

Class	Register Number	Name
-------	-----------------	------



南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2019
Secondary Three

PHYSICS

Paper 1

Multiple Choice

Tuesday

15 October 2019

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.

1 Which group of quantities consists of only vectors?

- A mass, energy, time
- B weight, acceleration, pressure
- C force, displacement, velocity
- D speed, distance, moment

2 The diameter of a steel ball is measured using a micrometer screw gauge. A student takes an initial zero reading (diagram 1) and then a reading of the diameter (diagram 2).

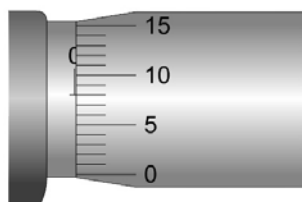


diagram 1

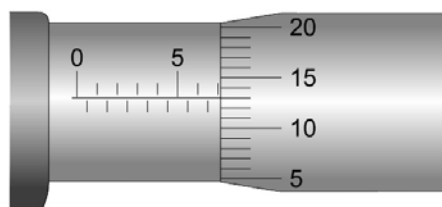


diagram 2

What is the true diameter of the ball?

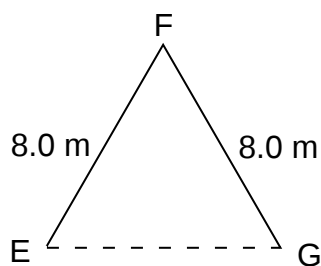
- A 7.05 mm
- B 7.21 mm
- C 9.05 mm
- D 9.21 mm

3 Four students each made a series of measurements of the acceleration of free fall g . The table shows the results obtained.

Which student obtained a set of results that could be described as accurate but not precise?

student	$g / \text{m s}^{-2}$			
A	8.1	9.2	10.1	11.2
B	9.0	8.9	8.7	8.8
C	9.9	10.0	10.0	10.1
D	11.0	13.0	9.0	7.0

- 4 A student takes 6.0 s to walk from E to F, and then takes another 6.0 s to walk from F to G as shown below.

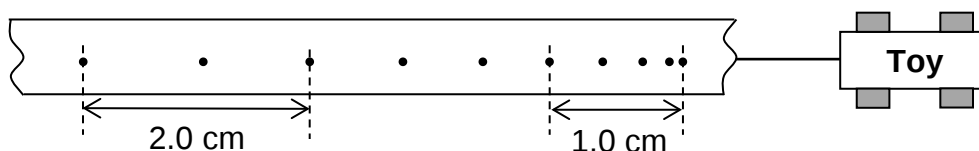


EFG forms an equilateral triangle with sides of length 8.0 m.

What is the magnitude of his average speed and velocity when travelling from E to G?

	speed / m s^{-1}	velocity / m s^{-1}
A	1.3	0.67
B	0.67	1.3
C	2.7	1.3
D	1.3	2.7

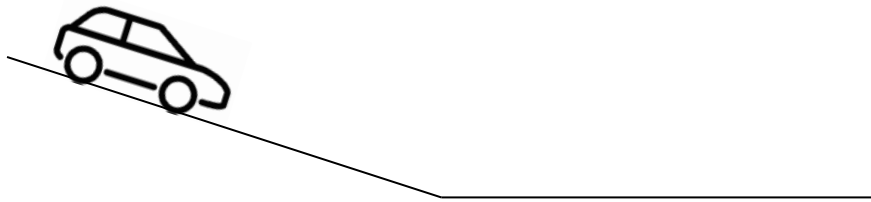
- 5 A ticker-tape timer is used to investigate the movement of a toy car. The frequency of the timer is 10 Hz and a portion of the tape is shown in the figure below.



What is the average acceleration of the toy car?

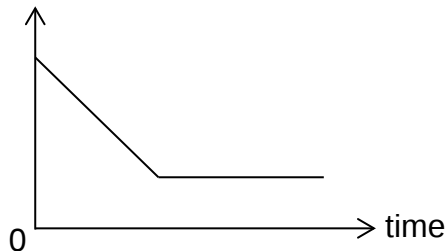
- A** 6.7 cm s^{-2} **B** 8.3 cm s^{-2} **C** 13 cm s^{-2} **D** 25 cm s^{-2}

- 6 A car rolls down a sloping runway and reaches a smooth flat surface as shown in the figure below.

