



CEDAR GIRLS' SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2025

SECONDARY FOUR

CANDIDATE
NAME

CLASS

INDEX
NUMBER

PHYSICS

Paper 1 Multiple Choice

6091/01

1 September 2025

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

Write your name, class and index number on the Answer Sheet in the spaces provided.

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.

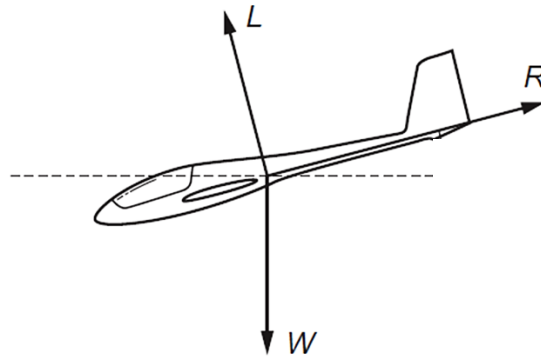
Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

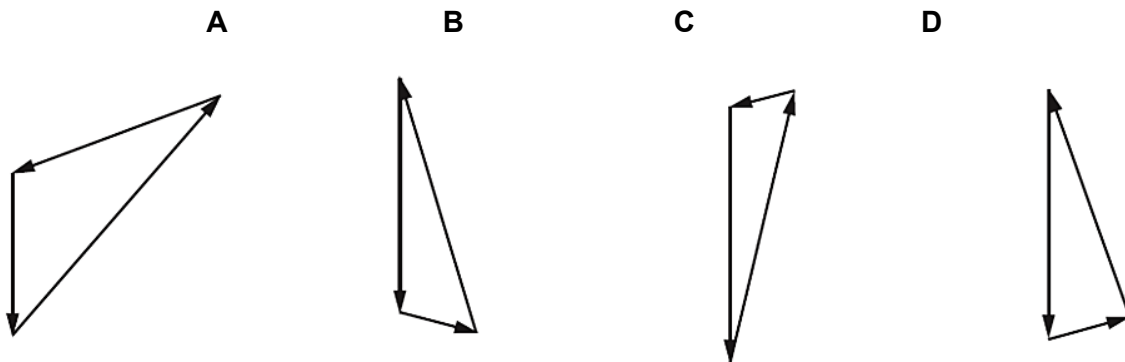
1 Which is the correct SI base unit expression for pressure?

- A** $(\text{kg m})/\text{s}^2$ **B** $(\text{kg m}^2)/\text{s}^3$ **C** $\text{kg}/(\text{m s}^2)$ **D** $\text{kg}/(\text{m}^2 \text{s})$

2 A glider is descending at constant velocity. The diagram shows the directions of the lift L , air resistance R and weight W acting on the glider.



Which vector triangle could represent the forces acting on the glider?



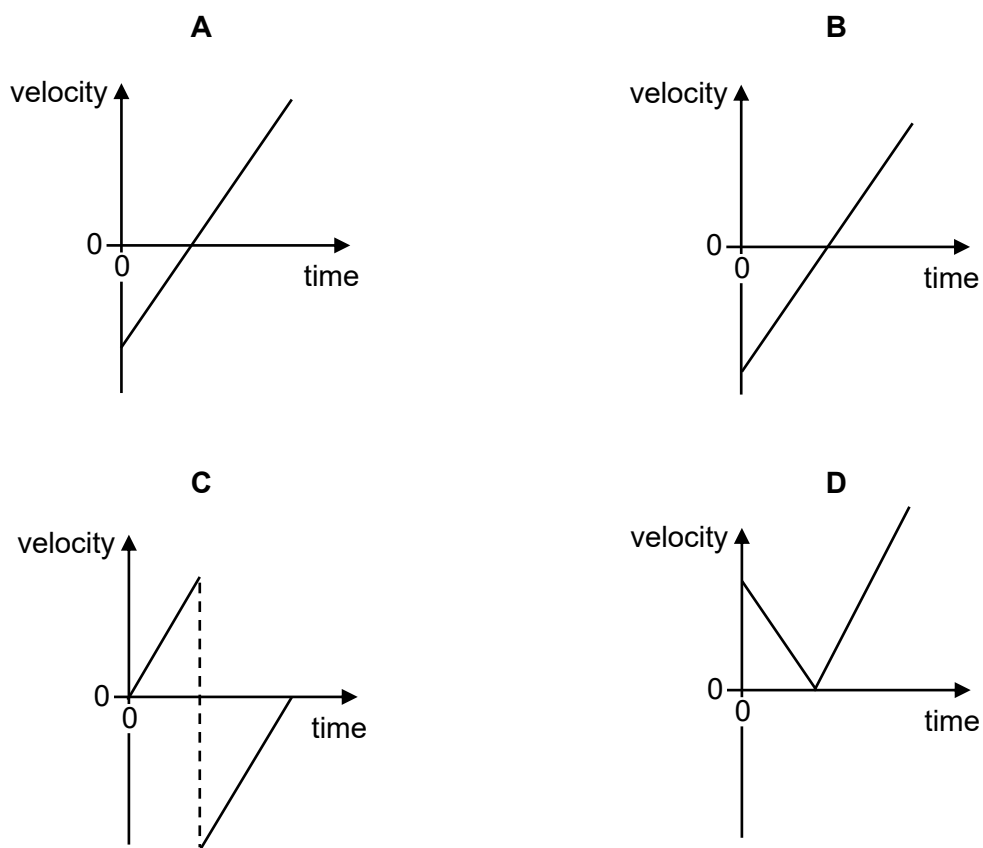
3 In which row are quantities correctly categorised into scalar quantities and vector quantities?

