

6th form final Physics 2020 assessment

Multiple Choice questions: There are 40 questions. All questions are worth 1 mark.

Which of the following lists the electromagnetic spectrum in order of INCREASING frequency

- Ultra violet < Gamma < Radio < Infra red*
- Radio < Gamma < Ultra Violet < Infra Red*
- Ultra violet < Infra red < Radio < Gamma*
- Radio < Infra red < Ultra violet < Gamma*

Physical quantities can be scalars or vectors, which of the following pairs are both vectors:

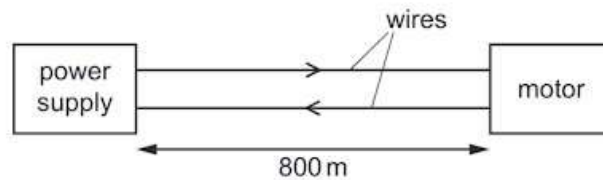
- Velocity and Distance*
- Weight and Acceleration*
- Momentum and Time*
- Kinetic energy and Force*

A sealed container of gas is heated and the pressure inside increases because:

- The molecules expand*
- The molecules hit the container more frequently*
- The kinetic energy of the molecules decreases*
- The molecules become heavier*

A motor is required to operate at a distance of 800 m from its power supply. The motor requires a potential difference (p.d.) of 16.0 V and a current of 0.60 A to operate.

Two wires are used to supply power to the motor as shown.



The resistance of each of these wires is 0.0050Ω per metre.

What is the minimum output p.d. of the power supply?

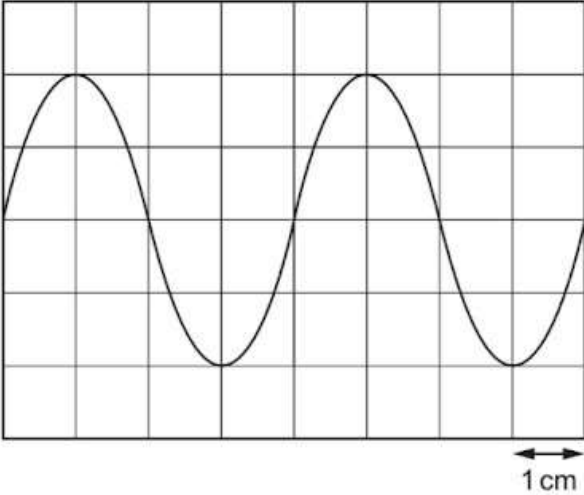
- 16 V*
- 11.2 V*
- 20.8 V*
- 18.4 V*

Which statement about electromagnetic (EM) waves is correct:

- EM waves travel in air almost as fast as in a vacuum*
- In air some EM waves travel faster than light*
- The shortest wavelength EM waves are in the X-ray region*
- The longest wavelength EM waves are in the infra-red region*

The time base on the CRO is 2.5 ms for each 1 cm division: What is the frequency of the wave?

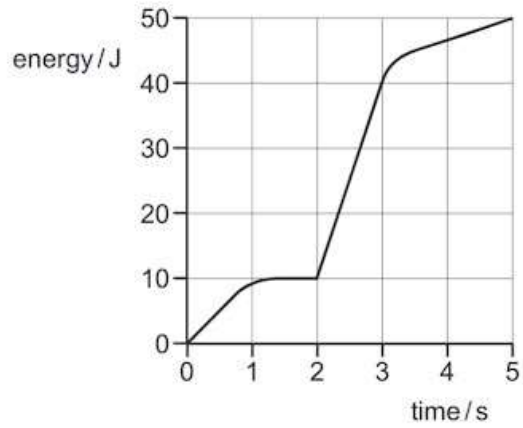
A sound wave is displayed on the screen of a cathode-ray oscilloscope (c.r.o.) as shown.



- 200 Hz
- 100 Hz
- 400 Hz
- 50 Hz

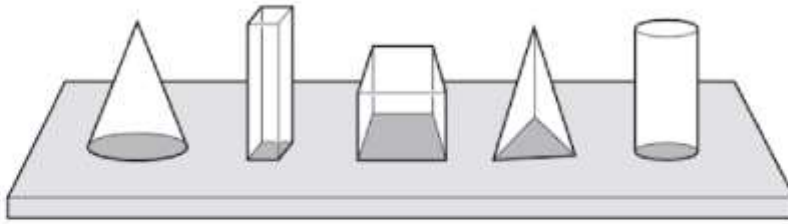
What is the maximum power that is generated at any time in the first 5 s?

