

Name:..... Register/Index Number: Class:

PRESBYTERIAN HIGH SCHOOL



PHYSICS

6091/1

Paper 1 Multiple Choice

1 September 2026

Tuesday

1 hour

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2026 SECONDARY FOUR EXPRESS PRELIMINARY EXAMINATION

INSTRUCTIONS TO CANDIDATES:

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

Write in soft pencil.

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

Write your name, class and register 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.

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.

- 1** What is the conversion factor for converting megametres (Mm) to millimetres (mm)?

A 10^3
B 10^6
C 10^9
D 10^{12}

- 2** Experiments are carried out on the Moon and on Earth. There is no atmosphere on the Moon and the gravitational field strength on the Moon is less than that on Earth.

A coin and a feather are dropped at the same instant from the same height.

Which statement is correct for the experiment on the Moon?

- A** The coin falls faster than the feather, but both take a longer time than on Earth.
B The coin falls faster than the feather, but both take a shorter time than on Earth.
C They fall together, taking a longer time than the coin takes on Earth.
D They fall together, taking a shorter time than the coin takes on Earth.
- 3** An object of mass 28 g and density 3.5 g/cm^3 is carefully lowered into a measuring cylinder containing 52 cm^3 of water.

What is the final reading on the measuring cylinder?

A 8.0 cm^3
B 44 cm^3
C 60 cm^3
D 98 cm^3

- 4 The total weight of the gas-filled balloon is 1500 N. The balloon rises at a constant speed of 3 m/s.

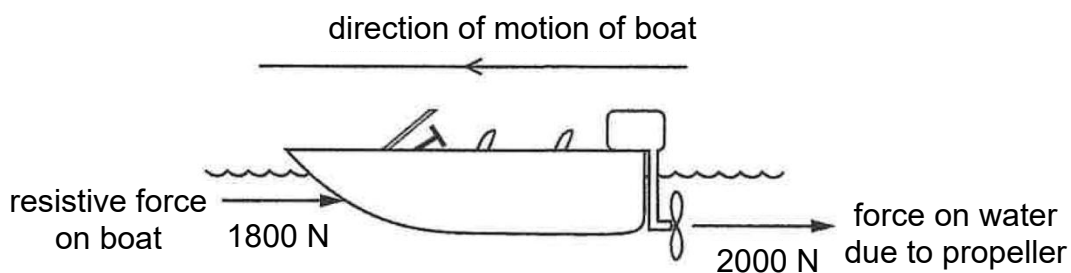
What is the resultant force acting on the balloon while it is rising?

- A 0 N
B 500 N
C 1500 N
D 4500 N
- 5 A parachutist of mass 80 kg is falling through air when he opens his parachute.

After the parachute opens, the total air resistance acting is initially 2400 N. The gravitational field strength g is 10 N/kg.

What is the initial deceleration of the parachutist after the parachute opens?

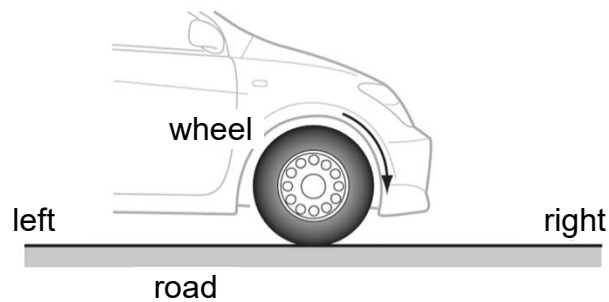
- A 10 m/s^2
B 20 m/s^2
C 30 m/s^2
D 40 m/s^2
- 6 The propeller on a boat pushes water backwards with a force of 2000 N. The boat moves through the water against a total resistive force of 1800 N.



What is the forward force **on the propeller** due to the water?

- A 200 N
B 1800 N
C 2000 N
D 3800 N

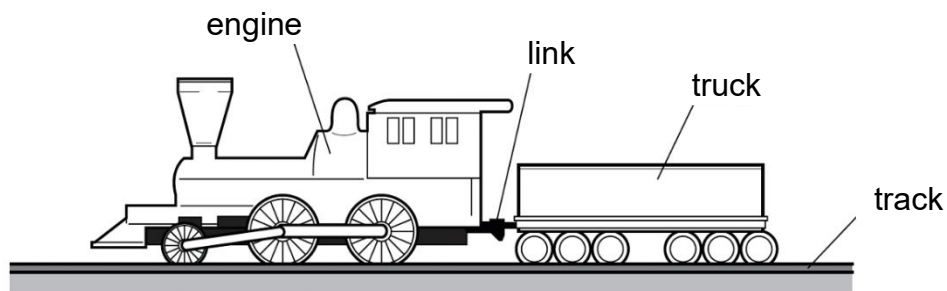
- 7 The front wheel of a car is turned in a clockwise direction by the engine as the car accelerates towards the right, as shown in the diagram. There is a force of friction between the wheel and the road.



What are the directions of the frictional forces on the wheel of the car and on the road?

	direction of frictional force on wheel	direction of frictional force on road
A	to the left	to the left
B	to the left	to the right
C	to the right	to the left
D	to the right	to the right

- 8 The engine pulls a truck at constant speed on a level track.