	scalar quantities	vector quantities
A	distance and energy	velocity and temperature
B	gravitational field strength and time	force and electric field strength
C	mass and energy	weight and acceleration
D	speed and moment	distance and force

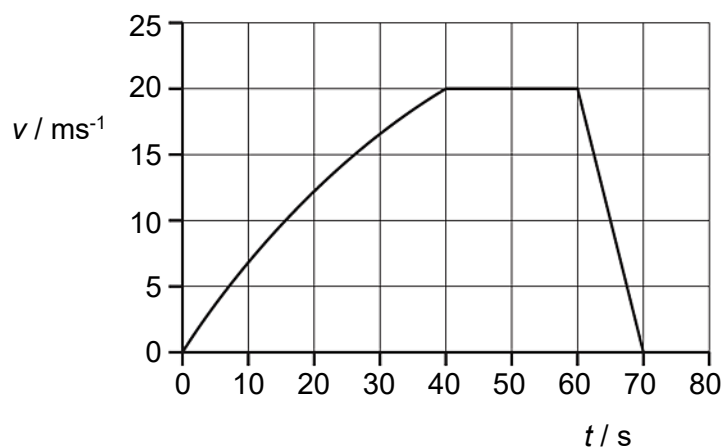
- 4 A person stands on the edge of a sea cliff. The person throws a stone vertically upwards. Air resistance acting on the stone can be ignored.

The stone eventually hits the sea.

Which velocity–time graph best shows the motion of the stone from when it is released until it hits the sea?



- 5 An object starts from rest at time $t = 0$ and moves in a horizontal line. The graph shows how the velocity v of the object varies with time.



What is the distance travelled by the object during the time that its acceleration is zero?

- A** 100 m **B** 400 m **C** 500 m **D** 800 m

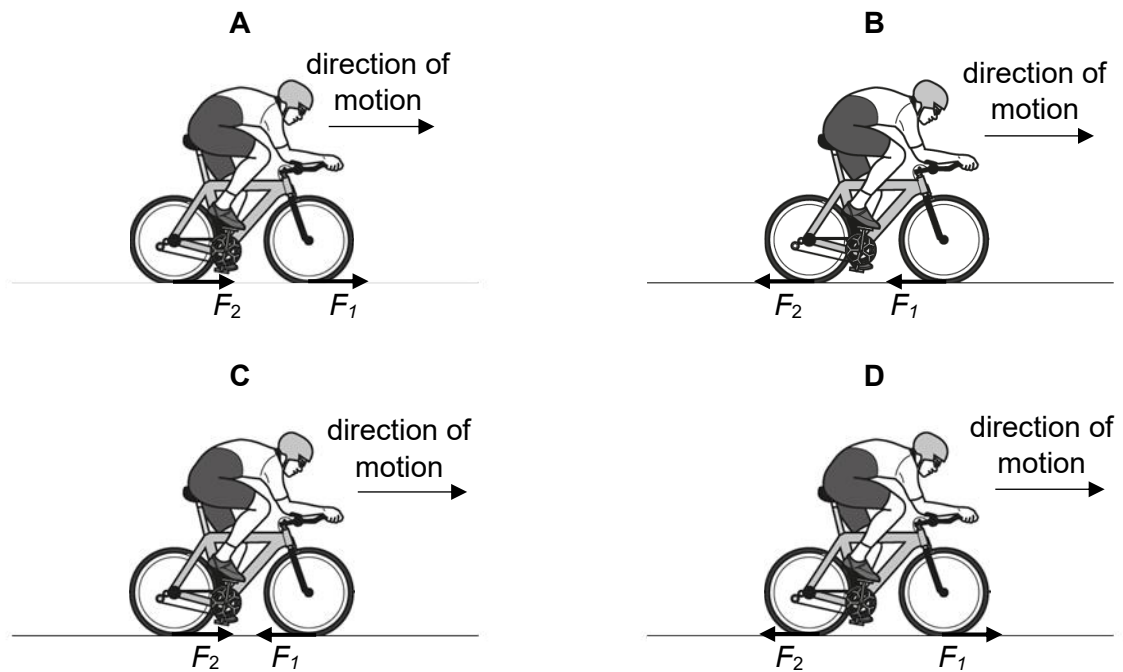
- 6 On the asteroid Ceres, a stone dropped from rest from a height of 1.0 m would take 2.8 s to reach the surface of the asteroid.

