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南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL
End-of-Year Examination 2018
Secondary Three

PHYSICS

Paper 1
Tuesday

Multiple Choice

9 October 2018

45 minutes
08:45 – 09:30

Additional materials: Optical Answer Sheet (OAS)

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Write your name, register number and class in the spaces at the top of this page.

Do not use staples, paper clips, highlighters, glue or correction fluid on the Multiple Choice **Optical Answer Sheet** (OAS) provided.

Write in soft pencil your name, class and register number on the Optical Answer Sheet.

There are **thirty** questions in 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 shade the lozenge of your choice in **soft pencil** on the Optical Answer Sheet.

INFORMATION FOR CANDIDATES

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

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

Any rough working should be done in this booklet.

The acceleration due to gravity (or gravitational field strength) g is taken to be 10 m s^{-2} (or 10 N kg^{-1}) near the Earth's surface.

This document consists of **13** printed pages and **1** blank page.

Setters: TW & HWQ

NANYANG GIRLS' HIGH SCHOOL

[Turn over

- 1 A micrometer is used to measure the thickness of a sheet of metal.

Diagram 1 shows the micrometer reading with the jaws closed and no metal sheet between the jaws.

Diagram 2 shows the micrometer reading with the jaws closed around the metal sheet.

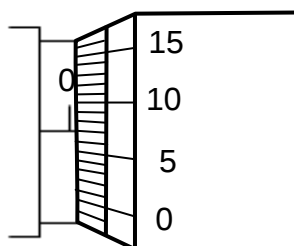


diagram 1

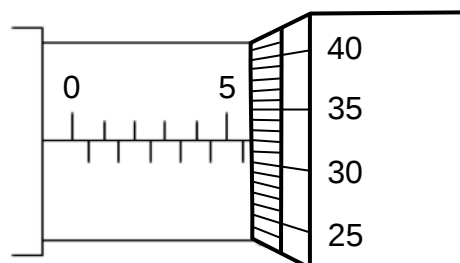


diagram 2

What is the thickness of the metal sheet?

- A 5.25 mm B 5.39 mm C 5.75 mm D 5.89 mm

- 2 The average mass of an adult man is 62 kg. What is possibly the volume of an adult man?

- A 0.0060 m^3 B 0.060 m^3 C 0.60 m^3 D 6.0 m^3

- 3 A student measures the acceleration due to gravity by dropping a lead mass.

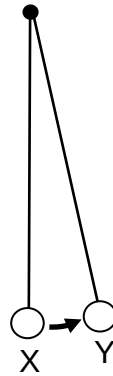
The experiment is repeated a total of four times and the results are shown in the table below.

acceleration / m s^{-2}	11.4	11.5	11.5	11.6
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Which statement is **correct**?

- A His results are accurate and precise.
B His results are accurate but not precise.
C His results are precise but not accurate.
D His results are neither accurate nor precise.

- 4 The time taken for a pendulum to swing from position X to position Y of maximum displacement is 1.2 s.



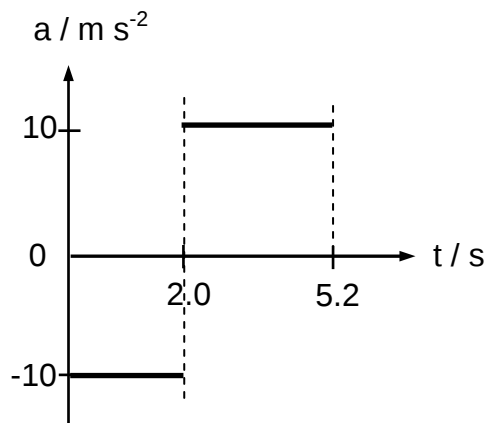
What is the frequency of its oscillation?

- A** 0.21 Hz **B** 0.28 Hz **C** 0.42 Hz **D** 0.83 Hz

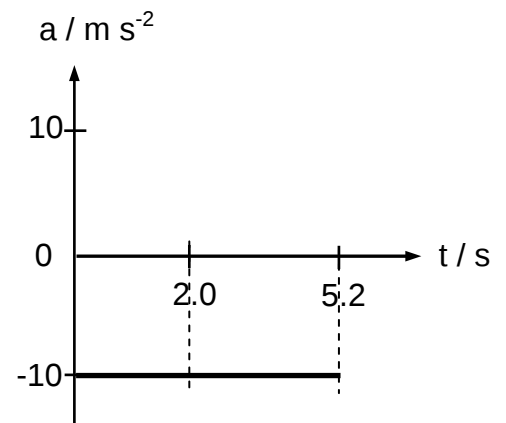
- 5 A ball is thrown vertically upward from the top of a cliff with a velocity of 20 m s^{-1} . It hits the water surface 5.2 s later.