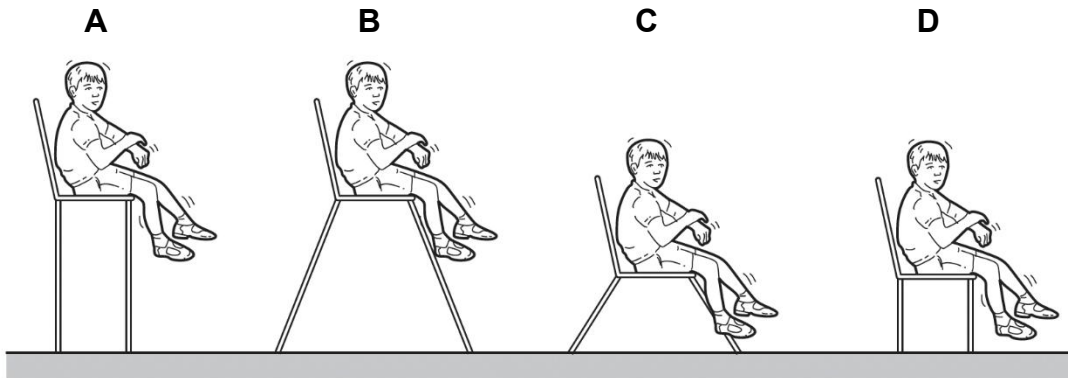


The link between the truck and the engine breaks. The driving force on the engine remains constant.

What effect does this have on the truck and on the engine?

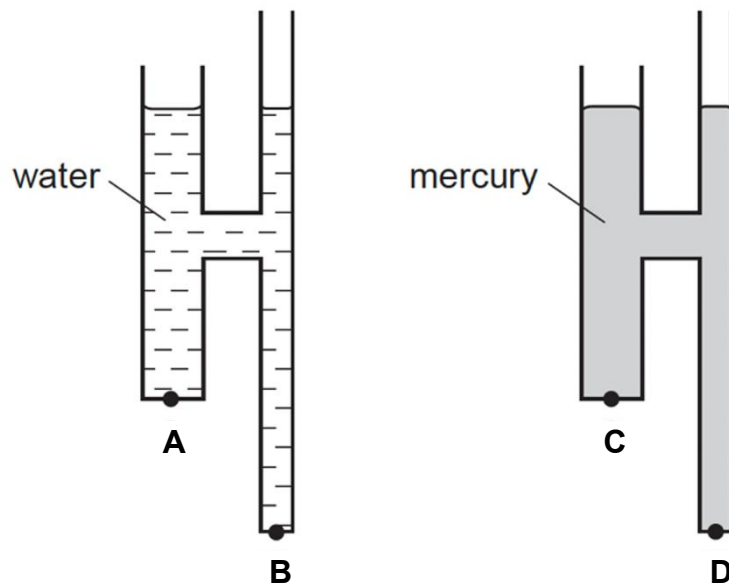
	truck	engine
A	slows down	speed stays constant
B	slows down	speeds up
C	stops immediately	speed stays constant
D	stops immediately	speeds up

- 9 Which chair is the **least** stable if the child moves?

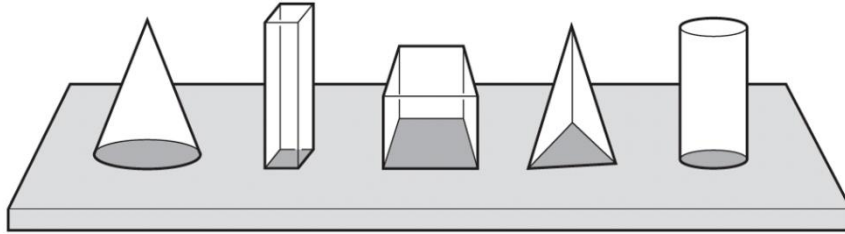


- 10 The diagram shows two identical pieces of apparatus. One is filled with water and the other is filled with mercury. Water is less dense than mercury.

At which point is the liquid pressure greatest?

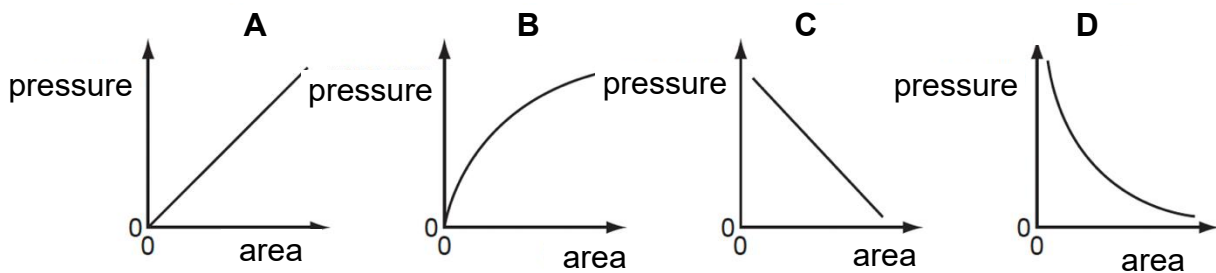


- 11 Five blocks have the same mass but different base areas. They all rest on a horizontal table.

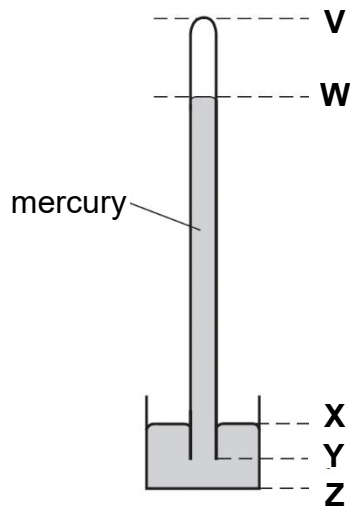


A graph is plotted to show the relationship between the pressure exerted on the table and the base area of the block.