What would be the weight of a 70 kg astronaut on Ceres?

- A 18 N B 70 N C 250 N D 700 N

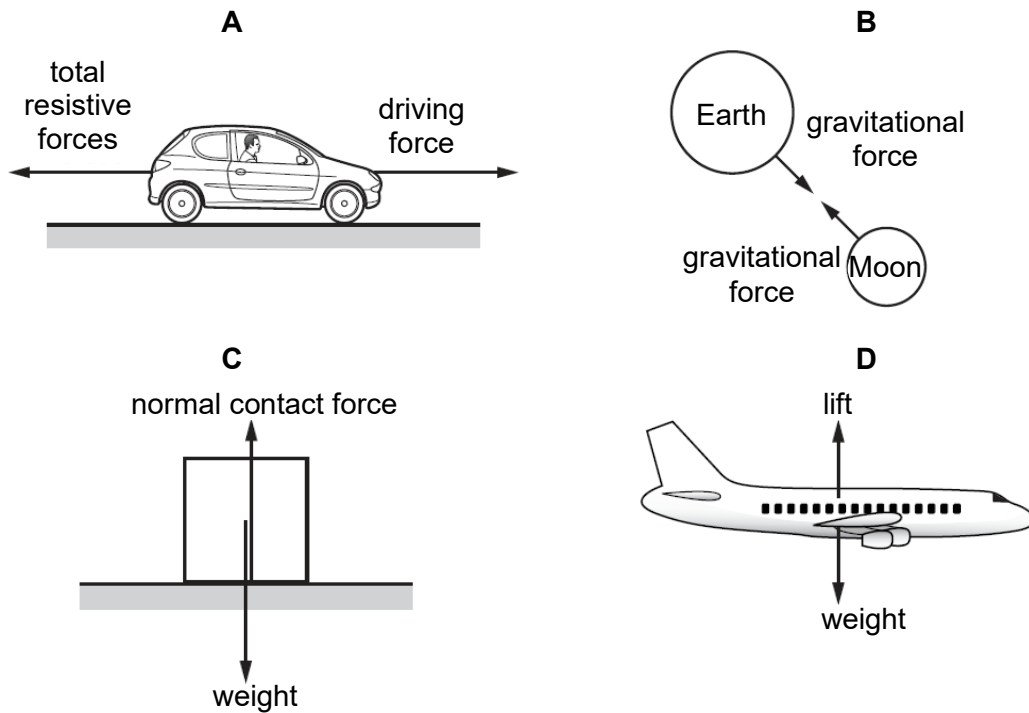
- 7 A race bicycle is accelerating along a level road.

Which diagram shows the direction of frictional force F_1 on the front wheel and the direction of frictional force F_2 on the rear wheel?

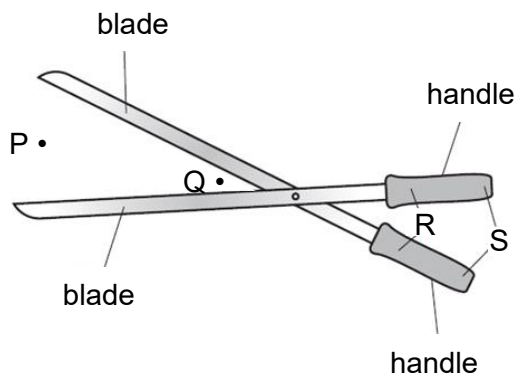


- 8 Each diagram illustrates a pair of forces of equal magnitude.

Which diagram gives an example of a pair of forces that is described by Newton's third law of motion?



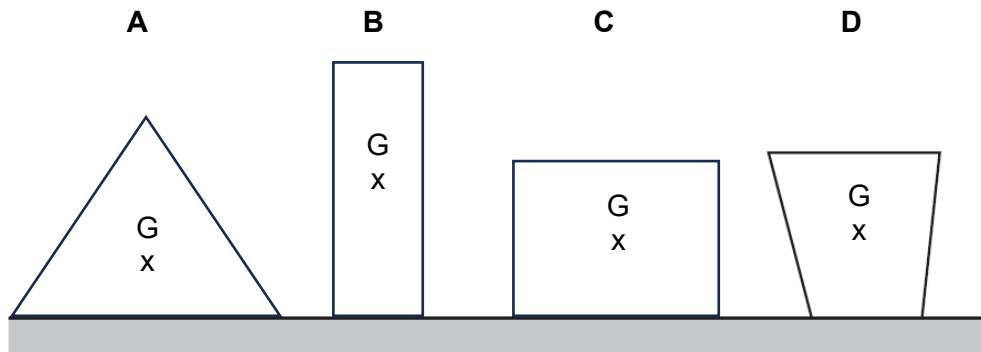
- 9 A pair of cutters is used to cut a rope.



