

Class	Register Number	Name
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南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2020
Secondary Three

PHYSICS

Paper 1

Multiple Choice

Wednesday

14 October 2020

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.

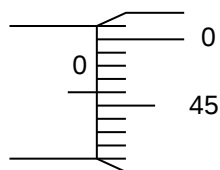
This document consists of **16** printed pages.

Setters: AJL & TPY

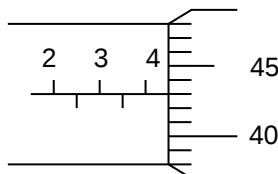
NANYANG GIRLS' HIGH SCHOOL

[Turn over

- 1 The diagrams below show the zero error for a micrometer screw gauge and its scale when a ball bearing is placed between the spindle and anvil.



zero error

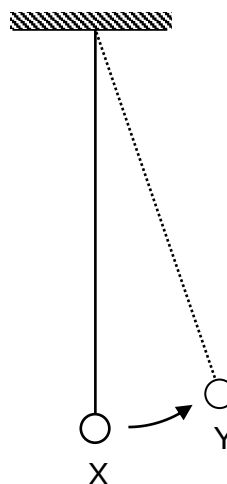


scale with ball bearing

What is the correct diameter of the ball bearing?

- A 4.39 mm B 4.93 mm
C 4.47 mm D 4.97 mm
- 2 The time taken for a pendulum to swing from its rest position X to its maximum displacement position Y is 1.5 s.

What is the frequency of the pendulum?



- 3 The Earth's mass is 5.94×10^{24} kg and its volume is 1.08×10^{12} km³.
What is the Earth's average density?

- A 5.50×10^3 kg m⁻³ B 5.50×10^9 kg m⁻³
C 5.50×10^6 kg m⁻³ D 5.50×10^{12} kg m⁻³

4 Which of the following has the highest average speed?

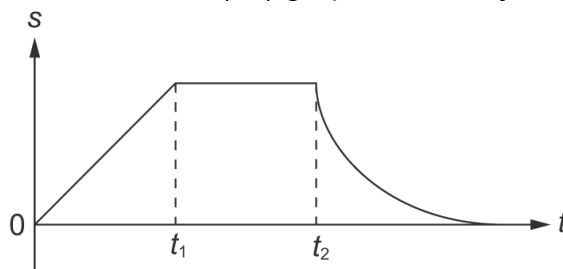
- A A cyclist completes a 15 km race in a time of 2 hours and 15 minutes.
- B A runner completes an 800 m race in 1 minute and 57 seconds.
- C A yacht sails 7.0 km of a race in 1 hour 10 minutes.
- D A windsurfer travels 1.2 km in 6 minutes.

5 Which of the following is/are **NOT** a uniformly accelerated motion?

- (1) A feather falls from a height in a vertical tube from which the air has been removed.
- (2) A ball moves on a frictionless horizontal surface in a straight line at a uniform speed.
- (3) A coin falls from a height in air and air resistance is negligible.

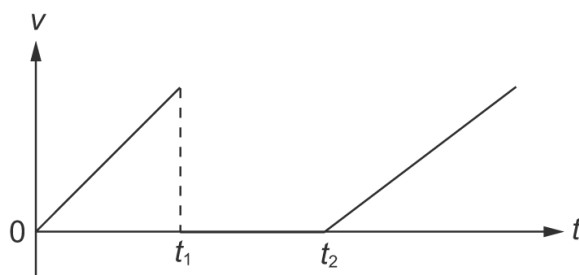
- A (1) only
- B (2) only
- C (1) and (3) only
- D (2) and (3) only

- 6 The following is the displacement-time ($s-t$) graph for an object.

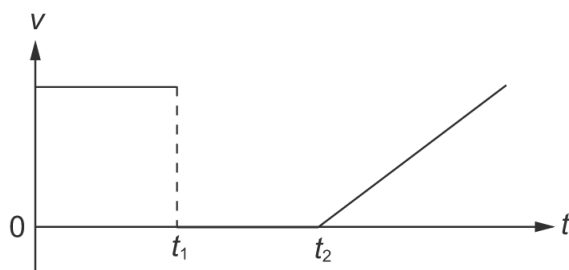


Which graph is its corresponding velocity-time ($v-t$) graph?