Which graph shows this relationship?



- 12 The diagram shows a simple mercury barometer.

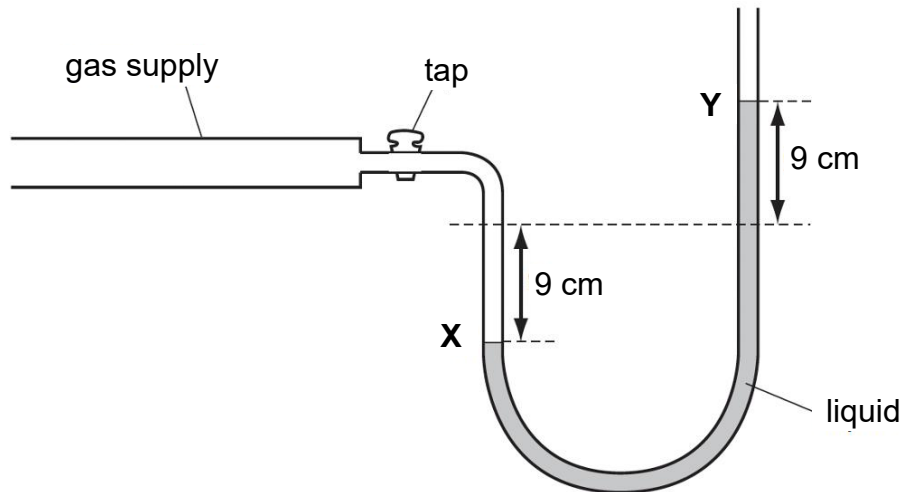


The atmospheric pressure increases.

Which distance increases?

- A VW
- B WY
- C XY
- D XZ

- 13** The diagram shows the levels **X** and **Y** in a liquid manometer with the gas tap open.



What is the pressure of the gas supply?

- A** 18 cm of liquid below atmospheric pressure
 - B** 9 cm of liquid below atmospheric pressure
 - C** 9 cm of liquid above atmospheric pressure
 - D** 18 cm of liquid above atmospheric pressure
- 14** Which is a non-renewable source of energy?
- A** a battery in a watch
 - B** a hydroelectric power station
 - C** a solar panel
 - D** a wind turbine
- 15** A parachutist has opened his parachute and is falling to Earth at constant speed.

What is the principal energy transfer taking place as he falls?

- A** energy in kinetic store → energy in potential store
- B** energy in kinetic store → energy in internal store
- C** energy in potential store → energy in kinetic store
- D** energy in potential store → energy in internal store

- 16** A builder lifts eight slabs from the ground on to the back of a lorry 1.5 m high.

The total time taken is 48 s and each slab weighs 200 N.

How much useful power does the builder produce?

- A** 50 W
- B** 400 W
- C** 2400 W
- D** 3200 W

- 17** Which row explains why a liquid has a fixed volume but does **not** have a fixed shape?

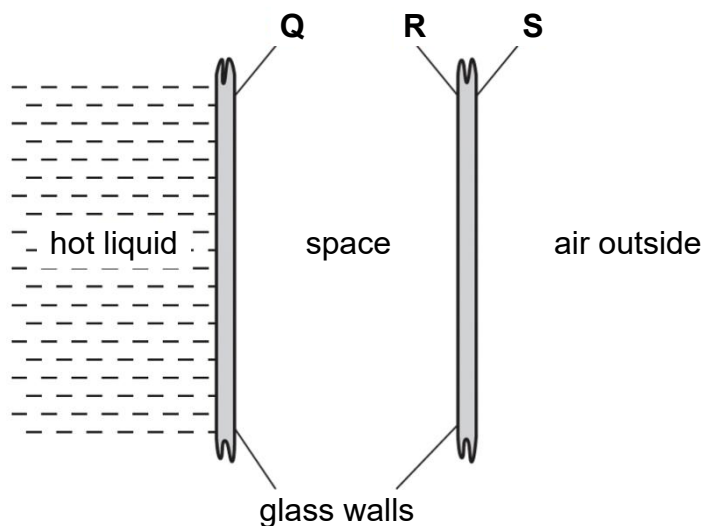
	force between molecules in the liquid	movement of molecules in the liquid
A	large	move throughout the liquid
B	large	vibrate at fixed positions
C	small	move throughout the liquid
D	small	vibrate at fixed positions

- 18** Air in a closed container contains smoke, illuminated by bright light. When viewed through a microscope, bright specks of light are seen moving at random.

Which statement is correct?

- A** The random motion of the specks is faster in a vacuum.
- B** The specs move faster when the air is at a higher temperature.
- C** The specs seen are molecules of air in rapid random motion.
- D** When the light is turned off, the specks slow down and stop moving.

- 19** A student uses a double-walled glass vessel to contain a hot liquid.



What reduces the heat loss by radiation?