An electrical generator is started at time zero. The total electrical energy generated during the first 5 seconds is shown in the graph.



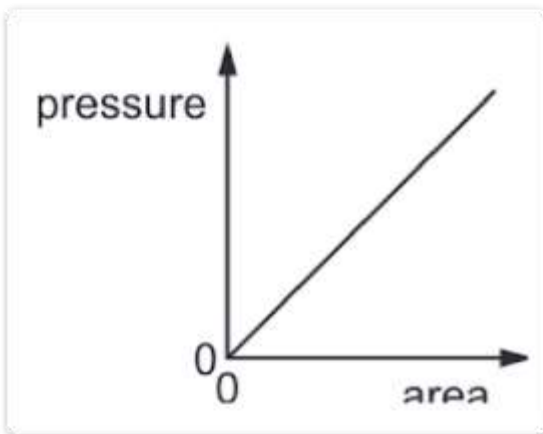
- 30 W
- 50 W
- 10 W
- 20 W

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

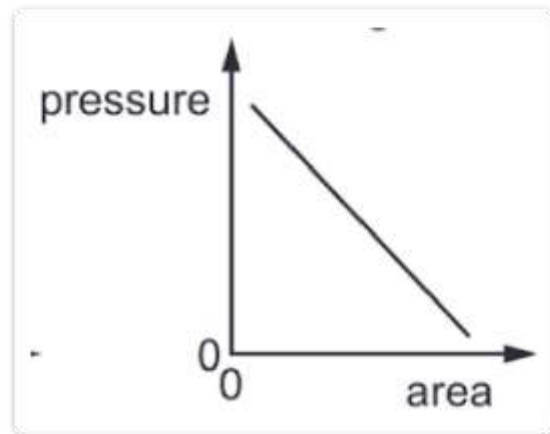


A graph is plotted to show the relationship between the pressure exerted on the table and the base area of the block.

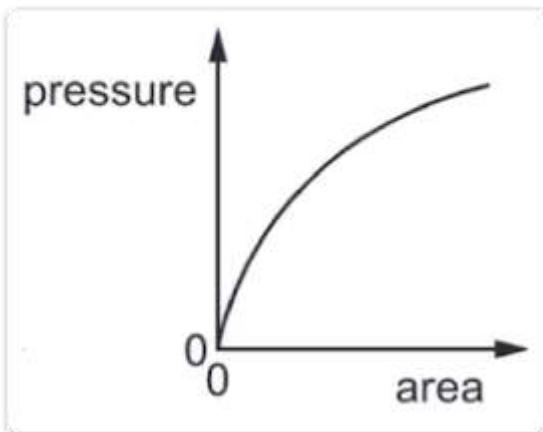
Which graph shows this relationship?



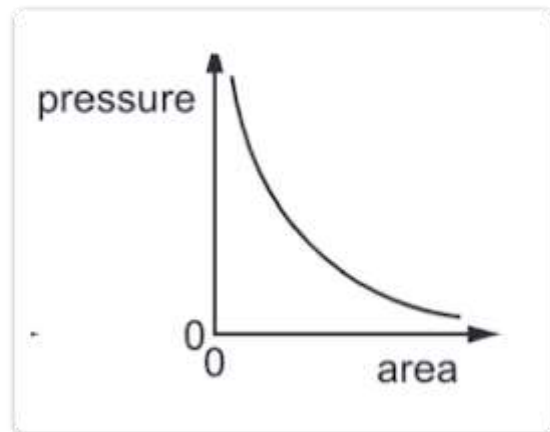
Option



Option..



.Option.



Option.

The momentum of a car of mass m increases from p_1 to p_2 .

