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**PHYSICS**

**0972/01**

Paper 1 Multiple Choice (Core)

**For Examination from 2018**

SPECIMEN PAPER

**45 minutes**

Additional Materials:      Multiple Choice Answer Sheet  
   Soft clean eraser  
   Soft pencil (type B or HB is 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 =  $10 \text{ m/s}^2$ )

This document consists of **19** printed pages and **1** blank page.

1 Which quantity is measured in newtons?

- A density
- B energy
- C pressure
- D weight

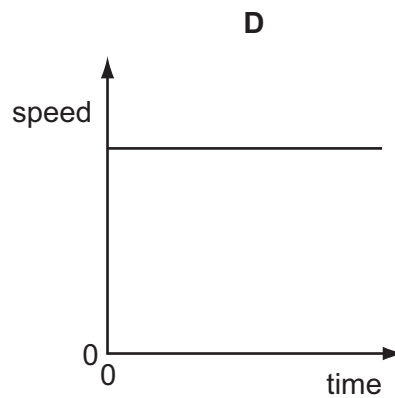
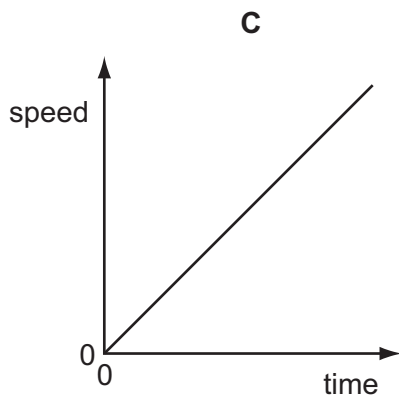
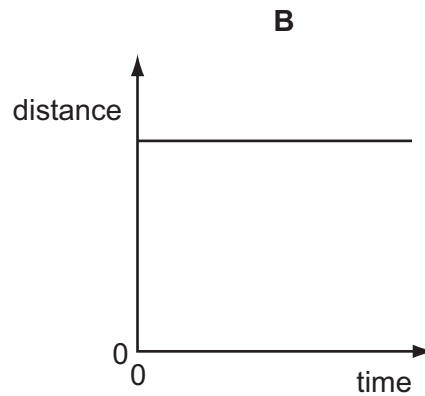
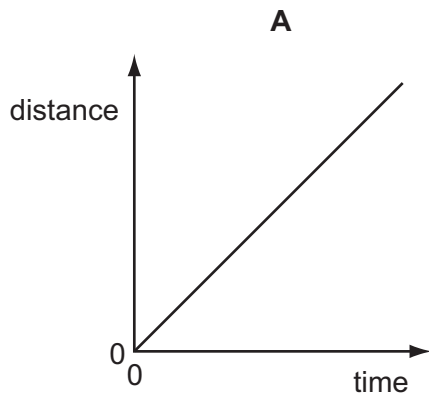
2 A measuring cylinder is used to measure the volume of a quantity of water.

Which measuring technique would **not** improve the accuracy of the measurement?

- A making sure that the measuring cylinder is vertical
- B making sure that the water surface is at eye level
- C reading the top of the water meniscus
- D using the smallest measuring cylinder available that will contain all the water

3 Two distance-time graphs and two speed-time graphs are shown.

Which graph represents an object that is at rest?

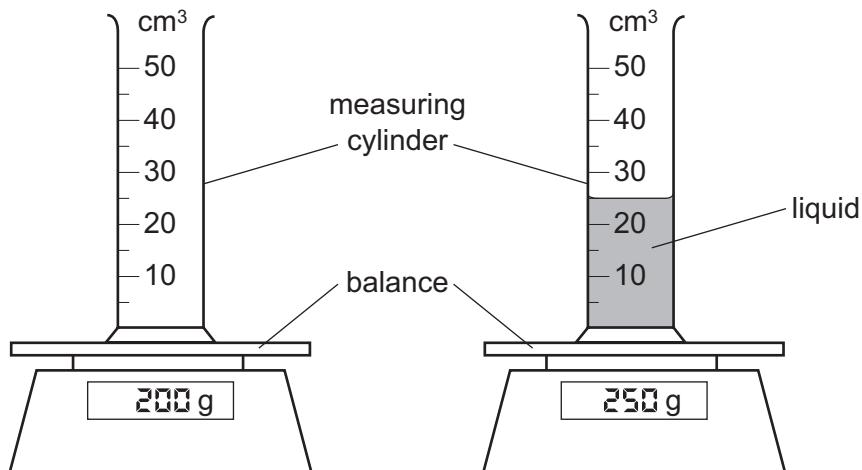


- 4 An astronaut in an orbiting spacecraft experiences a force due to gravity. This force is less than when she is on the Earth's surface.

Compared with being on the Earth's surface, how do her mass and her weight change when she goes into orbit?

	mass in orbit	weight in orbit
<b>A</b>	decreases	decreases
<b>B</b>	decreases	unchanged
<b>C</b>	unchanged	decreases
<b>D</b>	unchanged	unchanged

- 5 The diagram shows an experiment to find the density of a liquid.



What is the density of the liquid?

- A** 0.5g/cm<sup>3</sup>      **B** 2.0g/cm<sup>3</sup>      **C** 8.0g/cm<sup>3</sup>      **D** 10.0g/cm<sup>3</sup>
- 6 An experiment is carried out to measure the extension of a rubber band for different loads.