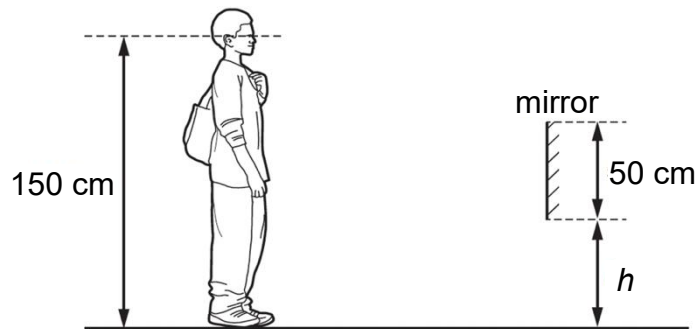
- A** a vacuum in the space between the walls
 - B** painting surface Q black
 - C** painting surface R black
 - D** painting surface S silver
- 20** A dipper moving up and down makes waves in a ripple tank.

What will happen when the dipper frequency is increased?

- A** The waves will be closer together.
- B** The wave peaks will be higher and the troughs lower.
- C** The waves will move more quickly across the tank.
- D** The waves will move more slowly across the tank.

- 21** A shoe shop puts a mirror on the wall so that customers can look at their shoes.

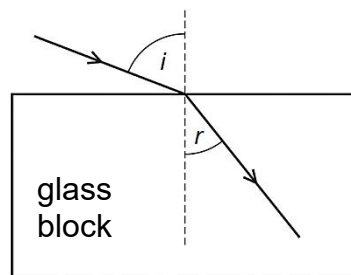
The length of the mirror is 50 cm. A customer has eyes 150 cm above ground level.



The bottom of the mirror is at height h above the ground.

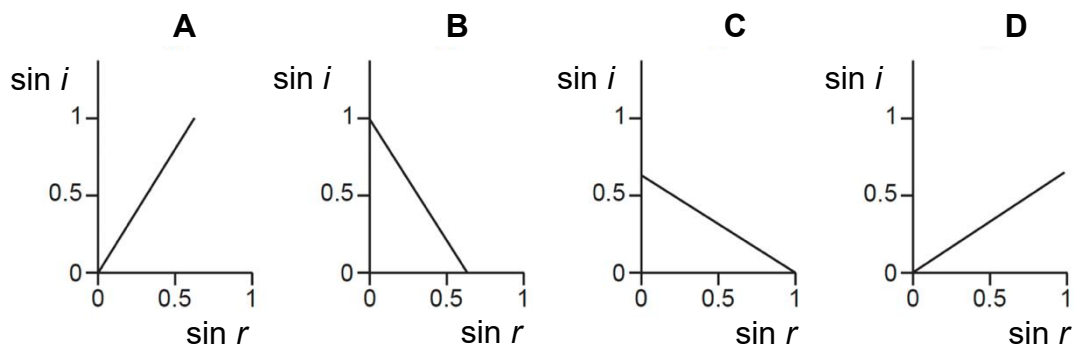
What is the smallest value of h that allows the customer to see an image of his shoes in the mirror?

- A** 0 cm
B 25 cm
C 50 cm
D 75 cm
- 22** A ray of light enters a glass block at an angle of incidence i , producing an angle of refraction r in the glass.

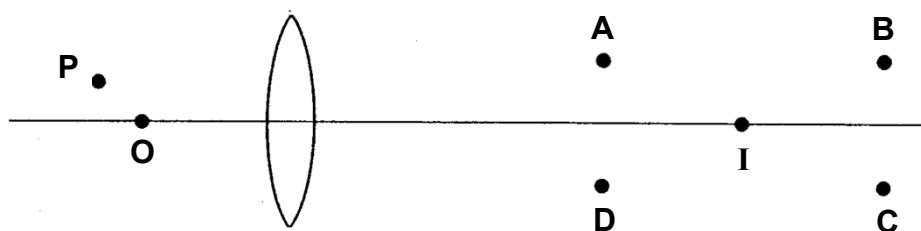


Several different values of i and r are measured, and a graph is drawn of $\sin i$ against $\sin r$.

Which graph is correct?



- 23 Where does the lens form an image of an object at **P**?



- 24 The table lists the main components of the electromagnetic spectrum and their approximate frequency range.

	frequency / Hz
gamma rays	10^{19} to 10^{22}
X-rays	10^{18} to 10^{21}
ultra-violet	10^{15} to 10^{18}
visible light	10^{14} to 10^{15}
infra-red	10^{12} to 10^{14}
microwaves	10^9 to 10^{12}
radiowaves	10^3 to 10^9

Which range of frequencies can be used to detect cracks inside a block of metal?

- A** 10^3 Hz to 10^{12} Hz
B 10^{12} Hz to 10^{15} Hz
C 10^{15} Hz to 10^{18} Hz
D 10^{18} Hz to 10^{22} Hz

- 25** A pupil wants to charge a metal ball by induction, using a strip of polythene. She uses the following steps but not in this order.

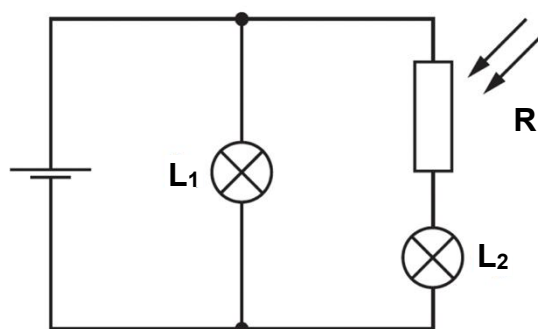
- 1 the metal ball is earthed momentarily
- 2 the polythene strip is brought up to the ball
- 3 the polythene strip is removed
- 4 the polythene strip is rubbed with a woollen cloth

To charge the ball correctly, in which order should she carry out the steps?