What is the increase in the kinetic energy of the car?

$$\frac{(p_2 - p_1)^2}{2m}$$

Option.

$$\frac{(p_2^2 - p_1^2)}{2m}$$

Option

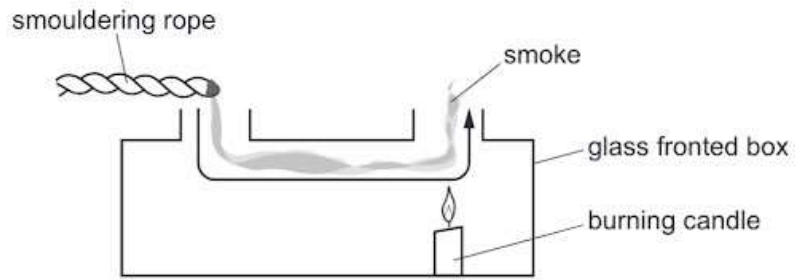
$$\frac{p_2 - p_1}{2m}$$

.Option.

$$\frac{p_1 - p_2}{2m}$$

Option..

When a piece of smouldering rope is held at the opening of the box in the diagram, smoke moves in the direction indicated.

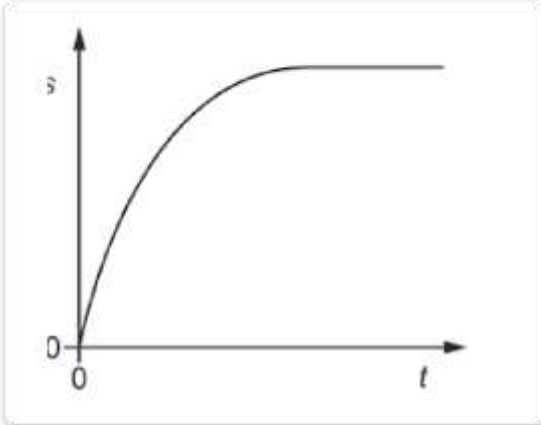


What is responsible for the movement of the smoke?

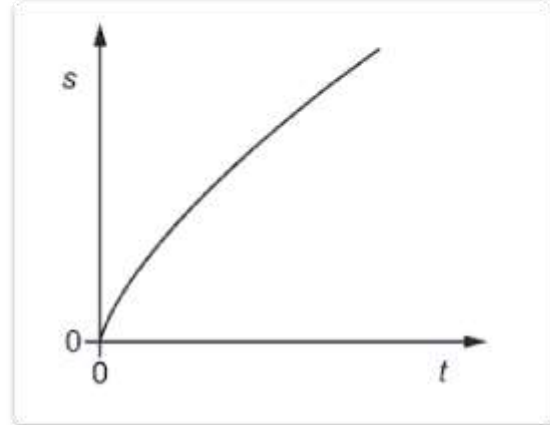
- Convection
- Evaporation
- Conduction
- Radiation

A tennis ball falls freely, in air, from the top of a tall building.

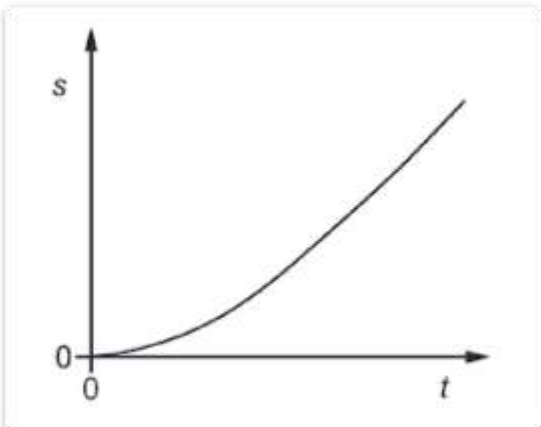
Which graph best represents the variation with time t of the distance s fallen?



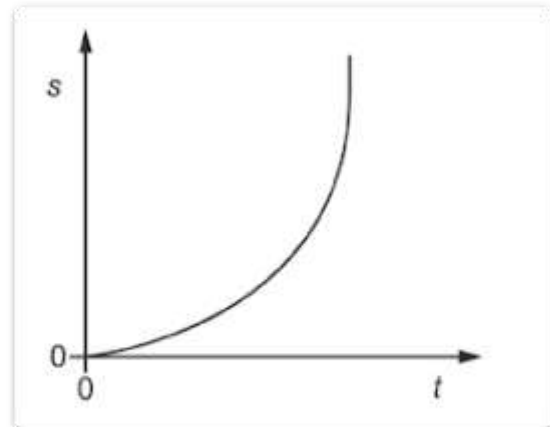
Option.



Option..