Where should the rope be positioned and at which labelled points should the hands be positioned to produce the greatest cutting force?

	rope position	hands position
A	P	R
B	P	S
C	Q	R
D	Q	S

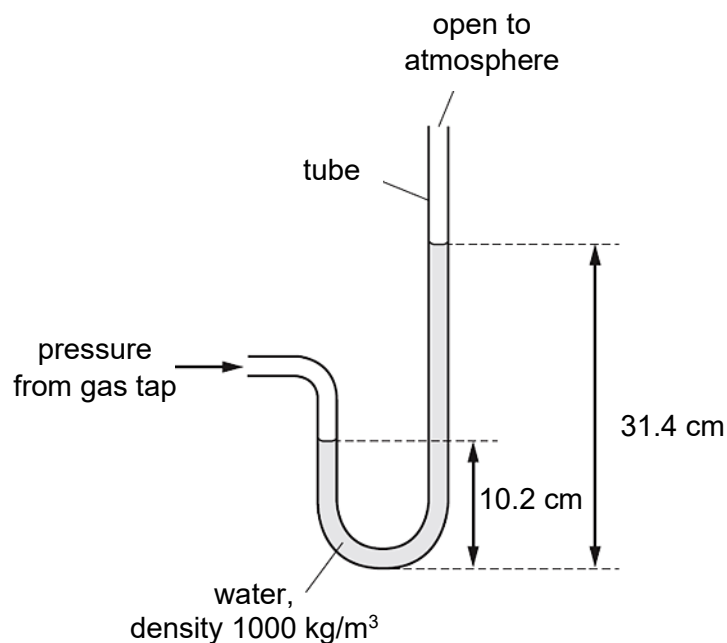
- 10 Four objects of equal mass rest on a table. The centre of mass of each object is labelled G. Which object is the most stable?



- 11 1.5 m^3 of water is mixed with 0.50 m^3 of alcohol. The density of water is 1000 kg/m^3 and the density of alcohol is 800 kg/m^3 .

What is the density of the mixture of volume 2.0 m^3 ?

- A 850 kg/m^3 B 900 kg/m^3 C 940 kg/m^3 D 950 kg/m^3
- 12 One end of a U-shaped tube is attached to a gas tap, with its other end open to the atmosphere. It contains water of density 1000 kg/m^3 and the heights of both sides of the water column are shown.

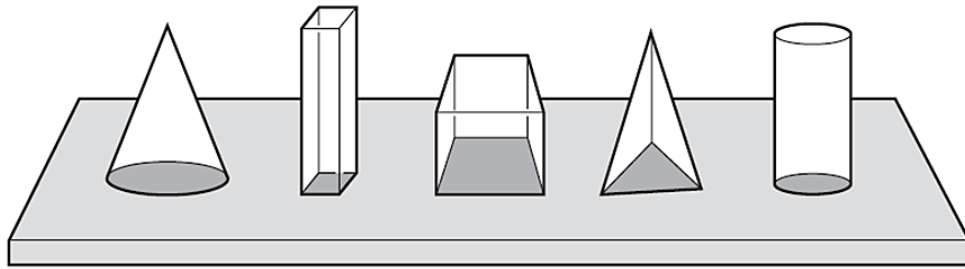


The atmospheric pressure is 101 kPa and the gravitational field strength is 10 N/kg .

What is the pressure of the gas from the gas tap?

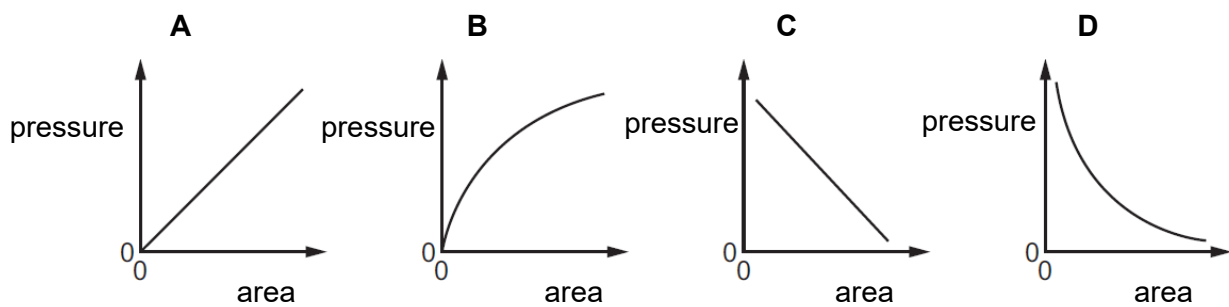
- A 99 kPa B 100 kPa C 102 kPa D 103 kPa

- 13** Five blocks have the same mass but different base areas. They all rest on a horizontal table.



A graph is plotted to show the relationship between the pressure exerted on the table and the base area of the block.

Which graph shows this relationship?



- 14** A mass attached to the lower end of a spring oscillates up and down.

At which points in the path of the mass do the energy in gravitational potential store of the mass (E_g), the energy in elastic potential store in the spring (E_e) and the energy in kinetic store of the mass (E_k) have their highest values?