The results are shown below.

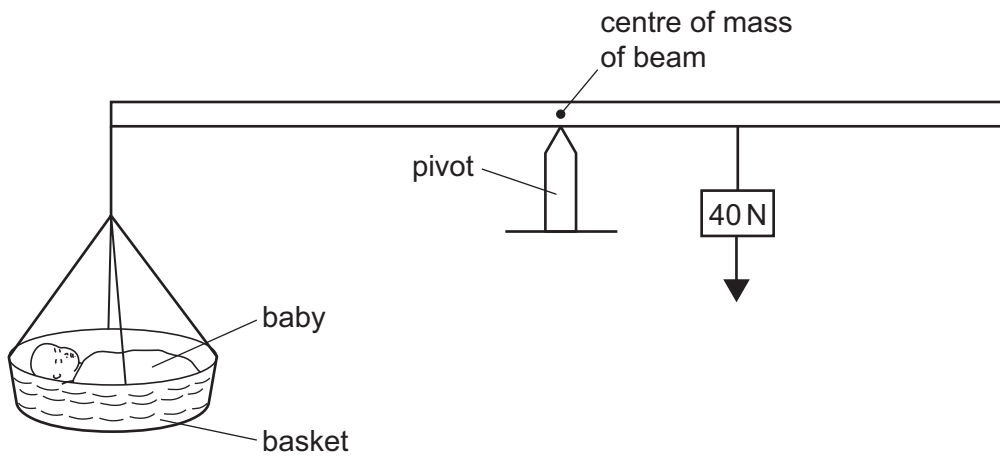
load/N	0	1.0	2.0	3.0
length/cm	15.2	16.2		18.6
extension/cm	0	1.0	2.1	3.4

Which figure is missing from the table?

- A** 17.2      **B** 17.3      **C** 17.4      **D** 17.6

- 7 Which statement about an object moving in a straight line through air is correct?
- A When it accelerates, the resultant force acting on it is zero.
- B When it moves at a steady speed, the air resistance acting on it is zero.
- C When it moves at a steady speed, the resultant force acting on it is zero.
- D When it moves, there is a resultant force acting on it.
- 8 The diagram shows a balance being used to find the weight of a baby. The weight of the basket can be ignored.

At equilibrium, the pivot is nearer to the 40 N balancing weight than to the baby.

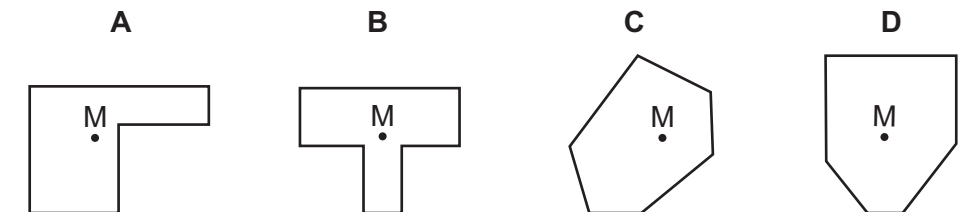


What is the weight of the baby?

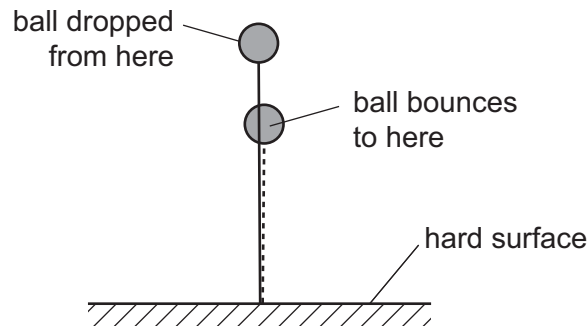
- A less than 40 N
- B 40 N
- C more than 40 N
- D impossible to tell without a scale on the beam
- 9 The diagram shows four objects on a flat surface.

The centre of mass of each object is marked M.

Which object is about to fall over?



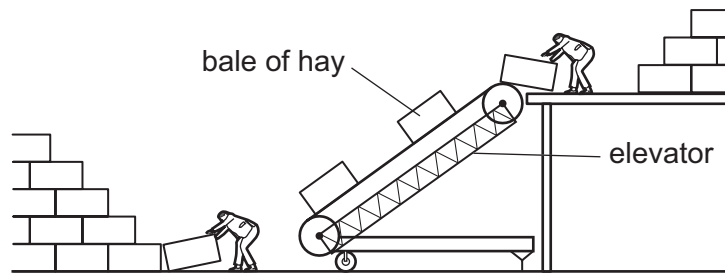
- 10 A ball is dropped on to a hard surface and bounces. It does not bounce all the way back to where it started, and so has not regained all of its original gravitational potential energy.



Which statement accounts for the loss of gravitational potential energy?

- A Energy was destroyed as the ball hit the ground.
  - B Energy was destroyed as the ball travelled through the air.
  - C The chemical energy and elastic energy of the ball have increased.
  - D The internal (heat) energy of the ball and its surroundings has increased.
- 11 Which energy resource is used to boil water to generate electricity?
- A hydroelectric
  - B nuclear fission
  - C tides
  - D waves

- 12 Two farmers use an electrically powered elevator to lift bales of hay. All the bales of hay have the same mass.