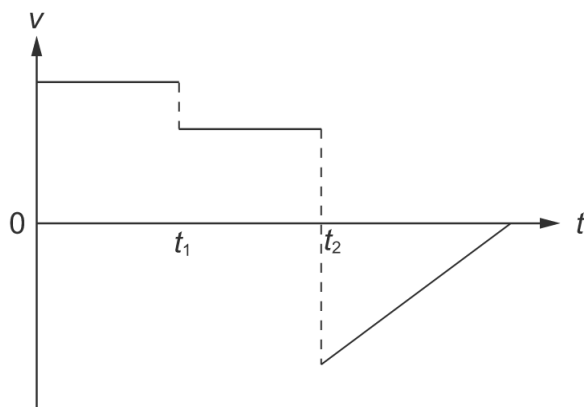
A



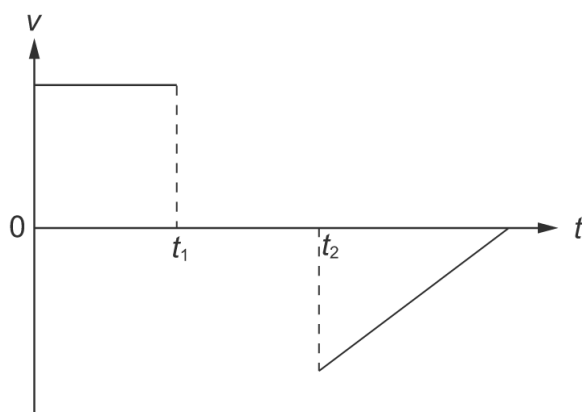
B



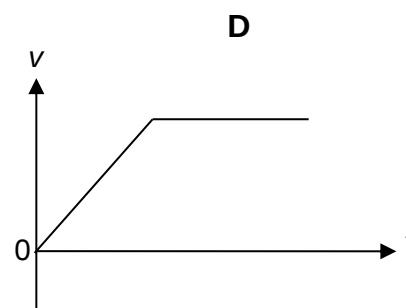
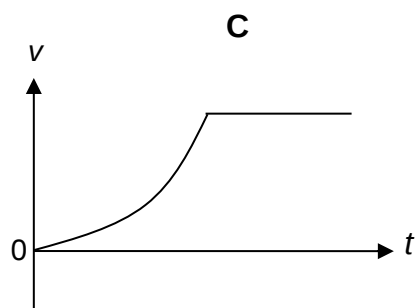
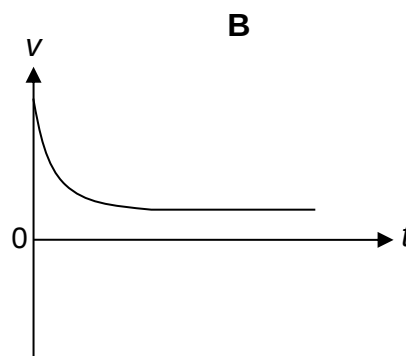
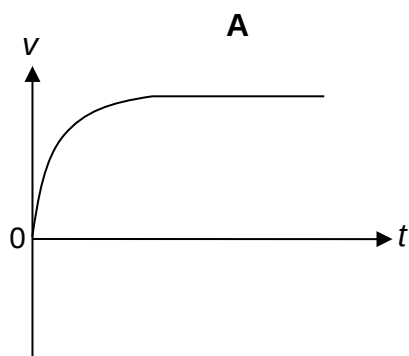
C



D



- 7 A car starts from rest and moves with decreasing acceleration until it reaches a constant speed.
Which graph shows how the velocity of the car varies with time?



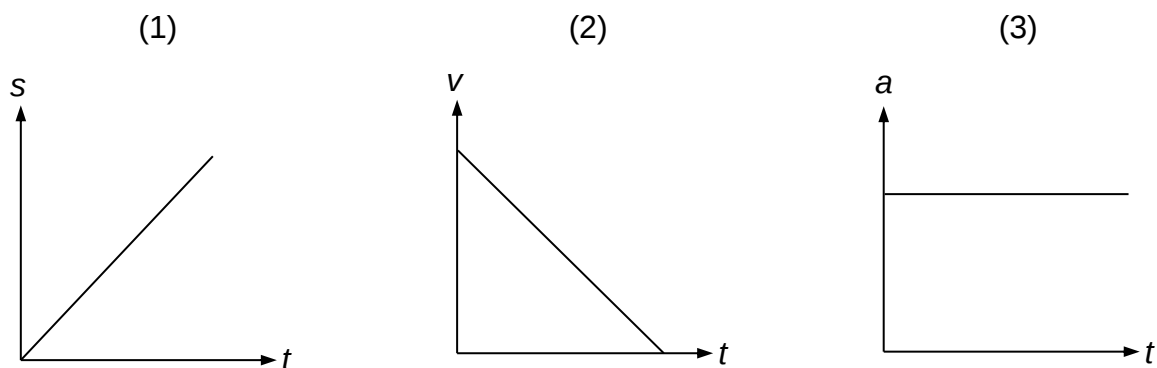
- 8 When an object falls in the Earth's gravitational field, it finally reaches a steady velocity.
Which statement can explain this observation?