	E_g	E_e	E_k
A	bottom	middle	top
B	bottom	top	middle
C	top	bottom	middle
D	top	bottom	top

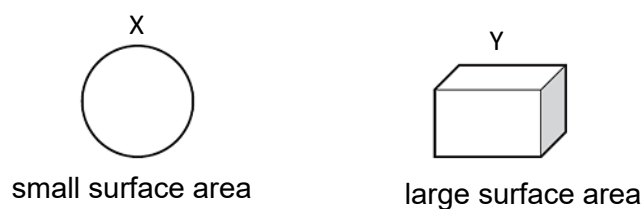
- 15** Which energy resource is non-renewable?

- A** geothermal
- B** natural gas
- C** solar
- D** tidal

- 16** Particles of dust, suspended in water, are viewed through a microscope. The particles can be seen to move irregularly.

This movement is due to

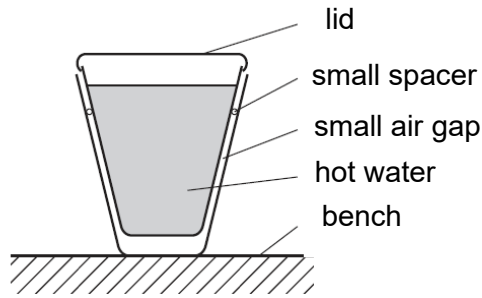
- A** convection currents in the water.
 - B** evaporation of the water near the dust particles.
 - C** gravitational forces acting on the particles of dust.
 - D** water molecules hitting the dust particles in a random way.
- 17** Two samples of the same material have the same mass but different surface areas.
- Each sample is heated to the same temperature and then left to cool to room temperature.
- Each sample is allowed to cool to the same final temperature.



Which row correctly compares the decrease in energy in internal store and the initial rate of cooling for each sample?

	decrease in energy in internal store	initial rate of cooling
A	X loses more energy than Y	X cools down faster than Y
B	Y loses more energy than X	Y cools down faster than X
C	X and Y lose the same quantity of energy	X cools down faster than Y
D	X and Y lose the same quantity of energy	Y cools down faster than X

- 18 Two plastic cups are placed one inside the other. Hot water is poured into the inner cup and a lid is put on top as shown.



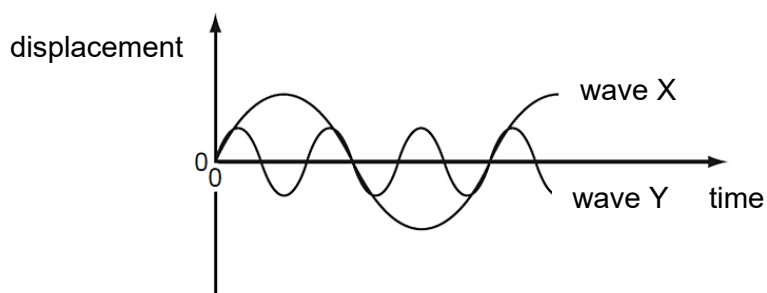
Which statement is correct?

- A Heat loss by radiation is prevented by the small air gap.
 - B No heat passes through the sides of either cup.
 - C The bench is heated by convection from the bottom of the outer cup.
 - D The lid is used to reduce heat loss by convection.
- 19 A scientist wants to determine the specific latent heat of vaporisation of a liquid.
- He pours the liquid into a vacuum flask and heats it with a 100 W heater. The mass of liquid in the vacuum flask when it starts to boil is 300 g. He continues to heat the liquid for a further 12 minutes, after which the mass of the remaining liquid is 100 g.
- What is the specific latent heat of vaporisation of the liquid?
(Assume that all the energy supplied by the heater is used to vaporise the liquid.)
- A 360 J/kg
 - B 6000 J/kg
 - C 240 000 J/kg
 - D 360 000 J/kg
- 20 A puddle of water is formed after a rain shower on a windy day.

Which statement explains the effect of the wind on the rate of evaporation of the water in the puddle?

- A The wind gives molecules in the water extra kinetic energy and so increases the rate of evaporation.
- B The wind removes evaporated water from near the surface and so decreases the rate of evaporation.
- C The wind removes evaporated water from near the surface and so increases the rate of evaporation.
- D The wind takes energy from molecules near the surface and so decreases the rate of evaporation.

- 21 The diagram shows two waves X and Y.



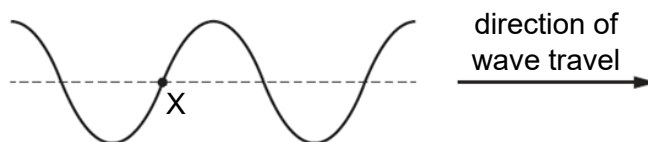
Wave X has amplitude 8 cm and frequency 100 Hz.

What are the amplitude and frequency of wave Y?