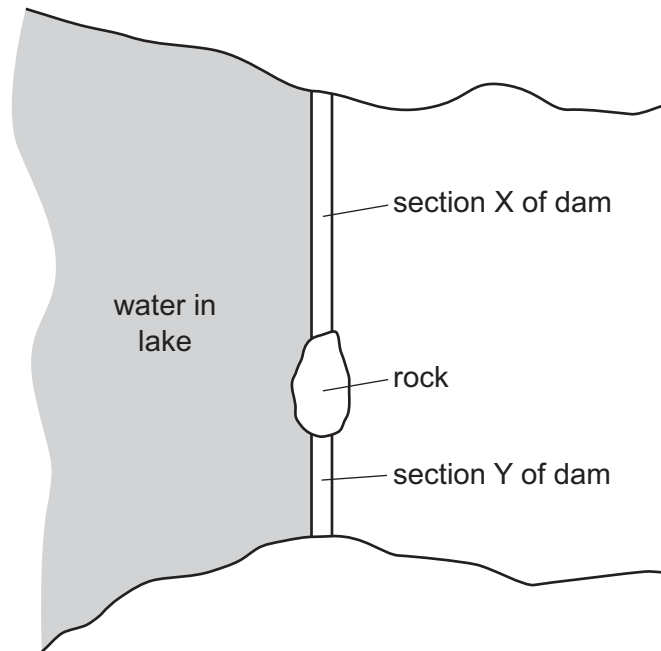


As sunset approaches, they increase the speed of the elevator so that more bales are lifted up in a given time.

How does this affect the work done in lifting each bale and the useful output power of the elevator?

	work done in lifting each bale	useful output power of the elevator
<b>A</b>	increases	decreases
<b>B</b>	increases	increases
<b>C</b>	no change	decreases
<b>D</b>	no change	increases

- 13 A dam across a lake is divided into two sections by a rock. Section X is longer than section Y but the two sections are otherwise identical. The water in the lake by the dam is the same depth everywhere. The diagram shows a view from above of the lake and the dam.

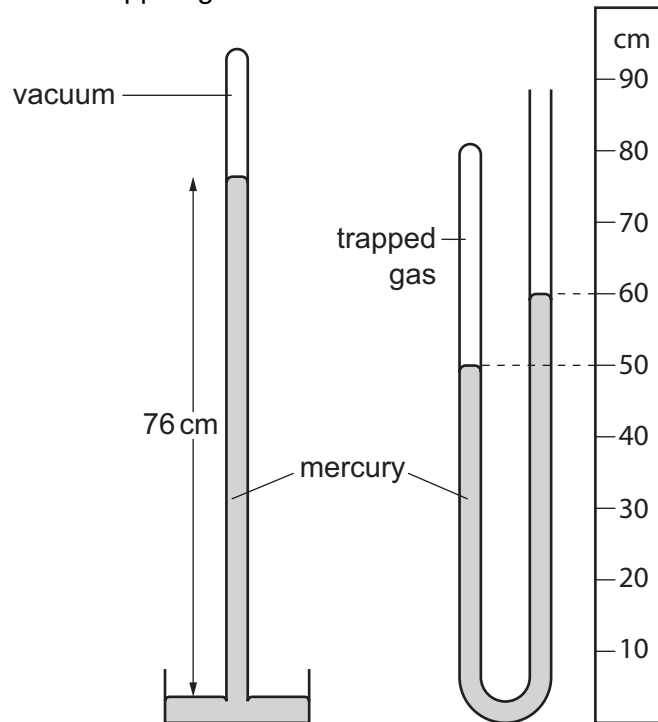


The water creates a total force on each section of the dam and an average pressure on each section of the dam.

Which statement is correct?

- A The average pressure on X equals the average pressure on Y.
- B The average pressure on X is less than the average pressure on Y.
- C The total force on X equals the total force on Y.
- D The total force on X is less than the total force on Y.

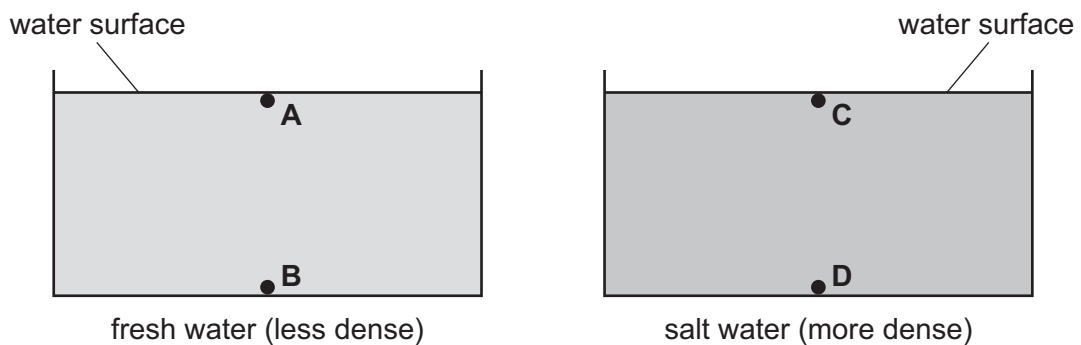
- 14 The diagram shows a simple mercury barometer alongside a mercury manometer. The manometer contains some trapped gas.



