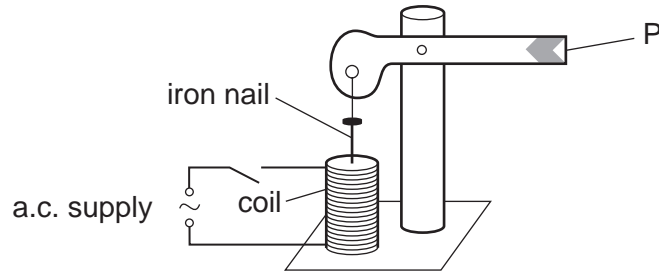
- A electric grill
- B intruder alarm
- C television remote controller
- D sunbed

23 A flash of lightning and the corresponding thunder clap are detected 6 s apart. It is calculated that the lightning struck about 1800 m away.

On which assumption is the calculation based?

- A Light reaches us almost instantaneously, but sound travels at 300 m/s.
- B Light travels 300 m/s faster than sound.
- C Sound reaches us almost instantaneously, but light travels at 300 m/s.
- D The sound of the thunder was emitted 6 s after the flash.

24 The diagram shows a model railway signal.

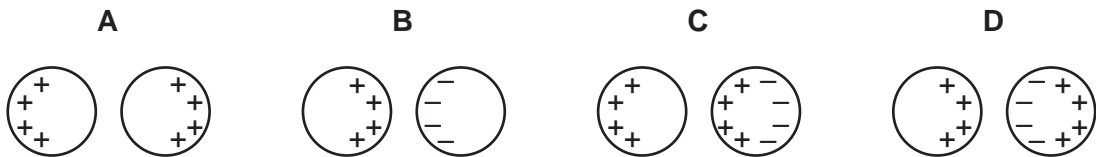


What does the end P do when the switch is closed?

- A It goes down and stays down.
  - B It goes up and stays up.
  - C It goes down and then returns to its original position.
  - D It goes up and then returns to its original position.
- 25 Which part of a video tape recording system does **not** rely on magnetic material for its operation?
- A the drive motor
  - B the power lead
  - C the transformer
  - D the video tape
- 26 A positively charged insulated metal sphere is brought close to, but not touching, a similar uncharged metal sphere.



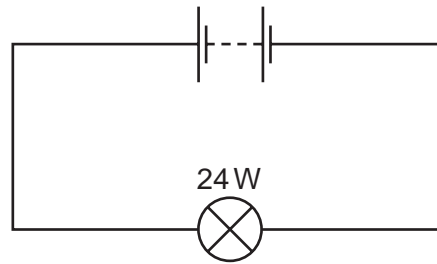
Which diagram shows the charge distribution on the spheres?



27 Under which condition does Ohm's law apply?

- A The current must be constant.
- B The power must be constant.
- C The temperature must be constant.
- D The voltage must be constant.

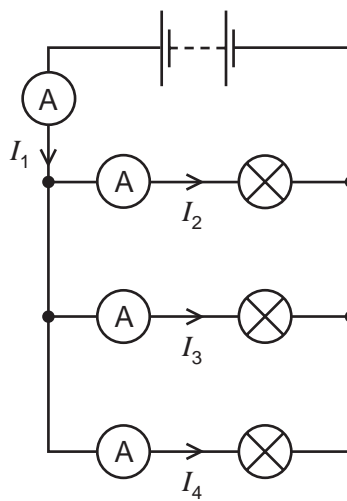
28 A battery is used to light a 24 W electric lamp. The battery provides a charge of 120 C in 60 s.



What is the potential difference across the bulb?

- A** 5V                      **B** 12V                      **C** 24V                      **D** 120V

29 A student sets up the circuit shown.

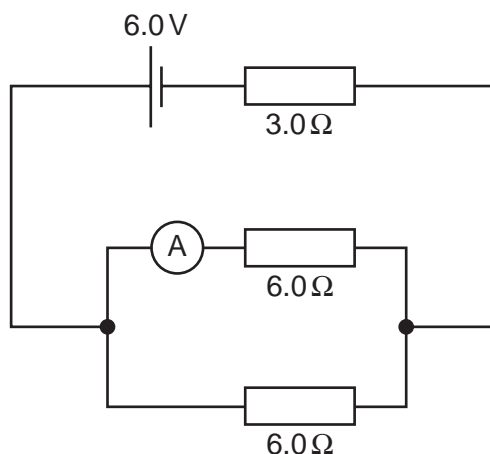


The currents measured with the ammeters are shown.