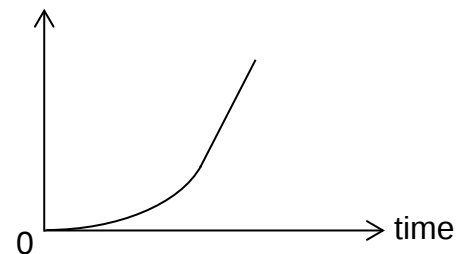


Which of the following displacement-time graphs best illustrates the motion of the car?

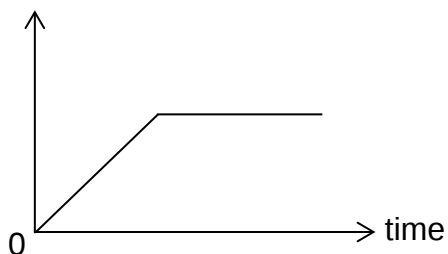
A displacement



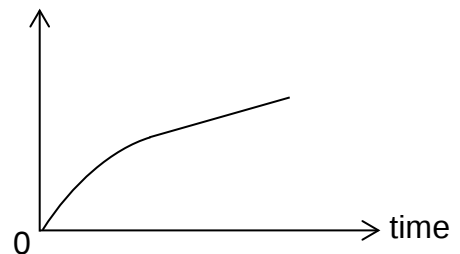
B displacement



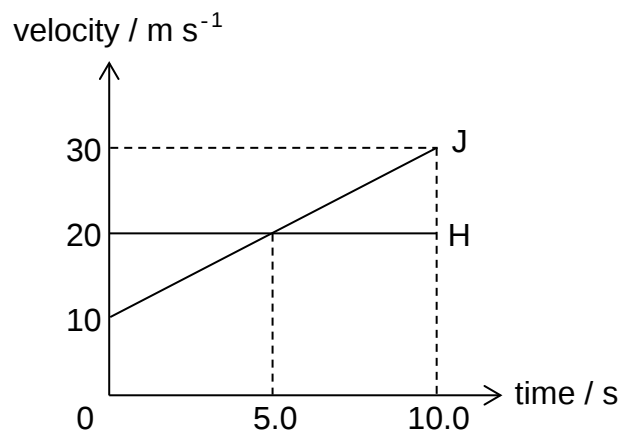
C displacement



D displacement



- 7 The following graph represents objects H and J in a state of linear motion, with H and J starting from the same point.



Which of the following statements is correct?

- A J is travelling at a greater average speed than H over 10.0 s.
- B J overtakes H at 5.0 s.
- C J undergoes increasing acceleration.
- D J and H have the same displacement at 10.0 s.

- 8** A boy throws a ball vertically upwards. It rises to a maximum height, where it is momentarily at rest, and then falls back to his hands.

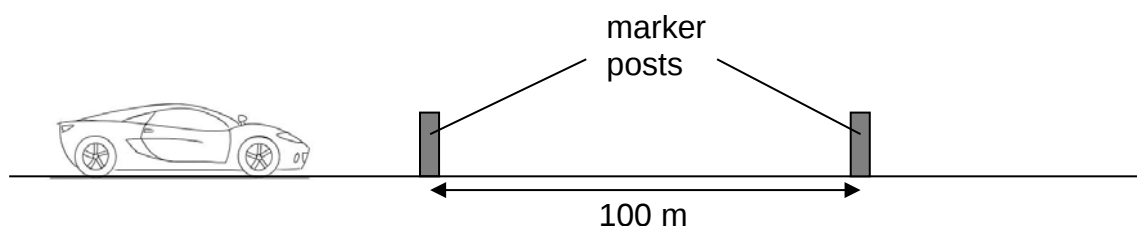
Which row gives the acceleration of the ball in m s^{-2} at various stages in its motion? (Take vertically upwards as positive. Ignore air resistance.)

	acceleration when		
	rising	at maximum height	falling
A	10	0	-10
B	10	10	10
C	-10	-10	-10
D	-10	0	10

- 9** Object K falls freely from rest for 5.0 seconds and object L also falls freely from rest for 15.0 s. How does the distance by which object L falls compare with object K? Assume air resistance is negligible.

- A** Object L travelled three times as far as object K.
B Object L travelled six times as far as object K.
C Object L travelled nine times as far as object K.
D Object L travelled twelve times as far as object K.