Ignoring the effect of air resistance, which is the acceleration-time graph of its motion?

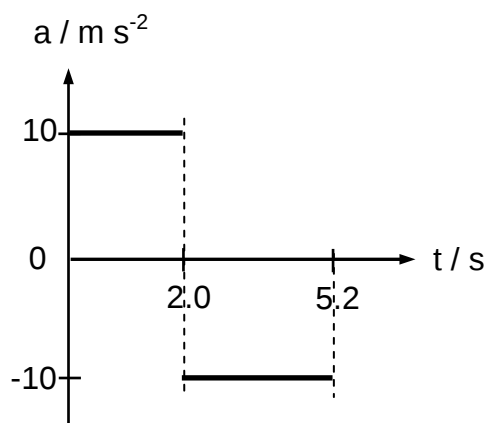
A



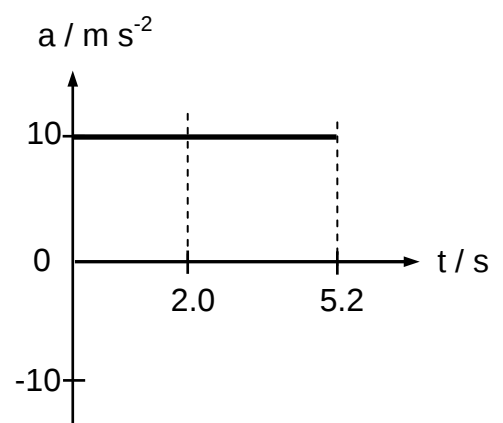
B



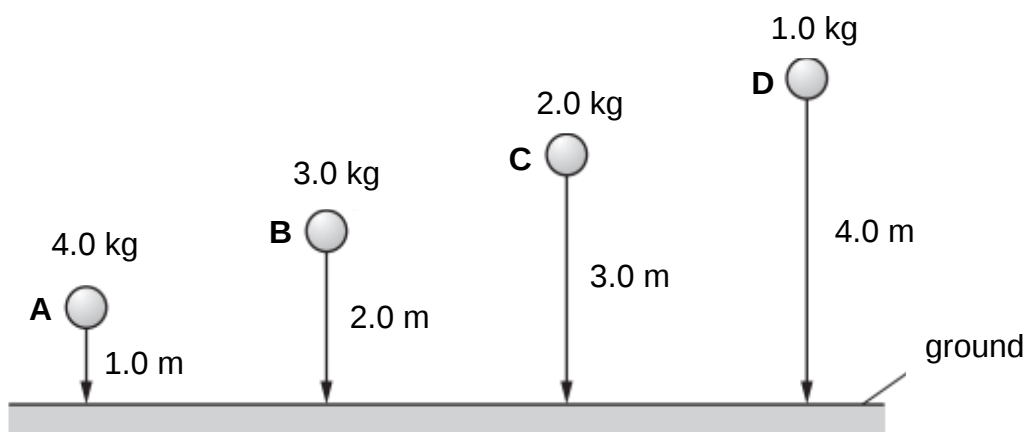
C



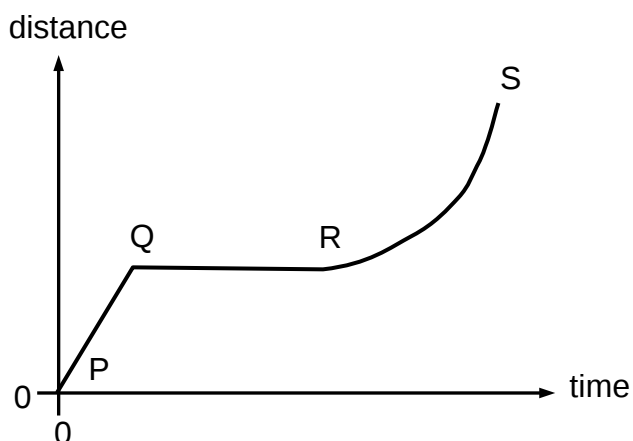
D



- 6 Four balls with different masses are dropped from the heights shown. Ignoring air resistance, which ball has the **greatest** average speed?