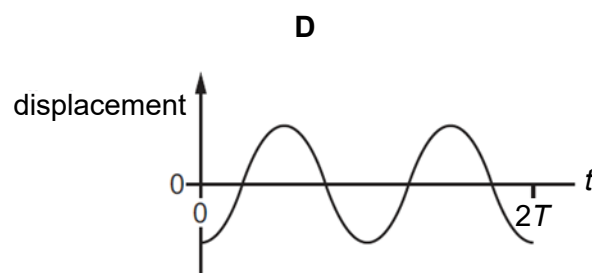
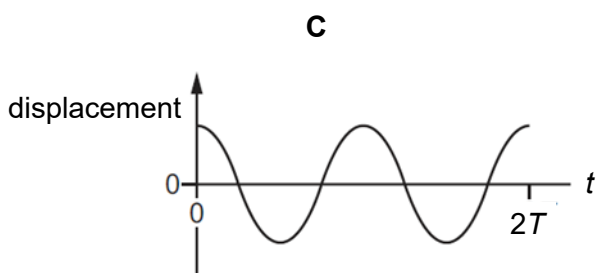
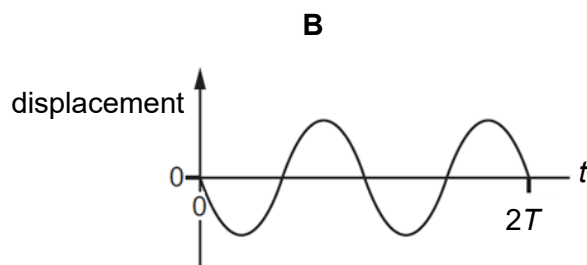
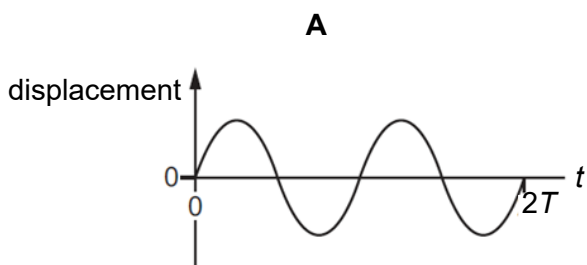
	amplitude / cm	frequency / Hz
A	2	33
B	2	300
C	4	33
D	4	300

- 22 A transverse wave travels along a rope. The diagram shows the rope at time $t = 0$.

The wave is travelling from left to right. The period of the wave is T . One particle of the rope is labelled X.



Which of the following shows the displacement-time graph of particle X between $t = 0$ and $t = 2T$?



- 23** A man stands 110 m from a high wall. He makes a short, sharp sound and then hears an echo from the wall. The speed of sound in air is 330 m/s.

How long after making the sound does the man hear the echo?

- A** 0.33 s **B** 0.67 s **C** 1.5 s **D** 3.0 s

- 24** 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

- 25** Visible light, X-rays and microwaves are all components of the electromagnetic spectrum.

Which statement about the waves is correct?

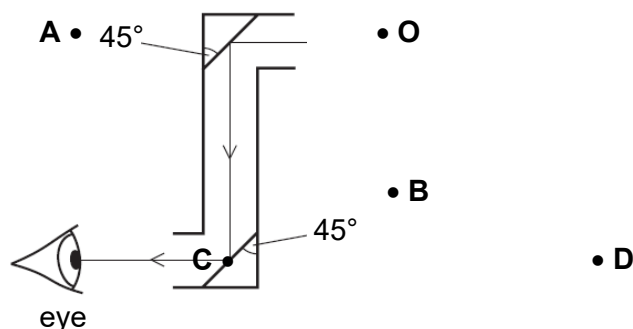
- A** In a vacuum, microwaves travel faster than visible light and have a shorter wavelength.
B In a vacuum, microwaves travel at the same speed as visible light and have a shorter wavelength.
C In a vacuum, X-rays travel faster than visible light and have a shorter wavelength.
D In a vacuum, X-rays travel at the same speed as visible light and have a shorter wavelength.

- 26** The diagram shows a child using a periscope to look at an object O on the other side of the wall.

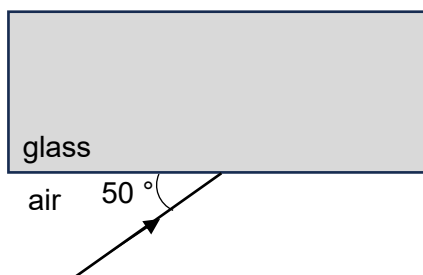
The periscope has two plane mirrors.



At which position is the image of O seen?



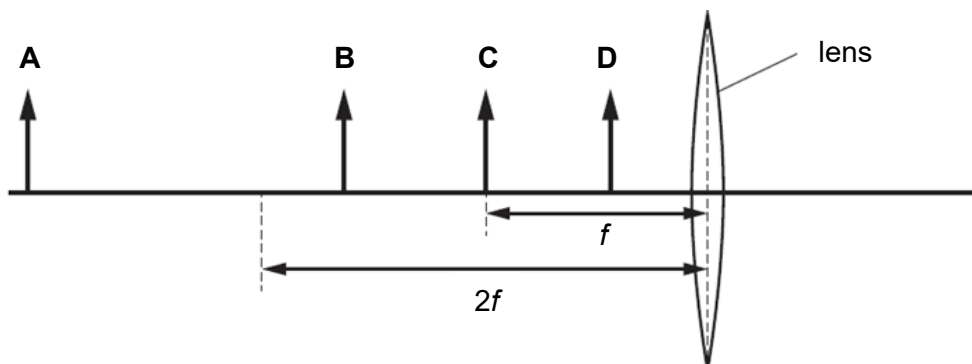
- 27 A ray of light strikes the surface of a glass block as shown in the diagram.