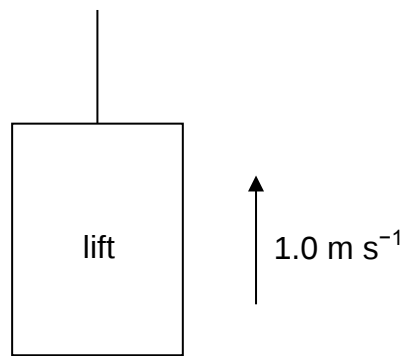
- 10** A car is travelling with uniform acceleration along a straight road. The road has marker posts every 100 m. When the car passes one post, it has a speed of 15 m s^{-1} , and when it passes the next one, its speed is 25 m s^{-1} .



What is the car's acceleration?

- A** 0.050 m s^{-2} **B** 0.50 m s^{-2} **C** 1.0 m s^{-2} **D** 2.0 m s^{-2}

- 11** An empty lift of mass 500 kg is moving up with a uniform velocity of 1.0 m s^{-1} . What is the resultant force on the lift?



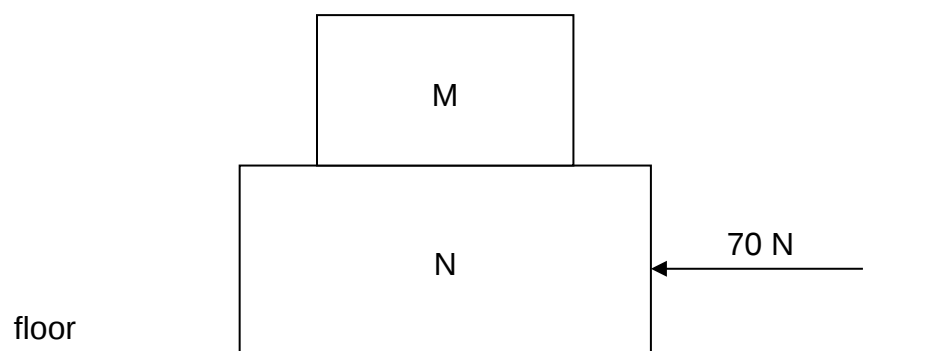
- A** 0 N **B** 4500 N **C** 5000 N **D** 5500 N
- 12** A body is moving under the action of a constant net force. What change must the body undergo?
- A** change in acceleration
B change in mass
C change in speed
D change in velocity
- 13** A man pulls a sledge of mass 22 kg across level ground with a horizontal force of 40 N. A constant force of friction of 10 N acts on the sledge.



What is the acceleration of the sledge?

- A** 0.36 m s^{-2} **B** 1.4 m s^{-2} **C** 1.8 m s^{-2} **D** 2.3 m s^{-2}

- 14** Boxes M and N are stacked one on top of the other on a frictionless floor as shown.



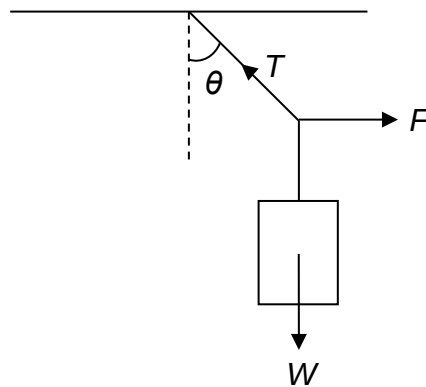
Box M has a mass of 3.0 kg and box N has a mass of 7.0 kg.

If 70 N is applied on box N to move both boxes, what is the net force acting on box N?

- A** 12 N **B** 49 N **C** 70 N **D** 98 N
- 15** Four of the gravitational forces that act between bodies in the Solar System are described below.
- P the force on the Moon due to the Earth
Q the force on the Earth due to the Sun
R the force on the Earth due to the Moon
S the force on the Moon due to the Sun
- Which two forces form an action-reaction pair?
- A** P and Q **B** P and R **C** Q and S **D** R and S
- 16** A crate is pulled along a smooth level surface by two workers using ropes. Worker A exerts a force of 15 N while worker B exerts a force of 20 N. Which of the following *cannot* be the magnitude of the resultant force acting on the crate?

- A** 4 N **B** 9 N **C** 16 N **D** 28 N

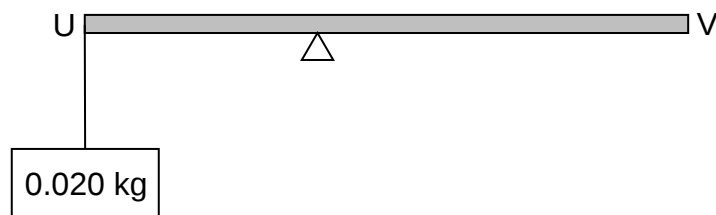
- 17** A weight W hanging from a string is pulled aside by a horizontal force F as shown in the diagram.