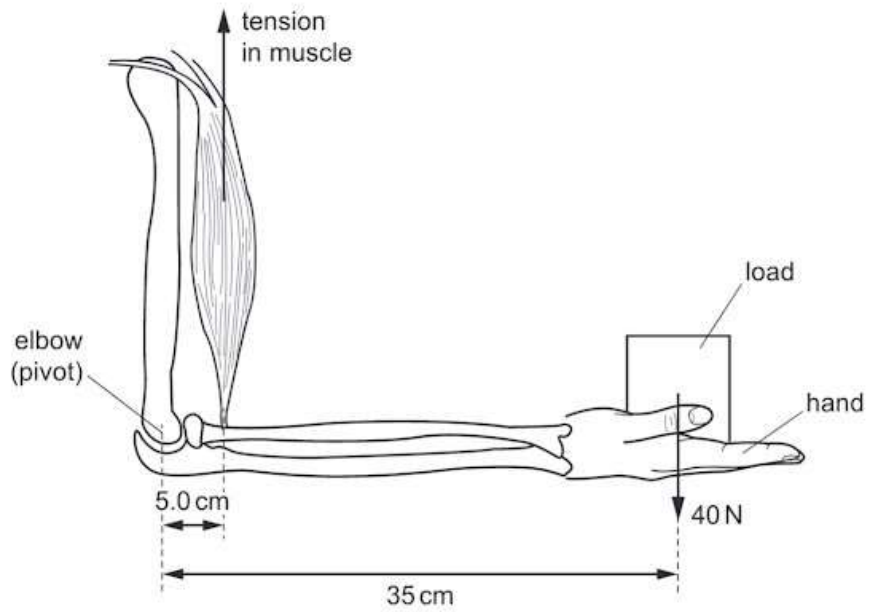


Option



.Option.

The diagram shows a muscle and bones in a person's arm. The hand holds a load of weight 40 N. The elbow acts as a pivot and the tension in the muscle keeps the lower part of the arm horizontal.



What is the tension in the muscle due to the load?

- 200 N
- 280 N
- 240 N
- 1400 N

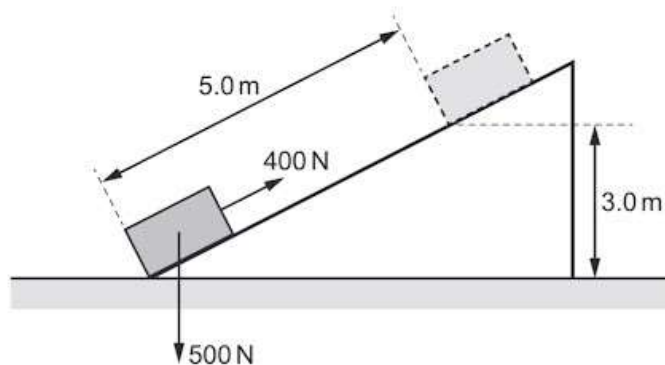
A car travelling in a straight line at a speed of 30 ms^{-1} passes near a stationary observer while sounding its horn. The true frequency of sound from the horn is 400 Hz.

The speed of sound in air is 336 ms^{-1} .

What is the change in the frequency of the sound heard by the observer as the car passes?

- 39 Hz
- 66 Hz
- 78 Hz
- 71 Hz

Work is done when a force of 400 N pulls a crate of weight 500 N at a constant speed along a ramp, as shown.



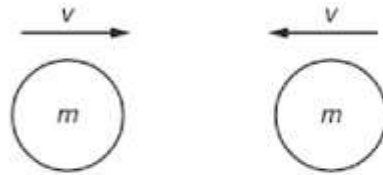
Part of the work done increases the gravitational potential energy E of the crate and the rest is work done W against friction.

What are the values of E and W ?

- $E: 1500 \text{ J}, W 500 \text{ J}$
- $E: 2000 \text{ J}, W 2500 \text{ J}$
- $E: 3500 \text{ J}, W 500 \text{ J}$
- $E: 1500 \text{ J}, W 2000 \text{ J}$

The spheres (below) collide head on and kinetic energy is conserved, which of the following is correct

Two similar spheres, each of mass m and travelling with speed v , are moving towards each other.



The spheres stick together on impact.

Option

The total kinetic energy after impact is mv^2 .

Option.

The total kinetic energy before impact is zero.

.Option.