Which equation is correct?

- A**  $I_1 = I_2 + I_3 + I_4$   
**B**  $I_1 = I_2 = I_3 = I_4$   
**C**  $I_2 + I_3 = I_4 + I_1$   
**D**  $I_4 = I_3 + I_2 + I_1$

30 The following circuit is set up.



What is the reading on the ammeter?

- A** 0.33A      **B** 0.50A      **C** 0.67A      **D** 1.0A

31 Energy is represented by the letter  $E$ , current by  $I$ , power by  $P$ , charge by  $Q$ , p.d. by  $V$  and time by  $t$ .

Which pair of equations is correct?

- A**  $E = It$  and  $P = VIt$   
**B**  $E = VQ/t$  and  $P = VI$   
**C**  $E = VIt$  and  $P = VI$   
**D**  $E = VQ$  and  $P = VI/t$

32 The case of an electric fan is earthed. The plug to the fan contains a 5A fuse. There is a current of 4A when the fan works normally.

The cable to the fan becomes so worn that the live wire makes electrical contact with the metal case.

What happens?

- A** The current flows to earth and the fuse is not affected.  
**B** The fuse melts and switches off the circuit.  
**C** The metal case becomes live and dangerous.  
**D** The metal case becomes very hot.

- 33 The diagram shows a beam of electrons entering a magnetic field. The direction of the field is into the page.



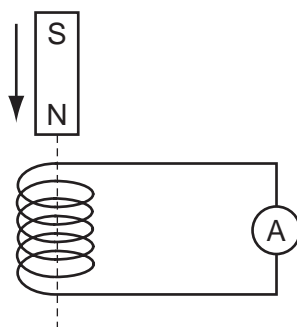
In which direction are the electrons deflected?

- A into the page
  - B out of the page
  - C towards the bottom of the page
  - D towards the top of the page
- 34 Which single-coil motor will have the largest turning effect?

	current in coil	number of turns in coil	iron core
<b>A</b>	6 A	100	no
<b>B</b>	10 A	200	no
<b>C</b>	6 A	100	yes
<b>D</b>	10 A	200	yes

- 35 A small coil is connected to a sensitive ammeter. The ammeter needle can move to either side of the zero position.

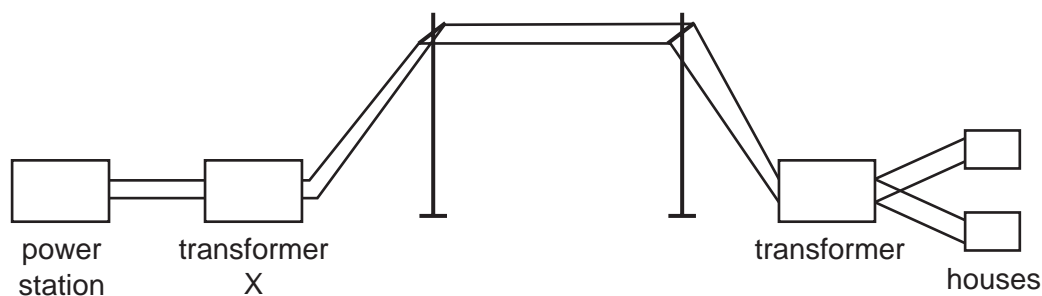
As the magnet falls towards the coil, the ammeter needle moves quickly to the right of the zero position.



The magnet moves through the coil.

How does the ammeter needle move as the magnet falls away from the coil?