What is the pressure of the trapped gas?

- A 10 cm of mercury
  - B 50 cm of mercury
  - C 66 cm of mercury
  - D 86 cm of mercury
- 15 The diagrams show two swimming pools. One contains fresh water and the other contains salt water. Salt water is more dense than fresh water.

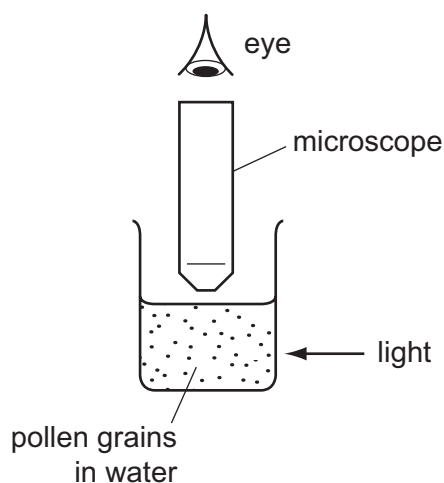
At which labelled point is the pressure the greatest?





- 16 Very small pollen grains are suspended in a beaker of water. A bright light shines from the side.

Small, bright dots of light are seen through a microscope. The dots move in rapidly changing, random directions.



What are the bright dots?

- A pollen grains being hit by other pollen grains
  - B pollen grains being hit by water molecules
  - C water molecules being hit by other water molecules
  - D water molecules being hit by pollen grains
- 17 A sealed gas cylinder is left outside on a hot, sunny day.

What happens to the average speed of the gas molecules and to the pressure of the gas in the cylinder as the temperature of the gas rises?

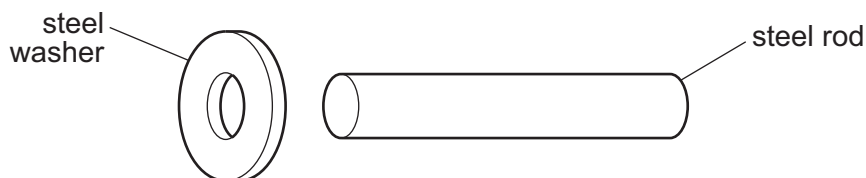
	average speed of gas molecules	pressure of gas in cylinder
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

- 18** A pool of water evaporates. As molecules escape, the temperature of the water left in the pool changes.

From where do the molecules escape and what is the effect on the temperature of the water in the pool?

	molecules escape from	temperature of water in the pool
<b>A</b>	all parts of the liquid	decreases
<b>B</b>	all parts of the liquid	increases
<b>C</b>	only the liquid surface	decreases
<b>D</b>	only the liquid surface	increases

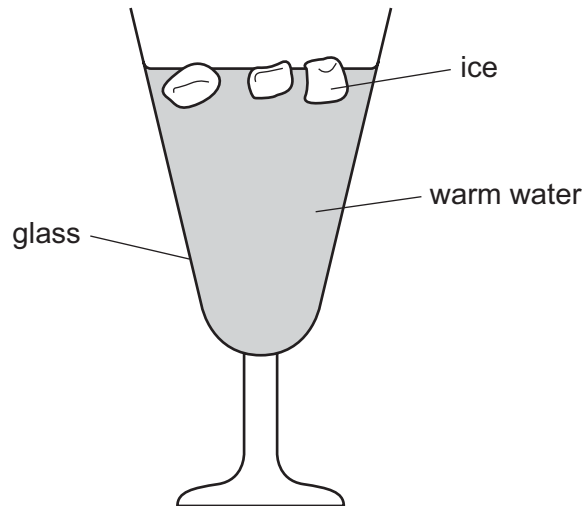
- 19** An engineer wants to fix a steel washer on to a steel rod. The rod is just too big to fit into the hole of the washer.



How can the engineer fit the washer on to the rod?

- A** Cool the washer and then place it over the rod.
- B** Cool the washer and rod to the same temperature and then push them together.
- C** Heat the rod and then place it in the hole in the washer.
- D** Heat the washer and then place it over the rod.

20 The diagram shows some ice being used to lower the temperature of some warm water.

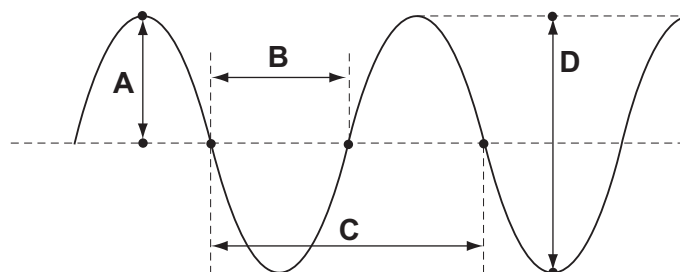


What is the main process by which the water at the bottom of the glass becomes cool?