- A** The air resistance acting on the object increases as it falls.
- B** The mass of the object is unchanged as it falls.
- C** The Earth's gravitational field decreases as it falls.
- D** The weight of the object increases as it falls.

- 9 A motorist travelling at 2.0 m s^{-1} can bring his car to rest in a distance of 10 m.
If he had been travelling at 6.0 m s^{-1} , in what distance could he bring the car to rest using the same braking force?

- A** 17 m **B** 52 m **C** 30 m **D** 90 m

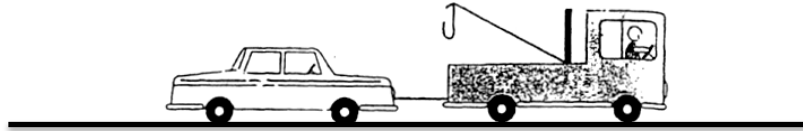
- 10** A driver driving at 100 km h^{-1} on a straight highway sees a road-block 100 m in front of her. There is a reaction time of 0.50 s and then she steps on the brakes.
If she wants to stop in front of the road-block, what is the minimum deceleration of the car?
- A** 3.4 m s^{-2} **B** 3.9 m s^{-2} **C** 4.3 m s^{-2} **D** 4.5 m s^{-2}
- 11** An object released from rest on a planet requires 1.0 s to fall a distance of 6.0 m .
What is the acceleration due to gravity on this planet?
- A** 3.0 m s^{-2} **B** 6.0 m s^{-2} **C** 12 m s^{-2} **D** 15 m s^{-2}
- 12** A 1.0 kg stone is thrown at 10 m s^{-1} vertically upward.
Neglecting air resistance, what is the net force that acts on the stone when it is halfway to the highest point?
- A** 0.50 N **B** 1.0 N **C** 5.0 N **D** 10 N
- 13** The graphs below show how the displacement s , velocity v and acceleration a of three different objects change with time.
Which graphs show a constant resultant force acting on each object?



- A** (1) and (2) only
B (1) and (3) only
C (2) and (3) only
D (1), (2) and (3)

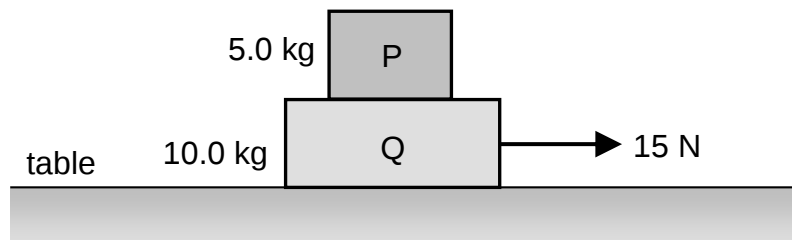
- 14** A tow truck pulls a broken-down car of mass 1000 kg and moves at a constant velocity of 9.0 m s^{-1} along a horizontal road. The resistive force acting on the car is 500 N.

What is the tension in the cable connecting the truck and the car?



- | | | | |
|----------|-------|----------|--------|
| A | 0 N | C | 9000 N |
| B | 500 N | D | 9500 N |

- 15** A 5.0 kg box P is placed on top of a 10.0 kg box Q. There is no friction between P and Q, and the table surface is smooth.

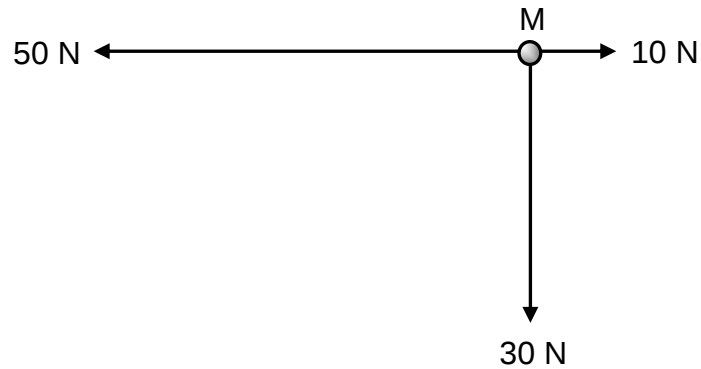


A 15 N horizontal force pulls box Q to the right.