The tension in the string is T .

Which of the following *must* result in a decrease in the angle θ ?

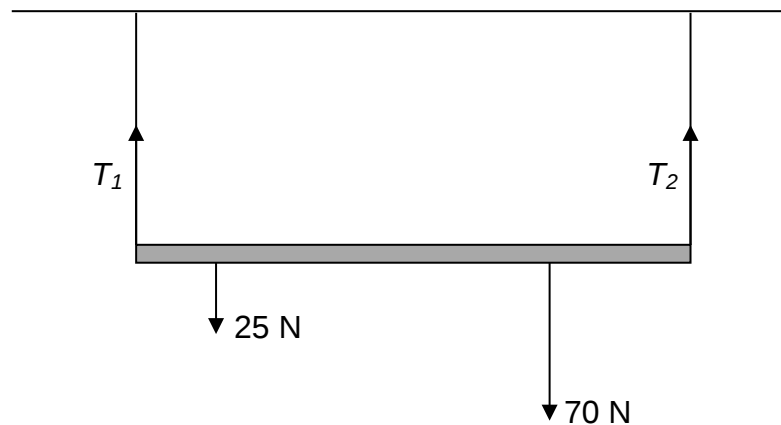
- A** increase W and increase F
 - B** decrease W and increase F
 - C** decrease W and decrease F
 - D** increase W and decrease F
- 18** A uniform metre rule, UV , of mass 100 g is balanced when it is pivoted off-centre with a mass of 0.020 kg placed at U .



What is the distance of the pivot from U ?

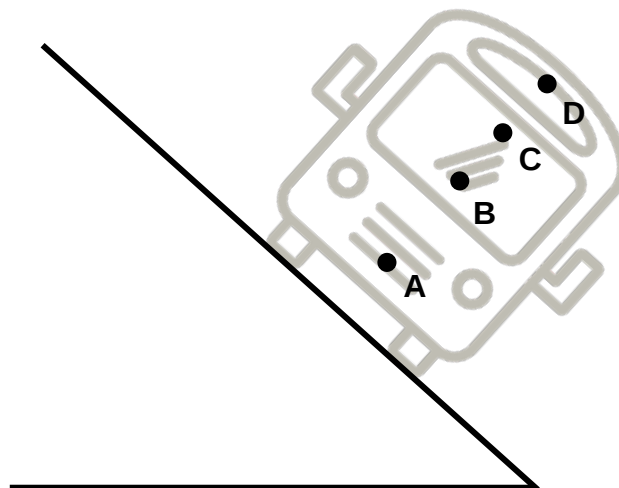
- A** 0.17 m **B** 0.25 m **C** 0.42 m **D** 0.50 m

- 19** A light uniform metre rule is held horizontal by two strings which have tensions T_1 and T_2 . Two forces of 25 N and 70 N act at the 15 cm and 75 cm marks respectively. What is the magnitude of T_1 and T_2 ?

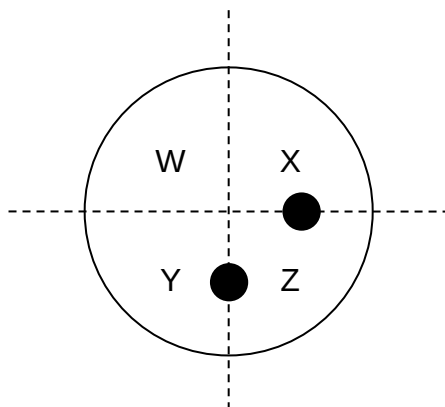


	T_1 / N	T_2 / N
A	48	48
B	56	39
C	70	25
D	39	56

- 20** Where is the centre of mass of the bus if it does not tip over when tilted at an angle as shown in the diagram below?



- 21** The figure below represents a uniform lamina with two shaded portions cut out. In which quadrant is the centre of gravity of the remaining portion?



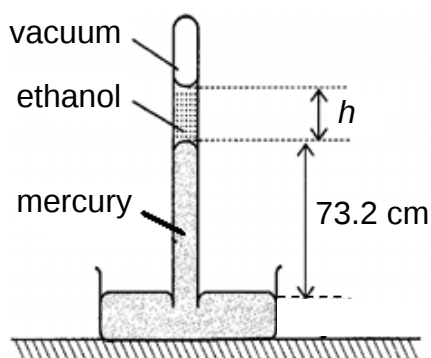
- A** quadrant W
B quadrant X
C quadrant Y
D quadrant Z
- 22** A barometer contains mercury and some ethanol as shown below.