- A condensation
  - B conduction
  - C convection
  - D radiation
- 21 Which list contains only transverse waves?
- A infra-red waves, light waves, sound waves
  - B infra-red waves, light waves, ultraviolet waves
  - C infra-red waves, sound waves, ultraviolet waves
  - D light waves, sound waves, ultraviolet waves

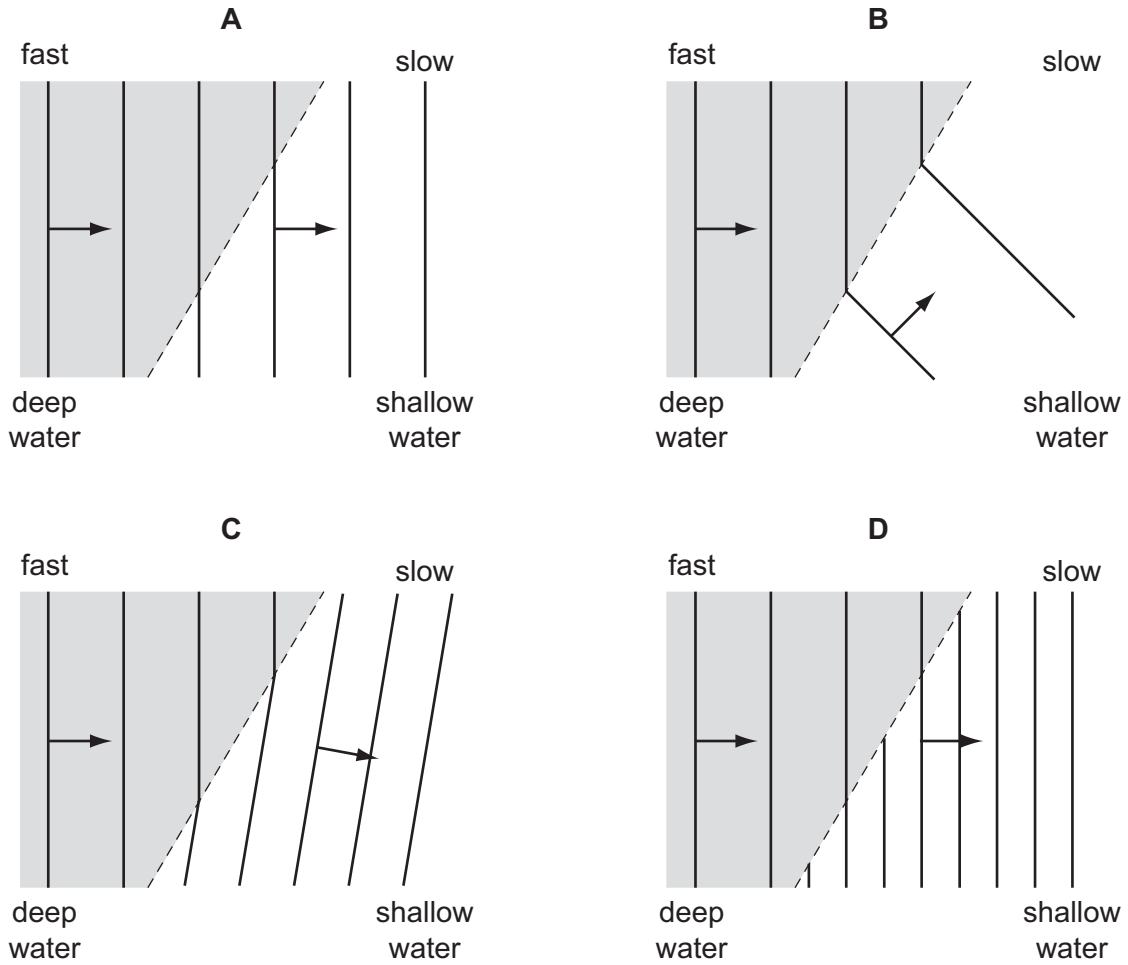
22 The diagram shows a wave.

Which labelled distance is the wavelength?



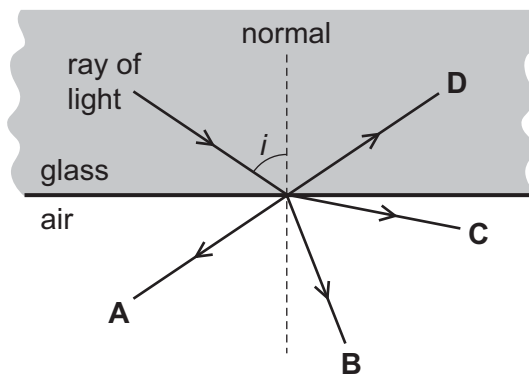
23 The diagrams show water waves that move more slowly after passing into shallow water.

Which diagram shows what happens to the waves?



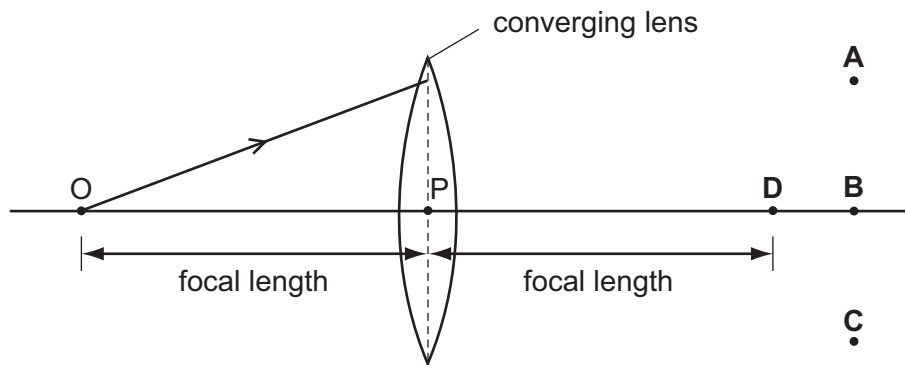
24 The diagram shows a ray of light incident on the edge of a piece of glass. The angle  $i$  is greater than the critical angle.