- A** 2 3 4 1
B 2 4 3 1
C 4 1 2 3
D 4 2 1 3
- 26** Which is equivalent to one coulomb?

- A** one ampere second
B one ampere per volt
C one volt ampere
D one volt per ampere

- 27 In the circuit shown, **R** is a light-dependent resistor. Its resistance decreases when the intensity of the light shining on it increases.

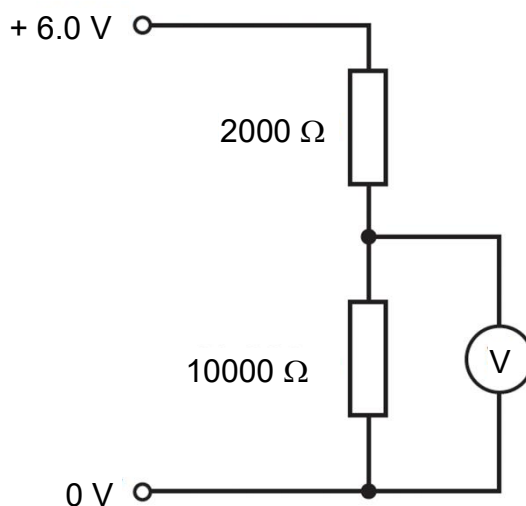


The light intensity on **R** increases.

What happens to the brightness of the two lamps **L₁** and **L₂**?

	L₁	L₂
A	decreases	decreases
B	decreases	increases
C	stays the same	decreases
D	stays the same	increases

- 28 The diagram shows a potential divider system of two resistors connected to a 6.0 V power supply.

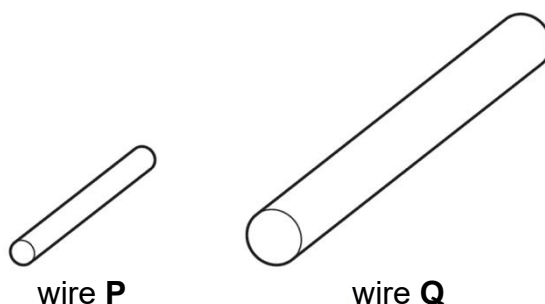


What is the reading on the voltmeter?

- A** 1.0 V
B 1.2 V
C 3.0 V
D 5.0 V

- 29** The resistance of a cylindrical wire **P** is $80\ \Omega$. A second wire **Q** is made from the same material.

The cross-sectional area of **Q** is four times that of **P**. The length of **Q** is twice the length of **P**.

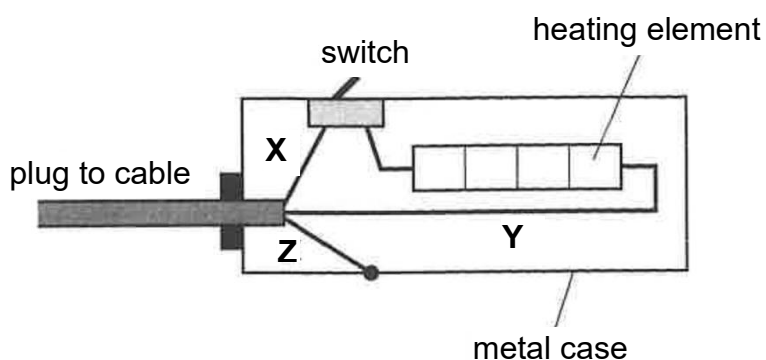


What is the resistance of **Q**?

- A** $10\ \Omega$
B $40\ \Omega$
C $160\ \Omega$
D $640\ \Omega$
- 30** The diagram shows the wiring of a mains electrical appliance.

The appliance has a metal case and a switch.

There are three wires **X**, **Y** and **Z** in the mains cable connected to the plug.



What should wires **X**, **Y** and **Z** be to make the appliance safe to use?

	wire X	wire Y	wire Z
A	live	earth	neutral
B	live	neutral	earth
C	neutral	earth	live
D	neutral	live	earth

- 31** It costs \$0.30 for 1 kWh of electrical energy.

How much will it cost to run a 60 W lamp for 10 hours?

- A** \$0.18
- B** \$0.60
- C** \$18.00
- D** \$180.00

- 32** In a mains circuit, the switch of an electric heater is always wired into the live conductor.

This is because, if the switch is wired into the neutral conductor,

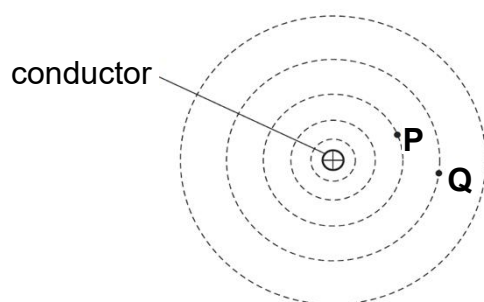
- A** the circuit in the heater remains live when the switch is open.
- B** the fuse blows if the current is less than the fuse rating.
- C** the heater continues to operate when the switch is open.
- D** the heater does not operate when the switch is closed.

- 33** A metal bar **PQ** hangs from a thin thread and always comes to rest with end **P** pointing north.
Another bar **XY** of the same metal settles in no definite direction.

What happens if the two bars are brought near one another?

- A** End **P** and end **Q** both attract end **X**.
- B** End **P** attracts end **X** but repels end **Y**.
- C** End **P** neither attracts nor repels end **X**.
- D** End **P** repels end **X** but attracts end **Y**.