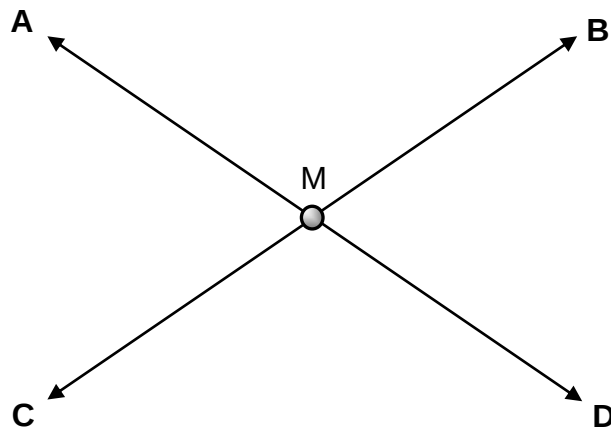
What is the initial acceleration of P and of Q?

	initial acceleration of P / m s^{-2}	initial acceleration of Q / m s^{-2}
A	0	1.5
B	1.0	1.0
C	0	1.0
D	1.5	1.5

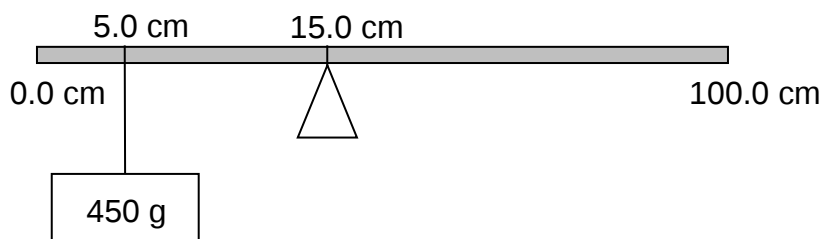
- 16** An object M has three forces acting on it as shown below.



Which arrow shows the direction of the resultant force acting on M?

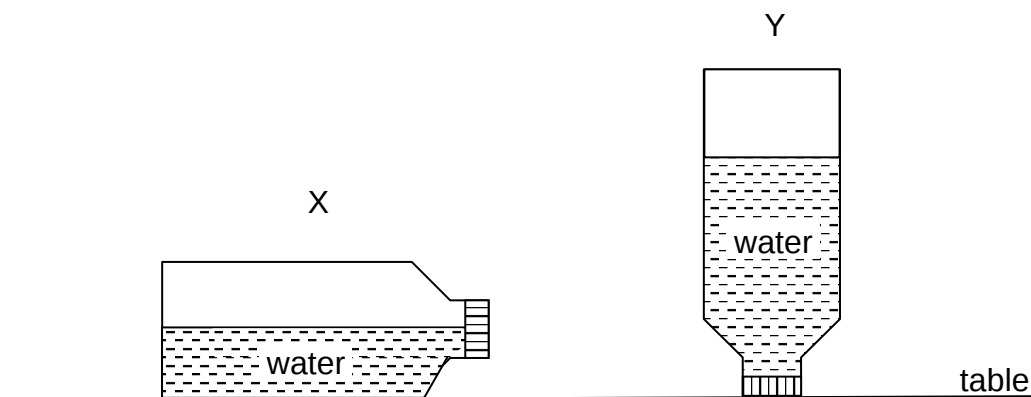


- 17** A 100 g non-uniform metre ruler is pivoted off-centre at the 15.0 cm mark. It is balanced with a 450 g load hanging at the 5.0 cm mark.



Where is the centre of gravity of the ruler?