The speed of light in glass is 2.07×10^8 m/s.

How much the light ray will deviate when entering the glass?

- A 13.7° B 23.7° C 26.3° D 31.9°
- 28 An object is placed in front of a converging lens. The lens has a focal length f .
In which labelled position should the object be placed in order to produce a real image of the object that is smaller than the object?



- 29 An electrostatically charged object will pick up small pieces of paper.

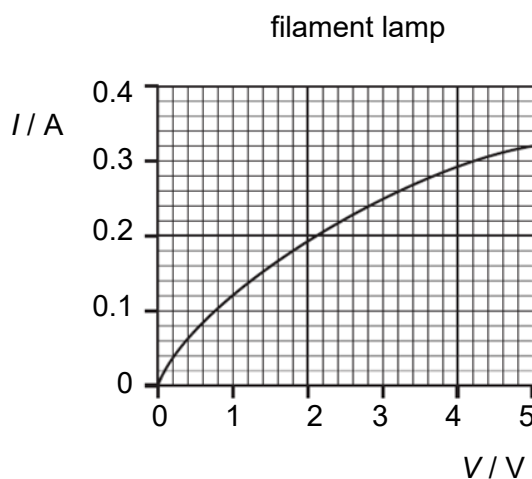
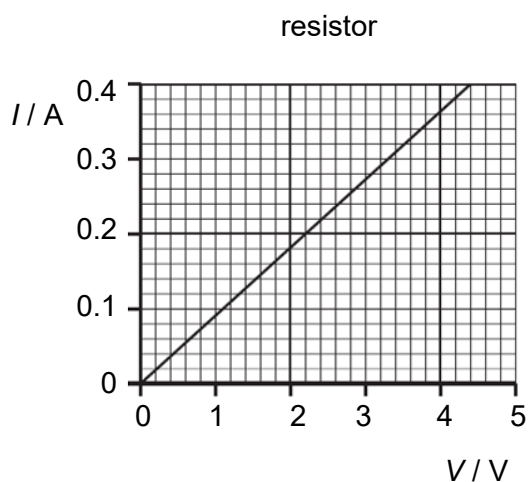
Which of the following will **not** pick up pieces of paper?

- A an earthed metal rod rubbed with a duster
B a plastic comb pulled through dry hair
C a polythene rod rubbed with a woollen cloth
D a rubber balloon rubbed on a nylon shirt

30 Which statement describes the direction of an electric field at a point?

- A the direction of the force on a negative charge
- B the direction of the force on a north pole
- C the direction of the force on a positive charge
- D the direction of the force on a south pole

31 A resistor and a filament lamp are connected in series with a power supply. The I - V characteristics of the resistor and of the lamp are shown below.



The potential difference (p.d.) across the resistor is 3.3 V.

What is the resistance of the lamp?

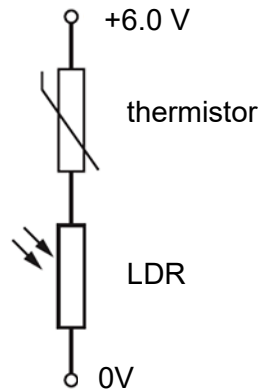
- A 0.071 Ω B 4.2 Ω C 11 Ω D 14 Ω

32 Four lamps have filaments made from the same material. The lamps are connected in parallel across a battery.

Which filament lamp produces the most heat and light per second?

	length of filament	cross-sectional area of filament
A	l	A
B	$2l$	A
C	l	$2A$
D	$2l$	$2A$

- 33** A thermistor and a light-dependent resistor (LDR) are connected in series. A potential difference (p.d.) of 6.0 V is applied across them as shown.



The thermistor has a resistance of $6000\ \Omega$ in a cold room and $1000\ \Omega$ in a warm room. The LDR has a resistance of $2000\ \Omega$ in dim light and $500\ \Omega$ in bright light.

When is the p.d. across the LDR equal to 2.0 V?

- A** in a cold room with bright light
 - B** in a cold room with dim light
 - C** in a warm room with bright light
 - D** in a warm room with dim light
- 34** With increasing hot weather due to climate change, an owner decided to install a 2.5 kW aircon unit to replace the two ceiling fans of 100 W each.