The total momentum before impact is $2mv$.

Option..

Each tyre of a car has an area of 100 cm^2 in contact with the ground.

The car has a mass of 1600 kg . The weight of the car is equally distributed amongst the four tyres.

The gravitational field strength g is 10 N/kg .

What is the pressure exerted on the ground?

$$4.0\text{ N/cm}^2$$

Option

$$16\text{ N/cm}^2$$

Option.

$$160\text{ N/cm}^2$$

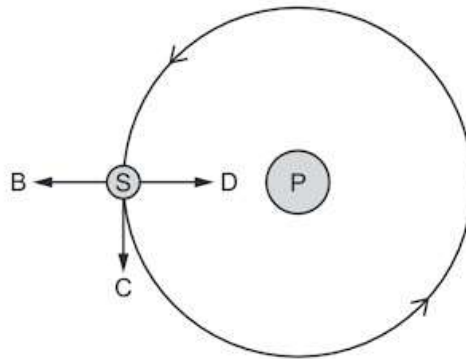
Option..

$$40\text{ N/cm}^2$$

.Option.

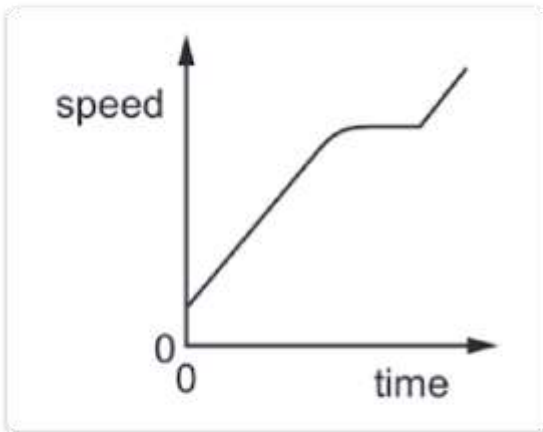
Which statement is correct:

The diagram shows a satellite S travelling at a constant speed in a circular orbit around a planet P.

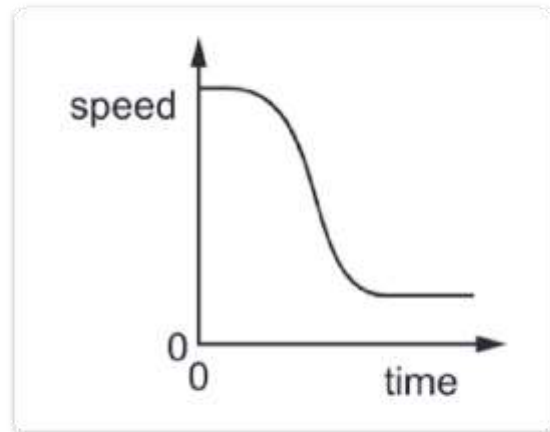


- The resultant force on the satellite is in direction B*
- The resultant force on the satellite is in direction C*
- The resultant force on the satellite is in direction D*
- The resultant force on the satellite is zero*

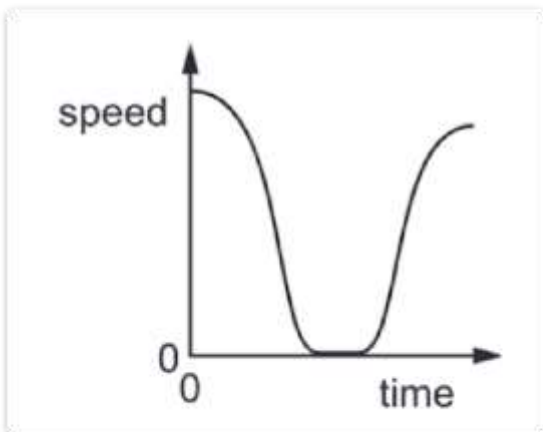
Which speed-time graph represents the motion of a railway train making a short stop at a station?



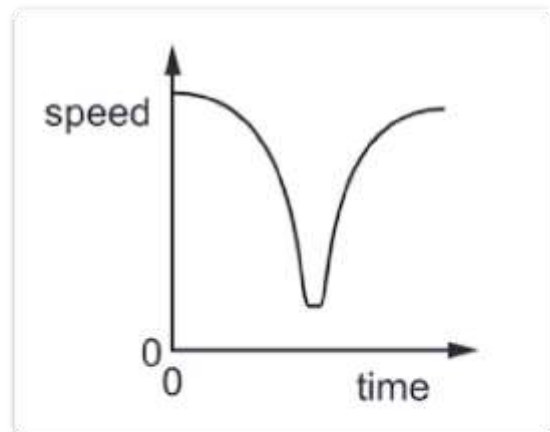
Option.