- 7 The graph shows how the distance travelled by a car varies with time.



Which row **correctly** describes the speed of the car in each section of the graph?

	P to Q	Q to R	R to S
A	constant	zero	increasing
B	constant	zero	decreasing
C	increasing	zero	increasing
D	increasing	constant	increasing

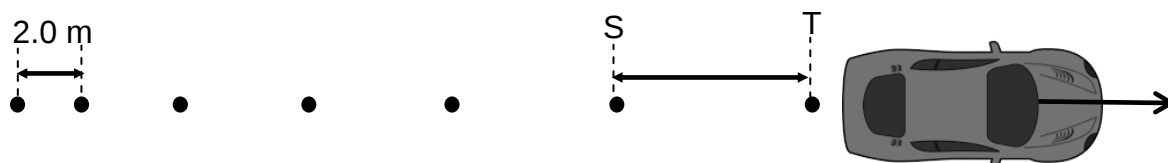
- 8 The table shows the speed of a car at 5-second intervals.

time / s	0	5	10	15	20
speed / m s^{-1}	0	5.0	15.0	30.0	50.0

Which row **correctly** describes the speed and acceleration of the car?

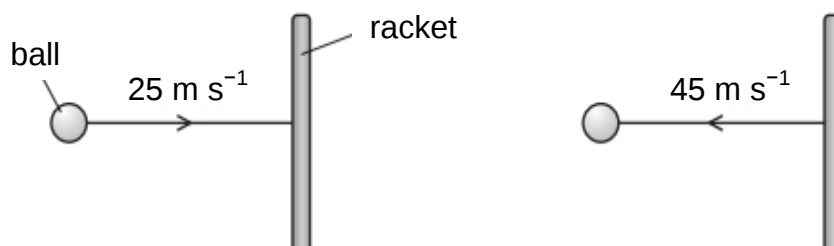
	speed	acceleration
A	increasing	constant
B	increasing	increasing
C	decreasing	constant
D	decreasing	increasing

- 9 A car travels with a constant acceleration of 1.3 m s^{-2} along a straight road. It drips oil at a constant rate of 1 drop every 2.0 seconds. The diagram below (not to scale) shows the oil marks on the road.



What is the distance between the two oil marks S and T?

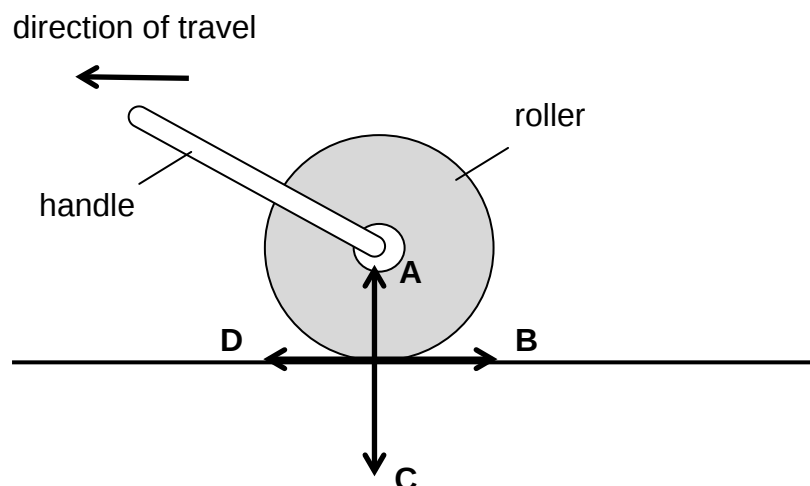
- A** 15 m **B** 18 m **C** 28 m **D** 33 m
- 10 A tennis ball of mass 0.050 kg travels horizontally at a speed of 25 m s^{-1} . The ball hits a tennis racket and rebounds horizontally at a speed of 45 m s^{-1} . The ball is in contact with the racket for 50 ms .



What average force does the racket exert on the ball?

- A** 0.020 N **B** 0.070 N **C** 20 N **D** 70 N

- 11** A roller is pulled along a horizontal ground in the direction shown.
In which direction does the force of friction exerted by the ground on the roller act?