The following data is given:

atmospheric pressure = 75 cm Hg

density of ethanol = 789 kg m^{-3}

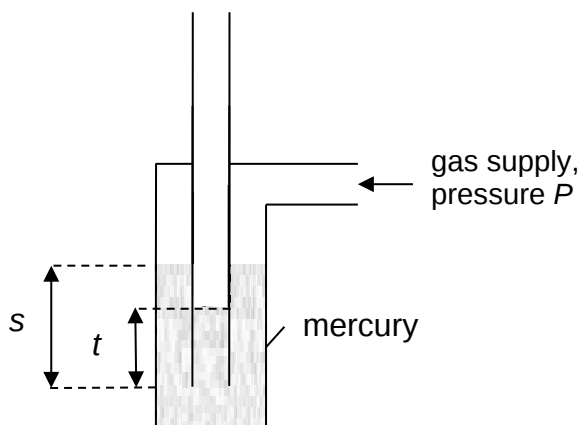
density of mercury = $13\,600 \text{ kg m}^{-3}$



What is the height h of the ethanol above the mercury column?

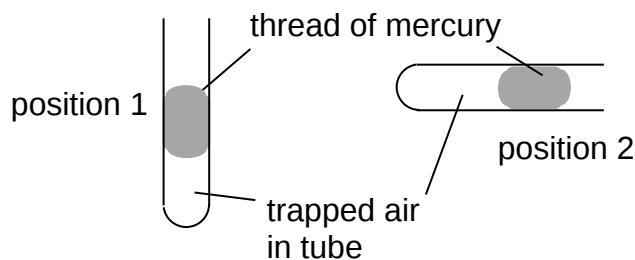
- A** 0.10 cm **B** 1.8 cm **C** 29.2 cm **D** 31.0 cm

- 23** An open tube stands, with one end in mercury, in a chamber that is connected to a gas supply. The pressure of the gas is P metres of mercury. The atmospheric pressure is h metres of mercury.



If t and s are measured in metres, what would the pressure P be in metres of mercury?

- A** $t + h$ **B** $t - h$ **C** $t + s$ **D** $t - s + h$
- 24** A narrow tube in position 1 contains a thread of mercury which traps air at the end of the tube. The other end of the tube is open to the atmosphere.

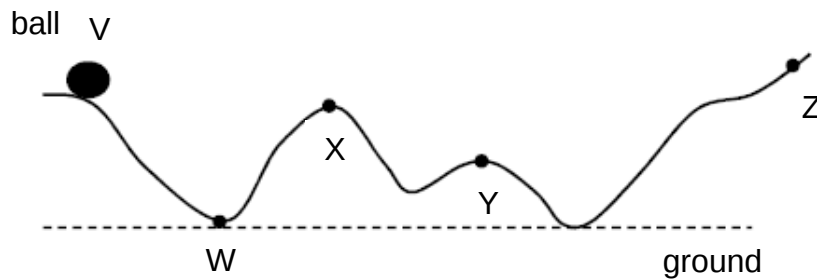


When the tube is rotated to position 2, the volume of the trapped air increases.

Which statement best explains this?

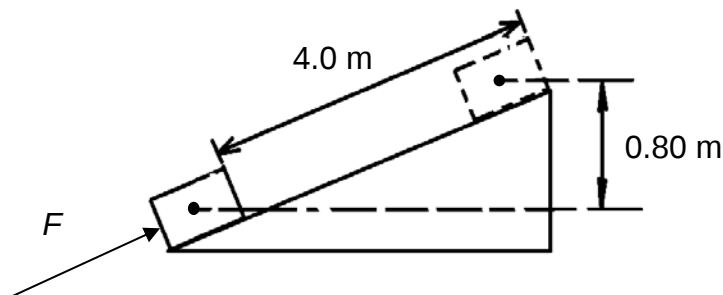
- A** The air gets hotter in the tube.
B The weight of the mercury is not acting on the trapped air.
C The pressure due to atmosphere is less when it acts sideways.
D The trapped air molecules push on the mercury less hard when it is horizontal.

- 25** A ball at V was released from rest on a smooth surface. Air resistance is negligible.



Which statement is correct?