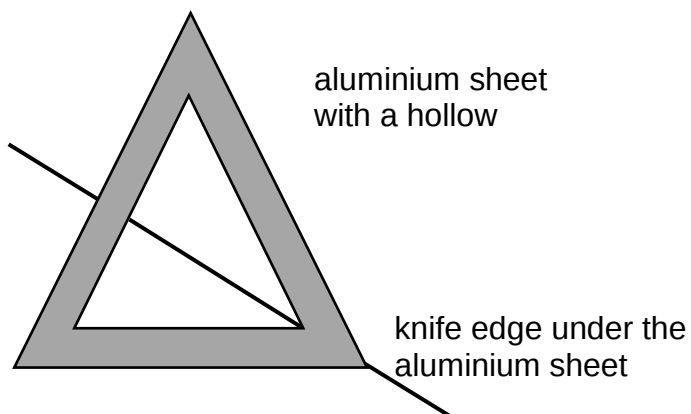
- A** at the 35.0 cm mark
B at the 45.0 cm mark
C at the 50.0 cm mark
D at the 60.0 cm mark
- 18** The diagram below shows the cross-sections of 2 identical light cylindrical bottles X and Y filled with water. Both bottles are at rest on top of a table.



Which of the following correctly describes the type of equilibrium for bottles X and Y?

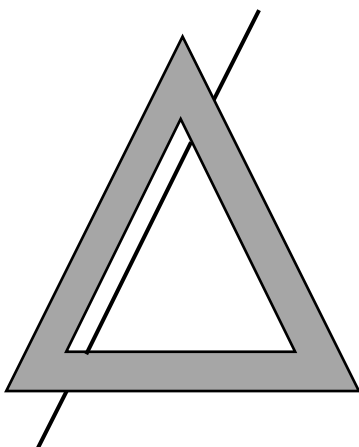
	X	Y
A	stable	unstable
B	unstable	stable
C	neutral	stable
D	neutral	unstable

- 19** A triangular piece of aluminium sheet of uniform thickness has a triangular hollow in the middle. It is balanced on a vertical knife edge as shown in the top view below.

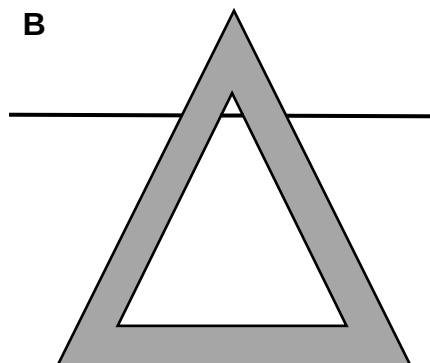


How else can the aluminium sheet be balanced on the knife edge?

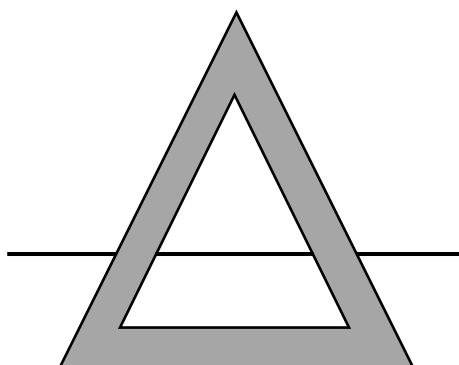
A



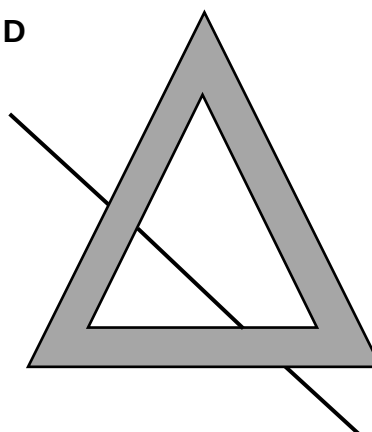
B



C



D

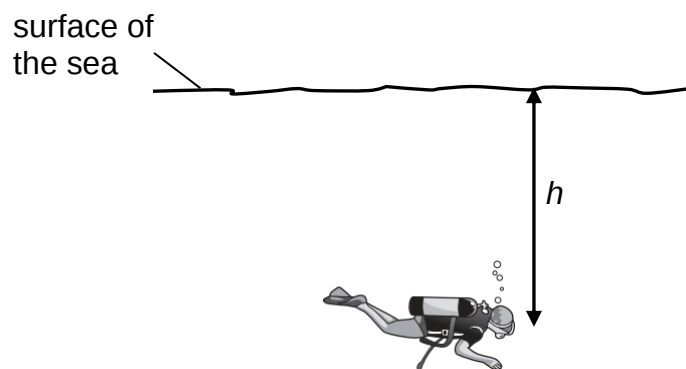


- 20** Two blocks J and K with identical shape and size are resting in the same manner on a horizontal table. Block K has a density that is half of block J.