- 12** A constant force acts on a body of mass m for a time t .

The increase in speed of the body depends on

- (1) the initial velocity of the body
- (2) the mass m
- (3) the time t

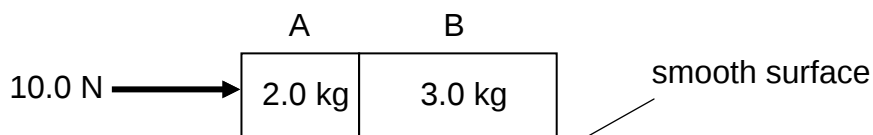
A (1) and (2) only

B (1) and (3) only

C (2) and (3) only

D (1), (2) and (3)

- 13** Two blocks A and B of masses 2.0 kg and 3.0 kg respectively are placed in contact on a smooth horizontal surface as shown below. A constant force of 10.0 N acts on block A.



What is the force exerted on A by B?

- A** 4.0 N to the left
- B** 4.0 N to the right
- C** 6.0 N to the left
- D** 6.0 N to the right

- 14** A man throws a stone vertically upwards.

Ignoring the effect of air resistance, which row describes the magnitude and direction of the force acting on the stone after it leaves the man's hand?

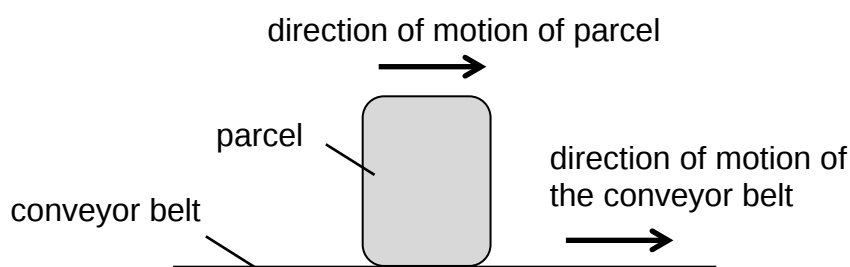
	magnitude	direction
A	increasing	downwards
B	constant	downwards
C	increasing	upwards
D	constant	upwards

- 15** An object of weight 20 N is placed on a weighing scale in a lift.

What is the reading shown on the weighing scale when the lift is moving downwards with a deceleration of 2.0 m s^{-2} ?

- A** 0 N **B** 16 N **C** 20 N **D** 24 N

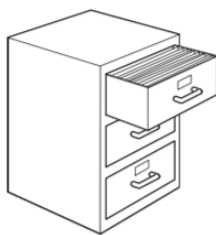
- 16** A parcel is placed on a horizontal conveyor belt. The conveyor belt and the parcel move to the right at constant speed. Only two horizontal forces act on the parcel, the air resistance and friction with the conveyor belt.



Which row **correctly** compares the direction and magnitude of these two forces?

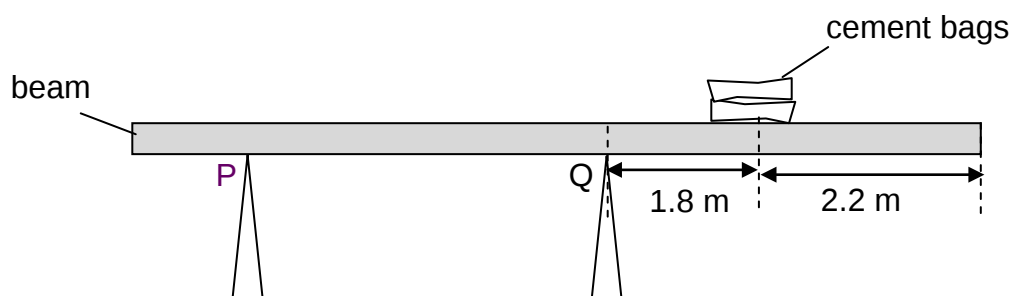
	direction	magnitude
A	opposite	the same
B	opposite	different
C	the same	the same
D	the same	different

- 17** Some office filing cabinets have a mechanism that allows only one drawer to be opened at a time as shown below.



If more drawers are opened at the same time the cabinet may topple forward.
Why is this so?