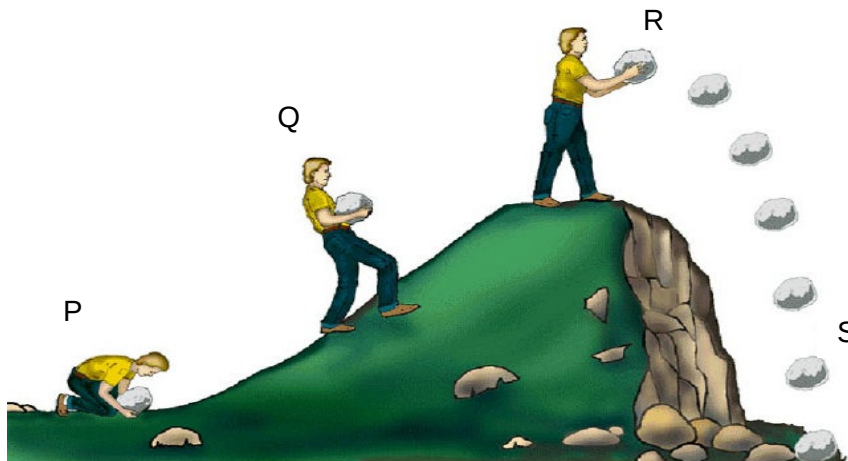
- A** The ball will move past point Z.
 - B** The kinetic energy of the ball at Y is greater than at X.
 - C** The gravitational potential energy of the ball at X is smaller than at Y.
 - D** The kinetic energy of the ball at W is the lowest.
- 26** A force F is applied to push a 6.0 kg box along a 4.0 m ramp to reach a height of 0.80 m above its starting position.



Assuming that there is no friction and the box moves with constant velocity, what is the magnitude of force F ?

- A** 12 N
- B** 18 N
- C** 36 N
- D** 48 N

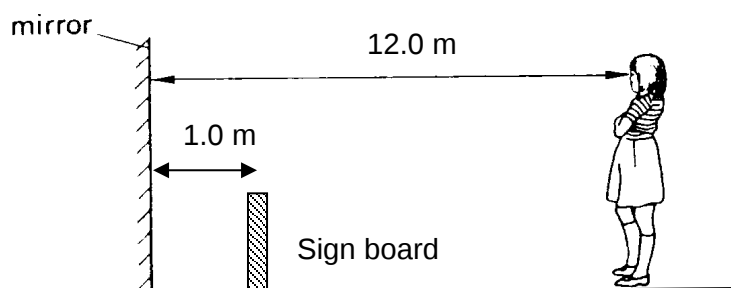
- 27** A person carries a rock from the ground to the top of the hill. He then drops the rock from the top of the hill as shown in the diagram below.



At which point(s) does the rock possess the most amount of energy?

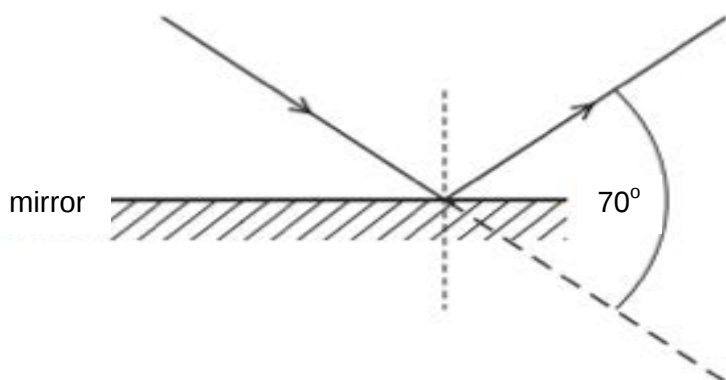
- A** R
 - B** Q
 - C** P and S
 - D** The energy is the same at all points.
- 28** Which of the following correctly describes the image formed by a plane mirror?
- A** An image formed by a plane mirror is real and upright.
 - B** The image will be formed only when the object is placed directly in front of the plane mirror.
 - C** The size of the image formed by the plane mirror is independent of the size of the mirror.
 - D** The image becomes smaller than the object as the object is moved farther away from the mirror.

- 29** A girl and a sign board are both in front of a plane mirror as shown.



How far away will the image of the sign board appear to be from the girl?

- A** 1.0 m
B 2.0 m
C 12.0 m
D 13.0 m
- 30** A light ray is incident on a mirror and is reflected off it as shown. The diagram is not drawn to scale.



What is the angle of incidence and the angle of reflection?

	angle of incidence / °	angle of reflection / °
A	35	35
B	35	55
C	55	35
D	55	55

End of Paper