- 34** The diagram shows the shape of the magnetic field lines near a current-carrying conductor.

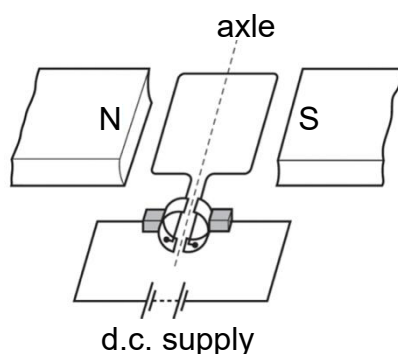


The current in the conductor is into the plane of the diagram.

Which row correctly states the direction of the field lines and compares the strengths of the field at points **P** and **Q**?

	direction of field lines	the field is stronger at
A	clockwise	P
B	clockwise	Q
C	anticlockwise	P
D	anticlockwise	Q

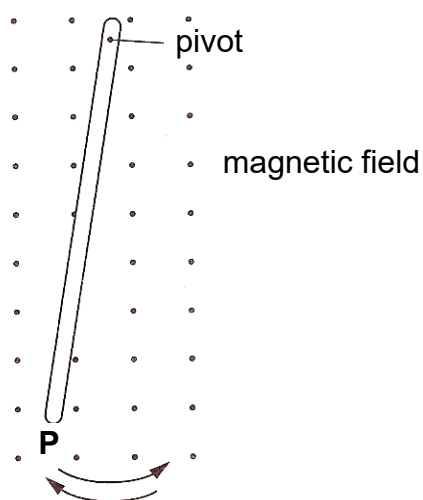
- 35** The diagram shows a d.c. motor with its coil horizontal.



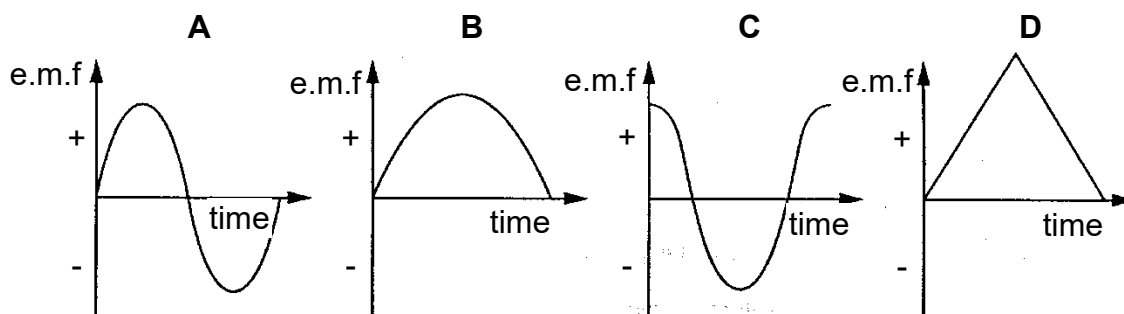
Why is a split-ring commutator used?

- A** to change the current direction in the coil as the coil passes the horizontal position
- B** to change the current direction in the coil as the coil passes the vertical position
- C** to change the current direction in the d.c. supply as the coil passes the horizontal position
- D** to change the current direction in the d.c. supply as the coil passes the vertical position

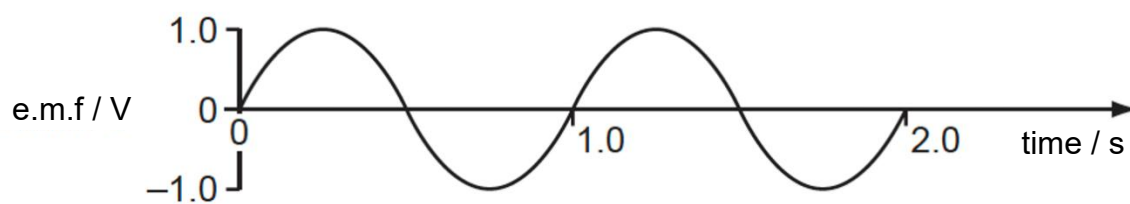
- 36 The diagram shows a metal bar swinging like a pendulum to and fro across a uniform magnetic field. The motion produces an induced e.m.f. in the bar.



Which graph could represent this e.m.f. during one complete to-and-fro oscillation of the bar, starting at **P**?