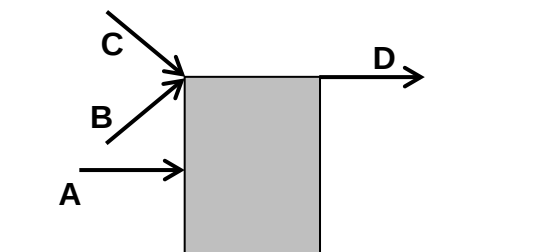
- A** Its centre of gravity is raised.
 - B** Its centre of gravity is lowered.
 - C** Its centre of gravity is not vertically within the base.
 - D** Its gravitational potential energy is increased.
- 18** A 10.0 m long uniform beam of mass 60.0 kg rests on two supports P and Q.



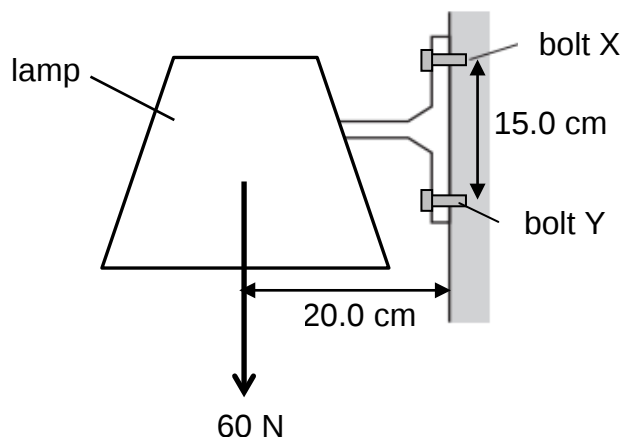
Cement bags, each of mass 5.0 kg, were placed on the beam at a distance of 1.8 m from Q as shown.

What is the **least** number of cement bags that can be placed on the beam to make it topple?

- A** 5 **B** 6 **C** 7 **D** 12
- 19** A heavy uniform block is placed on the ground as shown below.
Which is the **smallest** force that would tilt the block?



- 20** A lamp is fixed to the wall by two bolts, X and Y.



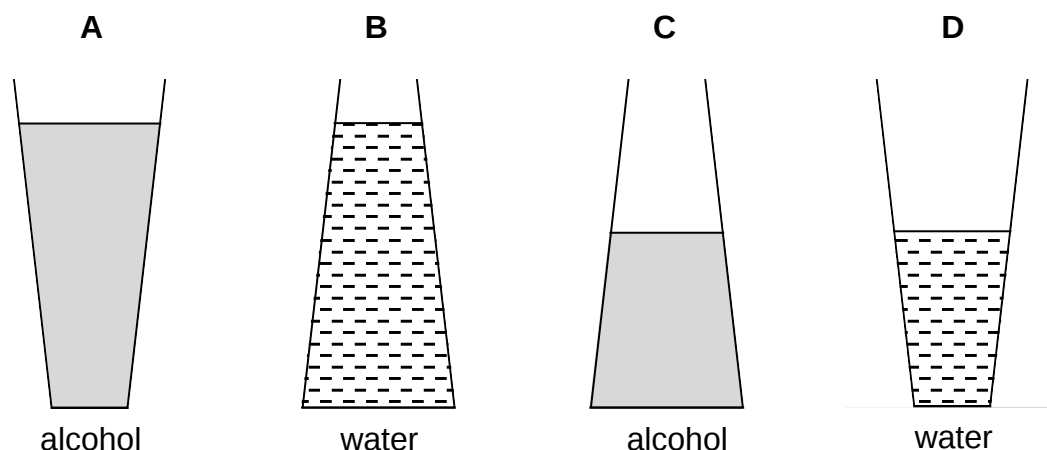
The weight of the lamp is 60 N.

What are the magnitudes and directions of the horizontal forces acting on the bolts X and Y?