Which arrow shows the direction of the ray after it leaves the edge of the glass?

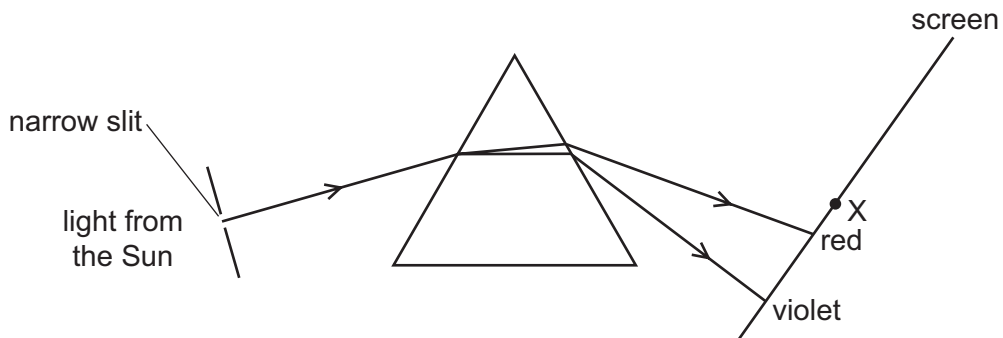


- 25 In the diagram, the distance  $OP$  is the focal length of the converging lens. One ray of light from  $O$  is shown.

Through which point will this ray pass, after refraction by the lens?



- 26 Light from the Sun passes through a narrow slit and a spectrum is produced on a screen.

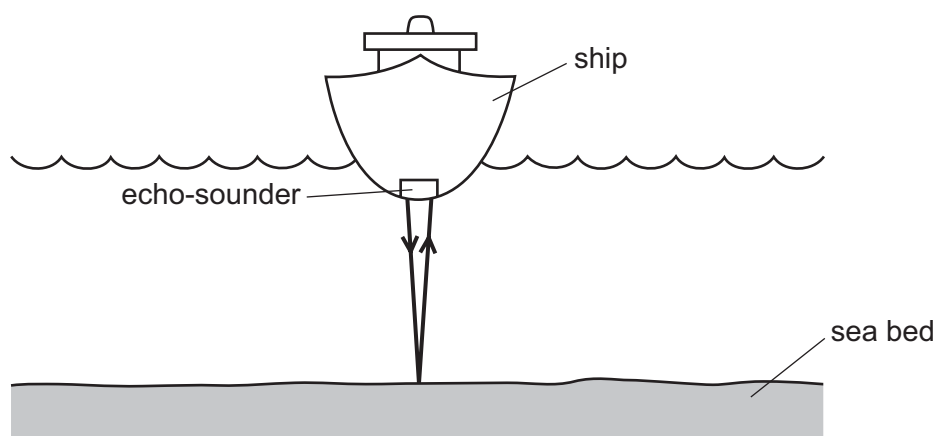


A thermometer placed at  $X$  shows a large temperature increase.

Which type of radiation causes this temperature increase?

- A infra-red
- B microwave
- C ultraviolet
- D visible light

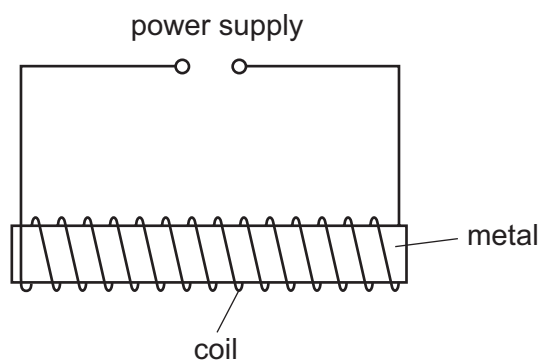
- 27 An echo-sounder on a ship produces a pulse of sound. The echo is received by the echo-sounder after two seconds.



The speed of sound in sea-water is 1500 m/s.

What is the depth of the sea-water below the ship?

- A 750 m      B 1500 m      C 3000 m      D 6000 m
- 28 Which frequency produces a sound that can be heard by a person?  
 A 2 Hz      B 10 Hz      C 2 kHz      D 30 kHz
- 29 The diagram shows apparatus that can be used to make a magnet.



Which metal and which power supply are used to make a **permanent** magnet?

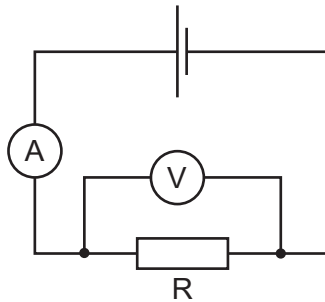
	metal	power supply
<b>A</b>	iron	6 V a.c.
<b>B</b>	iron	6 V d.c.
<b>C</b>	steel	6 V a.c.
<b>D</b>	steel	6 V d.c.

30 A polythene rod repels an inflated balloon hanging from a nylon thread.

Why do the rod and balloon repel?