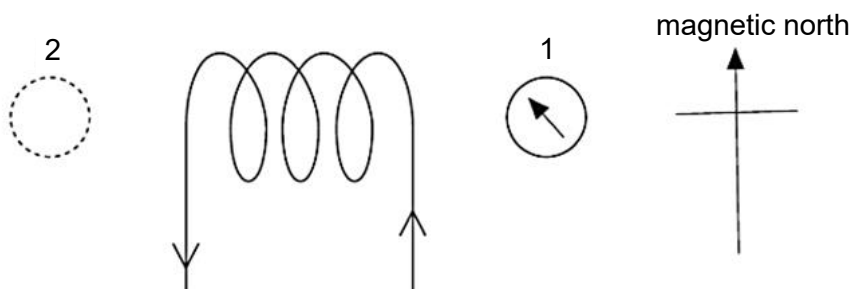
The aircon or the fans are switched on for 8 hours daily.

By just operating the aircon unit, what would be the additional cost that the owner needs to pay per week for the energy consumption if one kWh costs 30 cents?

- | | | | |
|------------------|------------------|------------------|------------------|
| A \$38.64 | B \$40.32 | C \$42.00 | D \$45.36 |
|------------------|------------------|------------------|------------------|

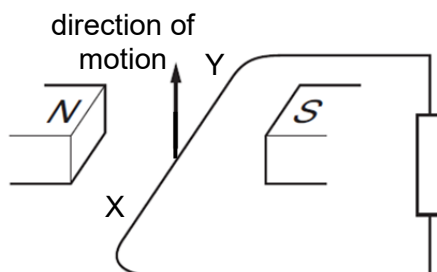
- 35** A compass needle is placed near one end of a coil of wire at position 1.

When a current is passed through the coil, the compass needle points in the direction shown.



Which of the following will cause the needle of the compass to point closer to magnetic north?

- A** Decreasing the current through the coil
 - B** Increasing the current through the coil
 - C** Moving the compass nearer to the coil
 - D** Moving the compass to position 2
- 36** The diagram shows a wire XY moving upwards in a magnetic field.



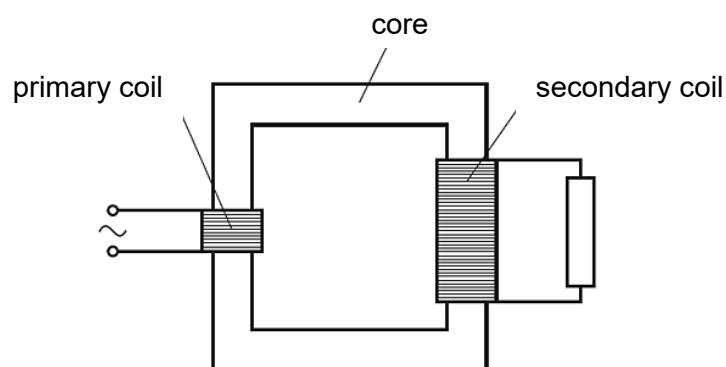
A current is induced in the wire.

The current-carrying wire XY experiences a force because of its interaction with the magnetic field.

Which row gives the direction of the induced current and the direction of the force experienced by the wire XY?

	direction of induced current	direction of force
A	from X to Y	downwards
B	from X to Y	upwards
C	from Y to X	downwards
D	from Y to X	upwards

- 37 The diagram shows the structure of a simple transformer.

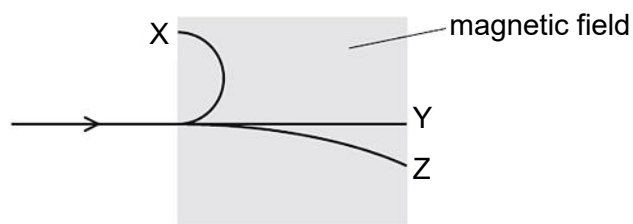


Which row shows the correct conditions for the efficiency of the transformer to be as high as possible?

	primary and secondary coils	material of core
A	thick copper wire	soft iron
B	thin copper wire	soft iron
C	thick iron wire	copper
D	thin iron wire	copper

- 38 The diagram represents the paths of three types of ionising radiation, X, Y and Z, through a magnetic field.

The three types of radiation are alpha, beta and gamma.



Which statement about the ionising radiation is correct?

- A** X is positively charged.
B Y is negatively charged.
C Z is the most ionising.
D X is the most penetrative.
- 39 When a nucleus of $^{238}_{92}\text{U}$ absorbs a slow neutron, it subsequently emits two β -particles.
 What is the resulting nucleus?

- A** $^{239}_{90}\text{Th}$ **B** $^{239}_{94}\text{Pu}$ **C** $^{240}_{91}\text{Pa}$ **D** $^{240}_{93}\text{Np}$

40 Which row correctly matches three radioactive sources to their uses?

	emits alpha-particles and has a long half-life	emits beta-particles and has a long half-life	emits gamma radiation and has a short half-life
A	monitoring the thickness of aluminium foil	smoke alarm	tracer to be injected to detect cancer
B	monitoring the thickness of aluminium foil	tracer to be injected to detect cancer	smoke alarm
C	smoke alarm	monitoring the thickness of aluminium foil	tracer to be injected to detect cancer
D	smoke alarm	tracer to be injected to detect cancer	monitoring the thickness of aluminium foil

END OF PAPER