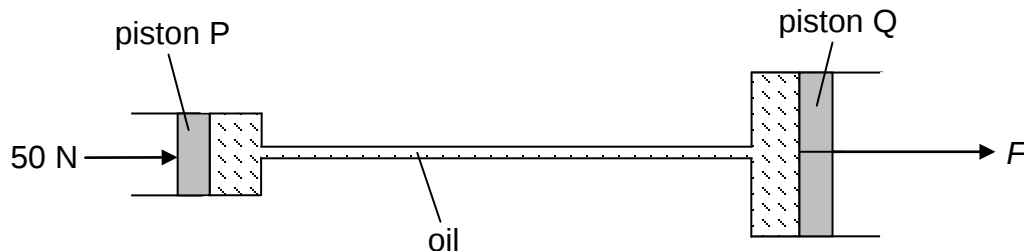
	force on bolt X	force on bolt Y
A	45 N to the right	45 N to the left
B	45 N to the left	45 N to the right
C	80 N to the right	80 N to the left
D	80 N to the left	80 N to the right

- 21** The diagrams show alcohol and water in different containers. Container A is filled to the same height as container B, while container C is filled to the same height as container D.

Given that the density of water and alcohol are 1.00 g cm^{-3} and 0.80 g cm^{-3} respectively, which column of liquid exerts the greatest pressure on the base of its container?



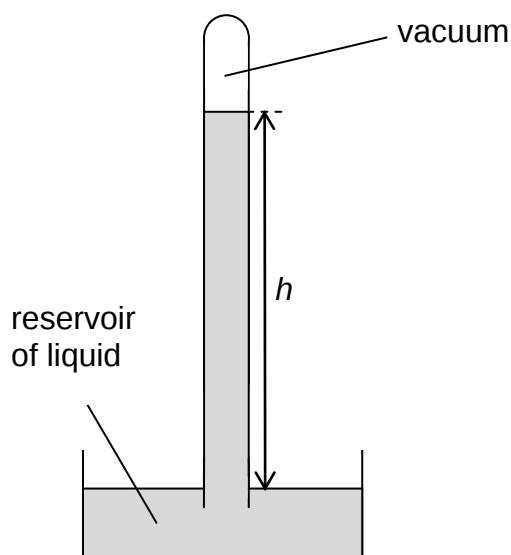
- 22** The diagram below shows a simple hydraulic system. A force of 50 N is applied to piston P. As a result, there is a force F on piston Q.



Piston P has an area of 4.0 cm^2 and piston Q has an area of 20.0 cm^2 .

What is the magnitude of force F ?

- A** 10 N **B** 50 N **C** 250 N **D** 1000 N
- 23** A barometer can be used to measure atmospheric pressure as shown.



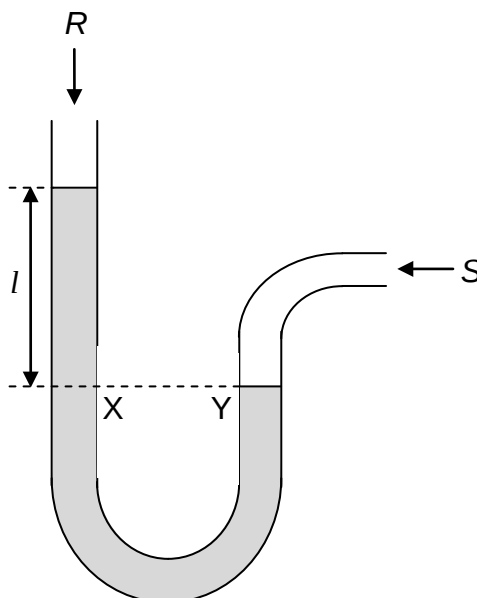
For a water barometer, the height h is 5.0 m. An alcohol barometer is placed at the same location contains alcohol.

The density of water and alcohol are $1.00 \times 10^3 \text{ kg m}^{-3}$ and $0.77 \times 10^3 \text{ kg m}^{-3}$ respectively.

What is the height h of the column of alcohol?

- A** 2.0 m **B** 3.2 m **C** 4.0 m **D** 6.5 m

- 24** The diagram shows a simple manometer that contains a liquid.



Side X is open to the atmosphere at pressure R .

Side Y is connected to a gas supply of pressure S .

Which pressure does the length l represent?

- A** R **B** S **C** $S - R$ **D** $R + S$

- 25** As a hydrogen balloon rises from ground level to an altitude of 500 m, its volume increases.

Which row describes the pressure within the balloon and in the air outside the balloon?