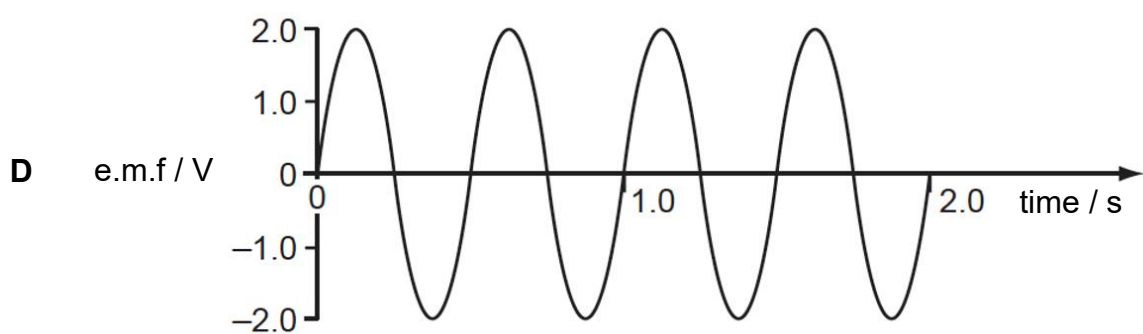
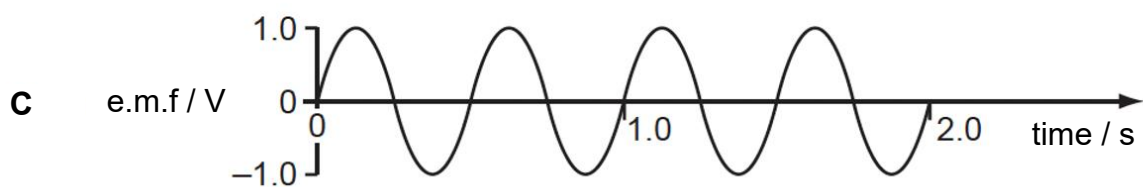
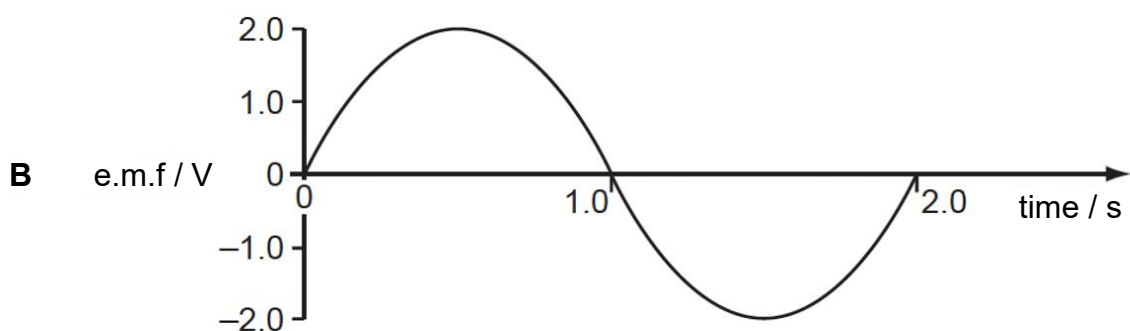
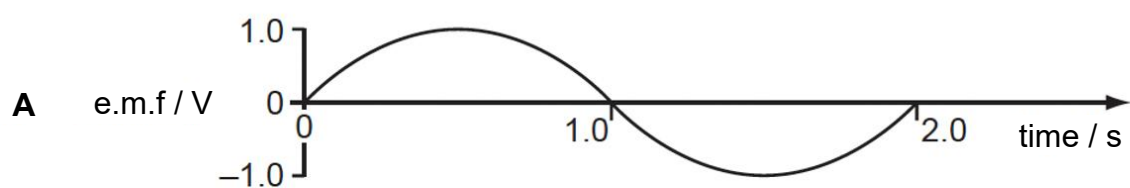


- 37 A simple a.c. generator produces an alternating e.m.f. as shown.

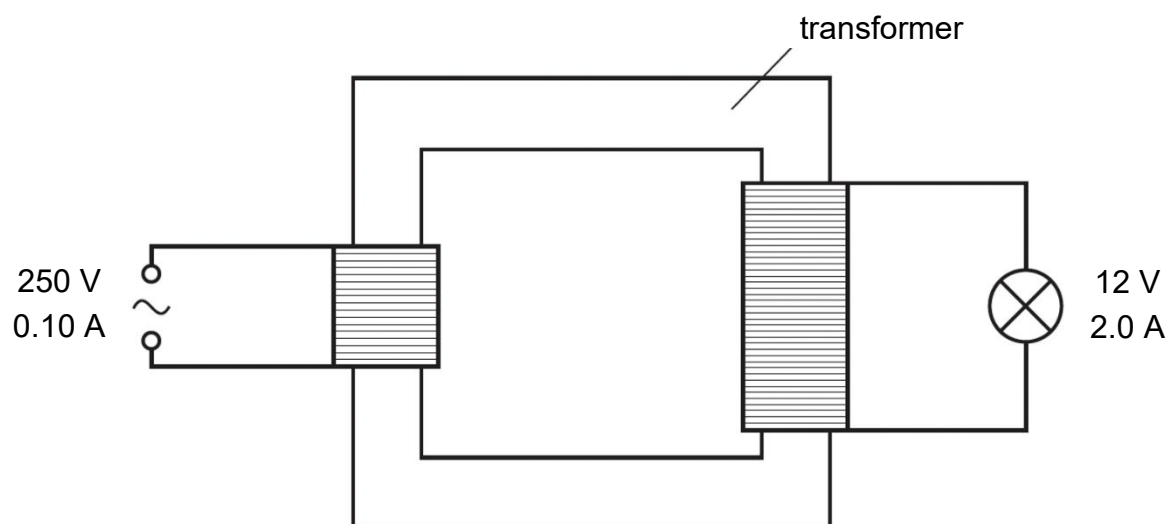


The speed of the generator is doubled.

Which graph best represents the new output?



- 38 A transformer is used to operate a 12 V lamp from a 250 V mains supply.



The mains current is 0.10 A. The current in the lamp is 2.0 A.