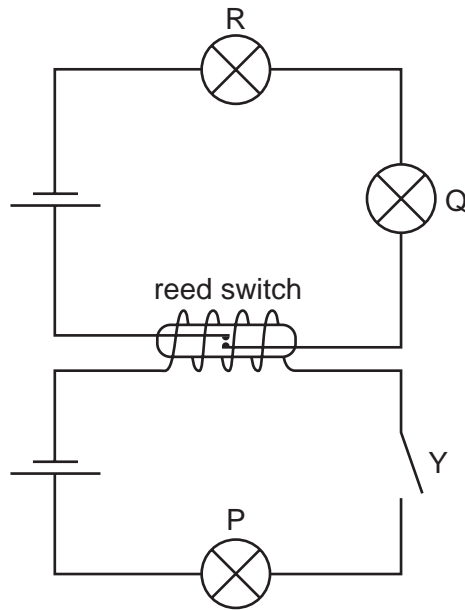
- A** It does not move.  
**B** It gives a steady reading to the right.  
**C** It moves quickly to the left of the zero position and then returns to zero.  
**D** It moves quickly to the right of the zero position and then returns to zero.
- 36 The diagram shows transformers and cables used to transmit electrical energy over long distances.



How does transformer X affect the voltage and the current from the power station?

	voltage	current
<b>A</b>	decreases it	decreases it
<b>B</b>	decreases it	increases it
<b>C</b>	increases it	decreases it
<b>D</b>	increases it	increases it

- 37 In the circuit shown, all lamps are identical and all cells are identical. The resistance of the coil of the reed switch is negligible.



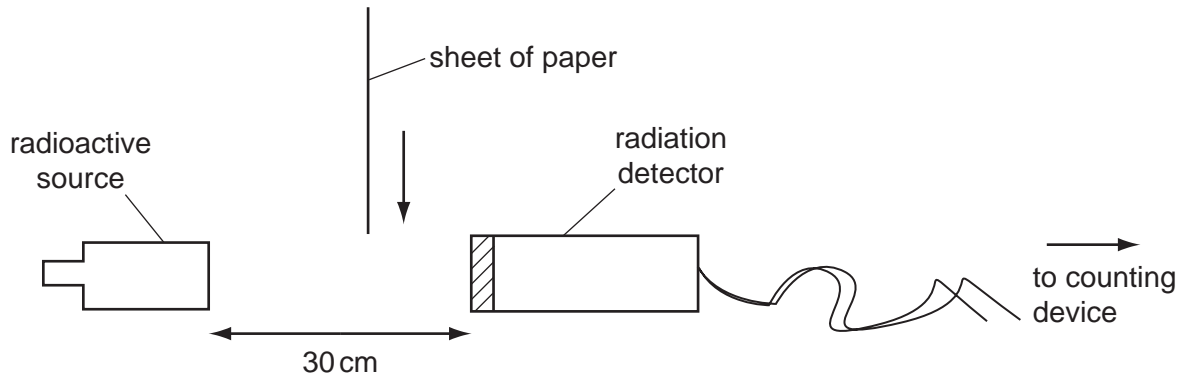
One cell lights one lamp to normal brightness.

What is the brightness of the lamps when switch Y is closed?

	P	Q	R
<b>A</b>	dim	dim	dim
<b>B</b>	normal	dim	dim
<b>C</b>	normal	off	off
<b>D</b>	off	normal	normal



- 38 An experimenter sets up the following apparatus, in air, to discover whether a radioactive source is emitting alpha-particles.



The experimenter moves the paper between the source and the detector. There is no difference in the count-rate.

Why is this?

- A Paper does not absorb alpha-particles.
  - B The count-rate due to the background radiation is too high.
  - C The radioactive source is too far from the detector.
  - D The source emits beta-particles and alpha-particles.
- 39 The half-life of a radioisotope is 2400 years. The activity of a sample is 720 counts/s.
- How long will it take for the activity to fall to 90 counts/s?
- A 300 years
  - B 2400 years
  - C 7200 years
  - D 19 200 years
- 40 The neutral atoms of all isotopes of the same element contain the same number of
- A electrons and protons.
  - B electrons and neutrons.
  - C neutrons only.
  - D neutrons and protons.





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