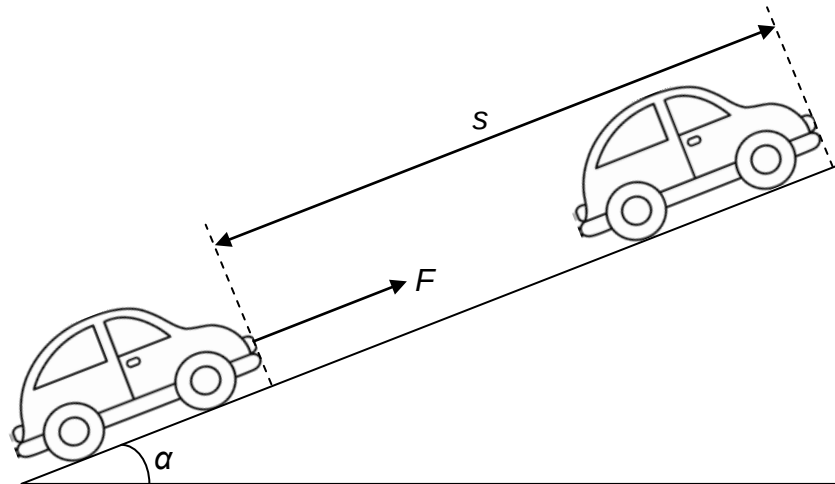
	pressure in the balloon	pressure of air outside
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- 26** A girl of weight 450 N runs up a flight of stairs in 15 s. The vertical height of the stairs is 7.0 m.

What is the average power developed by the girl during the climb?

- A** 30 W **B** 64 W **C** 210 W **D** 960 W

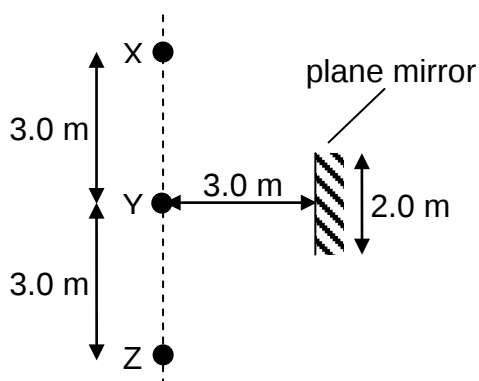
- 27** A constant force F , acting on a car of mass m , moves the car up the slope through a distance s at a constant velocity v . The angle of the slope to the horizontal is α .



Which expression gives the efficiency of the process?

- A** $\frac{mgs \sin \alpha}{Fv} \times 100\%$
- B** $\frac{mv}{Fs} \times 100\%$
- C** $\frac{mv^2}{2Fs} \times 100\%$
- D** $\frac{mg \sin \alpha}{F} \times 100\%$
- 28** Which characteristics describe an image formed by a vertical plane mirror?
- A** real and inverted
- B** virtual and upright
- C** real and larger than the object
- D** virtual and smaller than the object

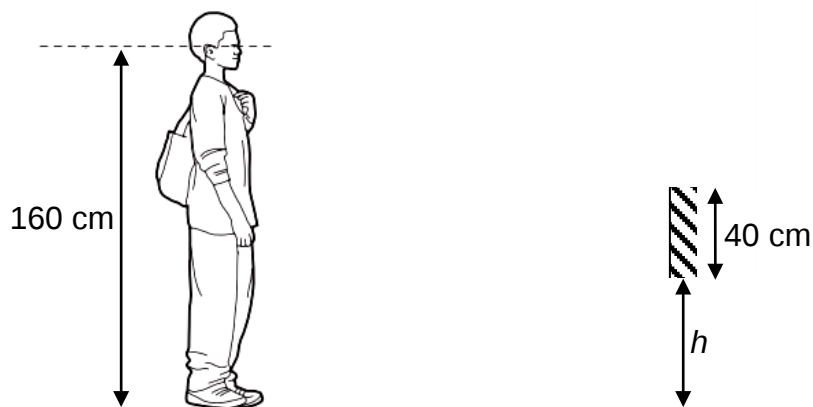
- 29** Three students X, Y, Z stand 3.0 m apart in front of a plane mirror, which is 3.0 m away from Y and 2.0 m long as shown below.



Student Y is standing opposite the mid-point of the mirror.

How many students can see the images of the other two?

- A** 0 **B** 1 **C** 2 **D** 3
- 30** A shoe shop puts a mirror on the wall so that customers can look at their shoes. The length of the mirror is 40 cm. The customer's eyes are 160 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** 20 cm **C** 40 cm **D** 80 cm

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