- A The rod and the balloon have opposite charges.
- B The rod and the balloon have like charges.
- C The rod is charged but the balloon is not.
- D The balloon is charged but the rod is not.

31 A circuit is set up to determine the resistance of a resistor R. The meter readings are 2.0A and 3.0V.



What is the resistance of the resistor R?

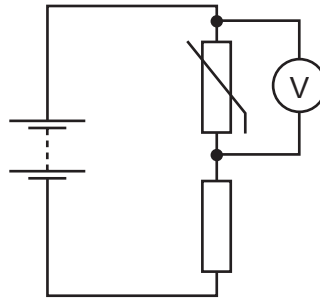
- A  $0.67\ \Omega$       B  $1.5\ \Omega$       C  $5.0\ \Omega$       D  $6.0\ \Omega$

32 A student uses a length of wire as a resistor. He makes a second resistor from the same material.

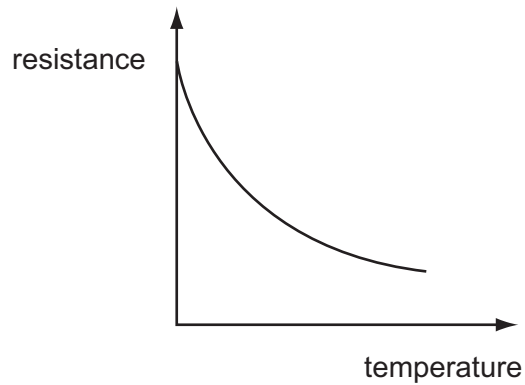
To be certain of making a second resistor of higher resistance, he should use a piece of wire that is

- A longer and thicker.
- B longer and thinner.
- C shorter and thicker.
- D shorter and thinner.

- 33 The circuit diagram shows a thermistor in a potential divider. A voltmeter is connected across the thermistor.



The graph shows how the resistance of the thermistor changes with temperature.



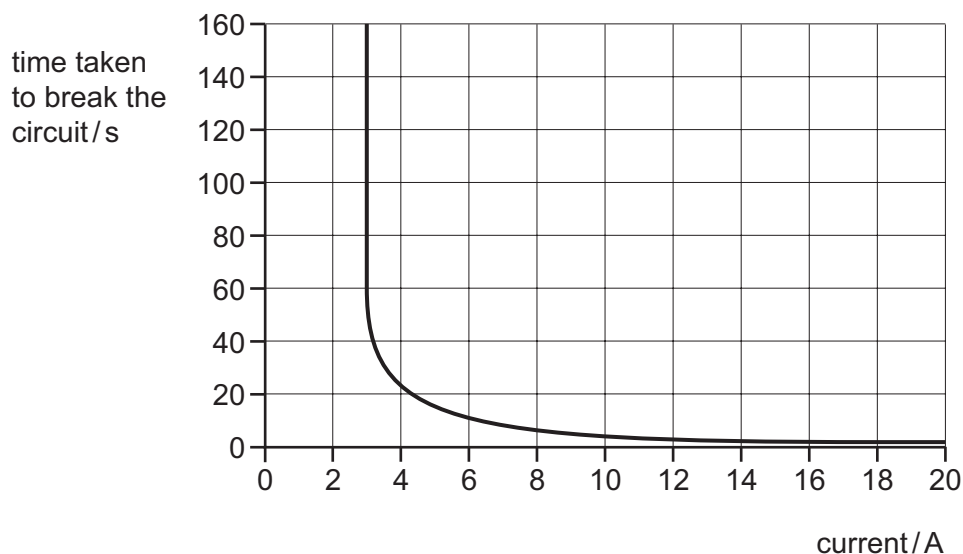
As the thermistor becomes warmer, what happens to its resistance and what happens to the reading on the voltmeter?

	resistance	voltmeter reading
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases



- 34 A circuit-breaker is designed to protect a circuit which usually carries a current of 2 A.

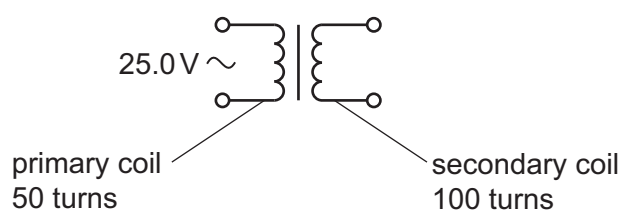
The time taken to break the circuit depends on the current, as shown in the graph.



What happens when the current in the circuit is 2 A and what happens when the current is 18 A?

	when the current is 2 A	when the current is 18 A
<b>A</b>	the circuit breaks in less than 5 seconds	the circuit breaks in less than 5 seconds
<b>B</b>	the circuit breaks in less than 5 seconds	the circuit does not break
<b>C</b>	the circuit does not break	the circuit breaks in less than 5 seconds
<b>D</b>	the circuit does not break	the circuit does not break

- 35 A transformer has 50 turns on its primary coil and 100 turns on its secondary coil. An alternating voltage of 25.0 V is connected across the primary coil.