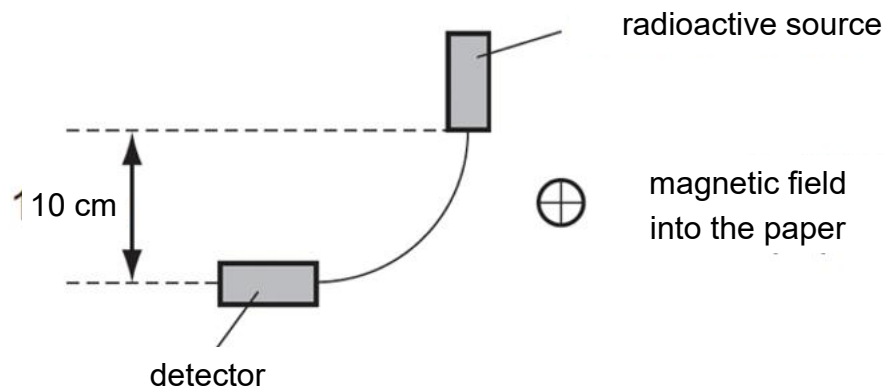
What is the efficiency of the transformer?

- A 0.048
 B 0.050
 C 0.96
 D 1.04
- 39 In a nuclear1....., hydrogen nuclei2..... to form helium nuclei, releasing energy.

Which words correctly complete gaps 1 and 2?

	1	2
A	fission	join together
B	fission	split apart
C	fusion	join together
D	fusion	split apart

- 40** In a laboratory experiment, particles from a radioactive source are deviated by a magnetic field and reach a detector.



Which particles are deviated and reach the detector?

- A** alpha-particles and gamma-rays
- B** alpha-particles only
- C** beta-particles and gamma-rays
- D** beta-particles only

END OF PAPER

**PRESBYTERIAN HIGH SCHOOL
SCIENCE DEPARTMENT
MARKING SCHEME**

Subject: Physics Paper 1
Setter: Mrs Zhou Meixian
Level: Sec 4 Express

Exam: Prelim
Year: 2026

Paper 1

Q/N	Suggested Answer	Explanation
1	C	$10^6 / 10^9 = 10^{-3}$
2	C	acceleration due to gravity is smaller on moon than on earth, thus takes longer time on moon than on earth. Since no atmosphere, they fall together (no air resistance).
3	C	volume = mass/ density = $28/3.5$ = 8 cm^3 Total volume = $52 + 8 = 60 \text{ cm}^3$
4	A	constant speed means resultant force = 0 N
5	B	$a = (2400 - 800) / 80$ = 20 m/s^2
6	C	N3L: force on water due to propeller = force on propeller due to water
7	C	force on road by wheel is to the left, so by N3L, force on wheel by road is to the right
8	B	For engine, driving force stays the same, but no backward force by truck. So resultant force is forward. Engine speeds up. For truck, no forward force. Only frictional forces act backwards. Since resultant force is in opposite direction of its motion, it decelerates.
9	A	unstable: high CG and small base
10	D	Pressure = $h\rho g$ Since mercury is denser, and at D, the h is greater, pressure at D greatest.
11	D	$P = F/A$ = $F (1/A)$ When area increase, pressure decrease, but relationship not linear.
12	B	X will be lower, while W rises
13	D	pressure due to gas supply = atm pressure + 18 cm of liquid
14	A	
15	D	potential store not transferred to kinetic store since kinetic store did not increase (speed did not increase)
16	A	Total weight = $200 \times 8 = 1600 \text{ N}$ power = $WD/t = (1600 \times 1.5) / 48 = 50 \text{ W}$
17	A	
18	B	
19	D	vacuum cannot prevent radiation
20	A	speed of wave depends on depth of liquid
21	B	For a plane mirror, reflection point lies halfway between object and the eyes. Lowest point on the mirror that needs to reflect light from the shoes

		is at $150 / 2 = 75$ cm above ground. Since mirror is 50 cm long, need $75 - 50 = 20$ cm of h.
22	A	when $\sin i = 0$, $\sin r = 0$. Gradient of line is n . Since it is glass, n is around 1.5. Thus, gradient of line must be more than 1.
23	D	P is further than O, so image of P is nearer to lens than I. Since object is between f and $2f$, it is inverted.
24	D	Gamma rays able to penetrate metals to detect cracks
25	D	
26	A	$Q = It$
27	D	voltage and resistance of L_1 remain same, so I through L_1 same When R decrease, voltage across R decrease. Based on potential divider principle, voltage across L_2 increase.
28	D	$10000/12000 \times 6 = 5.0$ V
29	B	Resistance of $Q = 80/4 \times 2 = 40$ ohm
30	B	Earth wire to metal casing Neutral carries current back to mains
31	A	Cost = $60/1000 \times 10 \times \$0.30 = \$0.18$
32	A	
33	A	PQ is magnet and XY is magnetic material. Will not repel unless both are magnets
34	A	use right hand grip rule
35	B	
36	A	Induced emf is proportional to the speed of bar cutting the magnetic field lines. At ends of the swing, speed is 0, emf = 0. At centre of swing, speed is maximum, emf is max. Left to right is positive, right to left will be negative.
37	D	Both frequency and amplitude will be doubled
38	C	$P_{\text{main}} = IV = 0.10 \times 250 = 25$ W $P_{\text{lamp}} = IV = 2.0 \times 12 = 24$ W Efficiency = $24/25 \times 100\% = 96\%$
39	C	
40	D	Using FLHR, mag field into paper, particles leave the source moving downwards. If it was alpha particles (positive charge), the force would be towards the right. But now the force is towards the left. Hence, the particles must be negative charge (beta particles).