Option



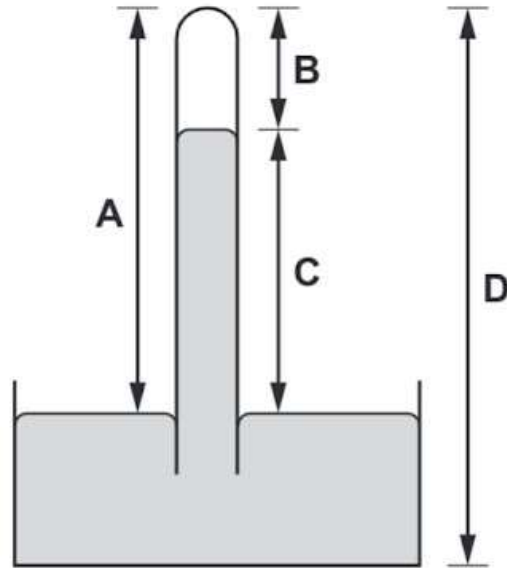
Option..



.Option.

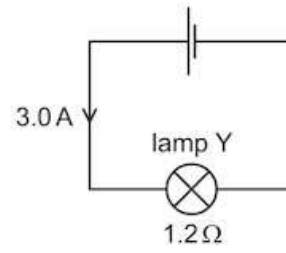
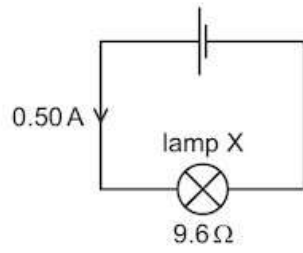
The diagram shows a simple mercury barometer.

Which height is a measure of the atmospheric pressure?



- A*
- C*
- D*
- B*

The circuit diagrams show two lamps X and Y each connected to a cell. The current in lamp X is 0.50 A and its resistance is $9.6\ \Omega$. The current in lamp Y is 3.0 A and its resistance is $1.2\ \Omega$.



What is the ratio $\frac{\text{power in lamp X}}{\text{power in lamp Y}}$?

- 1.3
- 0.75
- 4.5
- 0.22

The table lists the nucleon number and the proton number of various nuclei. The nuclei are represented by the letters L to T.

nucleus	nucleon number	proton number
L	227	89
M	226	89
N	225	89
O	227	90
P	226	90
Q	225	90
R	227	91
S	226	91
T	225	91

Which row in the following table correctly shows three nuclei of the same element, and three nuclei that have the same number of neutrons?

- Same element: R P N / Same number of neutrons O P Q*
- Same element: M P S / Same number of neutrons R S T*
- Same element: O P Q / Same number of neutrons M P S*
- Same element: L M N / Same number of neutrons R P N*

A student calculates his power in running up a flight of stairs. He measures the vertical height of the stairs, the time taken to run up the stairs and his weight.

How does he calculate his power?

$$\text{height} \times \text{time} \times \text{weight}$$

Option

$$\frac{\text{weight}}{\text{height} \times \text{time}}$$

Option..

$$\frac{\text{height} \times \text{weight}}{\text{time}}$$

Option.

$$\frac{\text{time} \times \text{weight}}{\text{height}}$$

.Option.

During an interval of time, fuel supplies energy X to a car.

Some of this energy is converted into kinetic energy as the car accelerates.

The rest of the energy Y is lost as thermal energy.

What is the efficiency of the car?

$$\frac{Y}{X - Y}$$

Option.

$$\frac{X - Y}{X}$$

.Option.

$$\frac{X - Y}{Y}$$

Option..