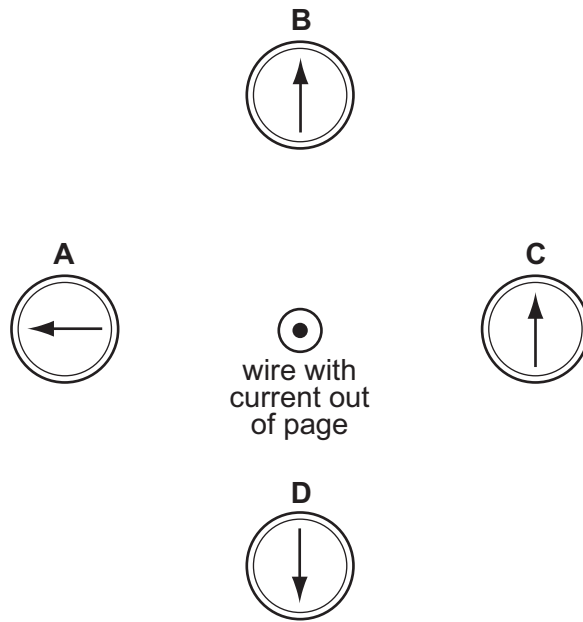


What is the voltage across the secondary coil?

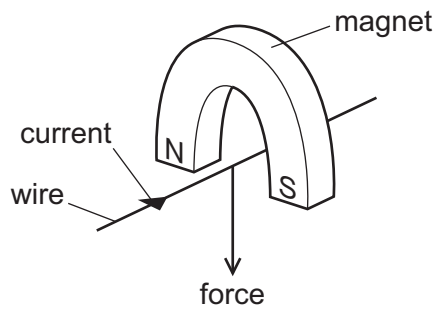
- A** 12.5V      **B** 50.0V      **C** 100V      **D** 200V

- 36 A wire perpendicular to the page carries an electric current in a direction out of the page. There are four compasses near the wire.

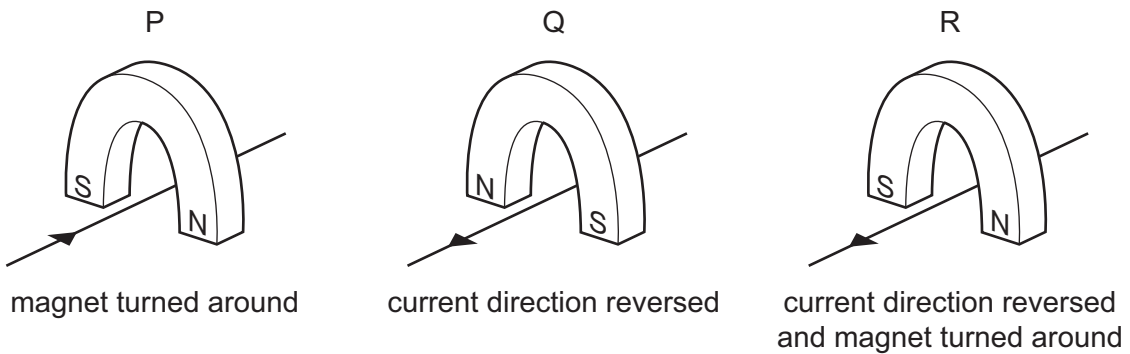
Which compass shows the direction of the magnetic field caused by the current?



- 37 A wire is placed between the poles of a horseshoe magnet. There is a current in the wire in the direction shown, and this causes a force to act on the wire.



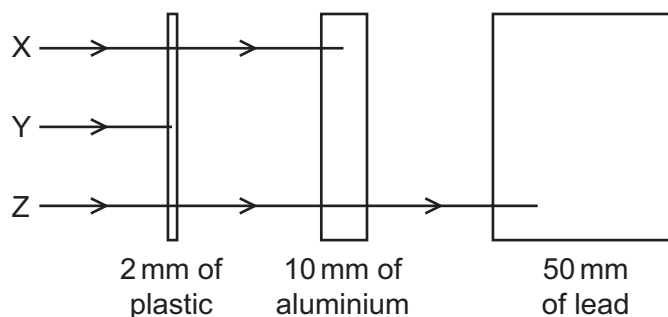
Three other arrangements, P, Q and R, of the wire and magnet are set up as shown.



Which arrangement or arrangements will cause a force in the same direction as the original arrangement?

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

38 The diagram shows the paths of three different types of radiation, X, Y and Z.



Which row in the table correctly identifies X, Y and Z?

	X	Y	Z
<b>A</b>	$\alpha$ -particles	$\beta$ -particles	$\gamma$ -rays
<b>B</b>	$\beta$ -particles	$\alpha$ -particles	$\gamma$ -rays
<b>C</b>	$\beta$ -particles	$\gamma$ -rays	$\alpha$ -particles
<b>D</b>	$\gamma$ -rays	$\alpha$ -particles	$\beta$ -particles

39 A particular nuclide has the symbol  ${}_{17}^{37}\text{Cl}$ .

What is true for atoms of this nuclide?

- A** There are 17 nucleons in the nucleus.
- B** There are 17 protons in the nucleus.
- C** There are 37 electrons in the nucleus.
- D** There are 37 neutrons in the nucleus.

40 A powder contains 400 mg of a radioactive isotope that emits  $\alpha$ -particles.

The half-life of the isotope is 5 days.

What mass of this isotope remains after 10 days?

- A** 0 mg
- B** 40 mg
- C** 100 mg
- D** 200 mg

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