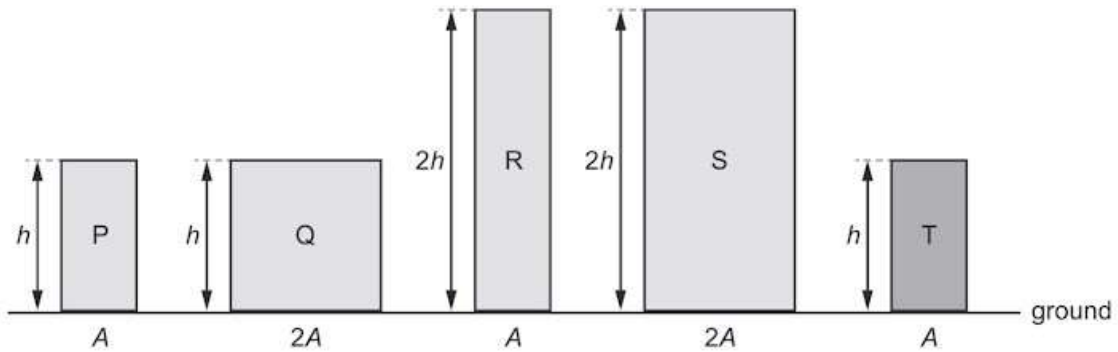
$$\frac{X}{X - Y}$$

Option

Which of the following 2 blocks exert the same pressure on the ground:

Blocks P, Q, R and S are made from material of the same density. Block T is made from a material of twice the density of the material of the other blocks.

The cross-sectional area and height of each of the blocks are shown.



- P and T*
- Q and S*
- Q and R*
- S and T*

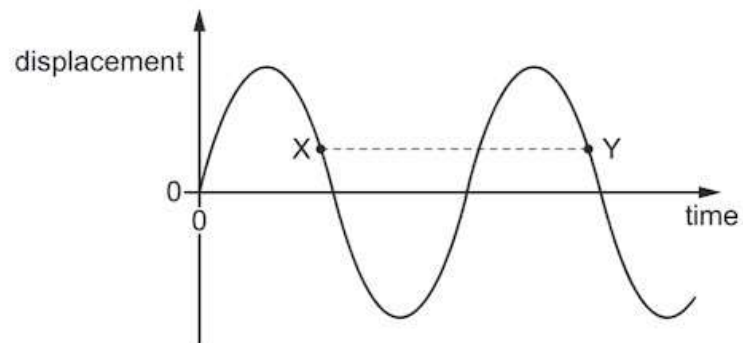
Liquids X and Y are stored in large open tanks. Liquid X has a density of 800 kg m^{-3} and liquid Y has a density of 1200 kg m^{-3} .

At which depths are the pressures equal?

- Depth X/m 8, Depth Y/m 20*
- Depth X/m 20, Depth Y/m 8*
- Depth X/m 10, Depth Y/m 15*
- Depth X/m 15, Depth Y/m 10*

A transverse progressive wave is set up on a string.

The graph shows the variation with time of displacement for a point on this string.



The separation XY on the graph represents the1..... of the wave.

X and Y have equal2..... .

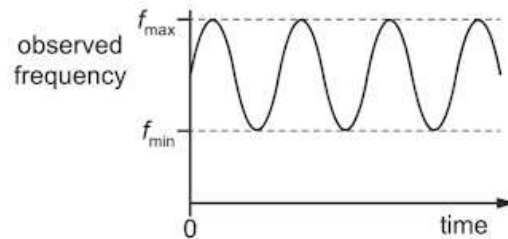
Which words correctly complete gaps 1 and 2?

- 1: *Wavelength*, 2: *Displacement*
- 1: *Period*, 2: *Displacement*
- 1: *Wavelength*, 2: *Amplitude*
- 1: *Period*, 2: *Amplitude*

A binary star consists of two stars rotating around a common centre. Light from one of the stars is observed on the Earth.



The observed frequency of the light varies between a minimum frequency f_{\min} and a maximum frequency f_{\max} , as shown.



The rate of rotation of the binary star increases.

What is the change to f_{\max} and the change to f_{\min} ?

- f_{\max} : decreases, f_{\min} : decreases
- f_{\max} : decreases, f_{\min} : increases
- f_{\max} : increases, f_{\min} : increases
- f_{\max} : increases, f_{\min} : decreases

A body of mass 10 kg falling freely in the gravitational field close to the Moon's surface has an acceleration of 1.6 m/s^2 .

What is the gravitational field strength on the Moon?

- 1.6 N/kg
- 0 N/kg
- 16 N/kg
- 10 N/kg