If block J exerts a pressure P on the table, what is the pressure exerted on the table by block K?

- A** $\frac{1}{4} P$ **B** $\frac{1}{2} P$ **C** P **D** $2P$

- 21** A diver uses a breathing apparatus under the sea as shown in the diagram.



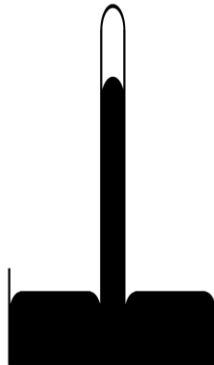
The diver blows out a bubble of gas. The bubble of gas has a volume of 15.0 cm^3 at the depth h and it increases to 22.5 cm^3 when it reaches the surface of the sea.

The atmospheric pressure is $1.0 \times 10^5 \text{ Pa}$ and the density of sea water is $1.03 \times 10^3 \text{ kg m}^{-3}$.

What is the depth h of the diver?

- A** 3.2 m **B** 4.9 m **C** 6.5 m **D** 15 m

22 The diagram below shows a simple barometer.

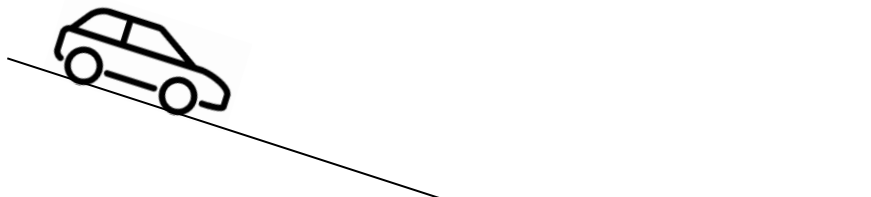


Which statement(s) is/are **incorrect**?

- (1) The vertical height of the mercury column is independent of the cross-sectional area of the tube.
- (2) The vertical height of the mercury column increases with altitude.
- (3) The vertical height of the mercury column is reduced if air is allowed to enter the tube.
- (4) The vertical height of the mercury column is not affected if water is added to the space above the mercury in the tube.

- A** (1), (2) and (3)
- B** (1) and (3)
- C** (2) and (4)
- D** (4) only

- 23** A car's engine is switched off and it rolls down a slope as shown below.

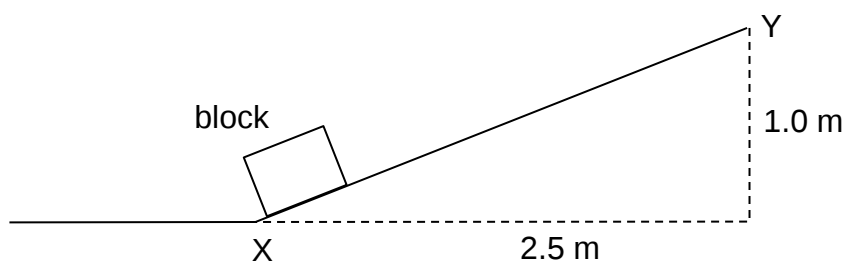


What are the changes in its kinetic energy and gravitational potential energy as it rolls down the slope?

	kinetic energy	gravitational potential energy
A	increases	increases
B	increases	decreases
C	decreases	increases
D	decreases	decreases

- 24** A 5.0 kg block is given an initial push to move up a slope XY as shown below.

If the frictional force along XY remains constant at 25 N, what is the work done against friction when the block travels from X to Y?



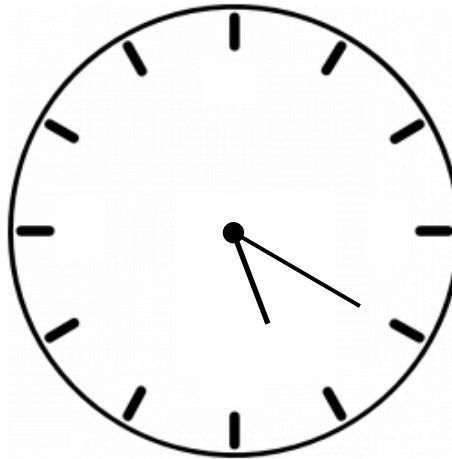
- A** 50 J **B** 63 J **C** 67 J **D** 100 J
- 25** A motor is used to lift a 100 N load through a height of 10 m in 20 s. The total amount of electrical energy used by the motor is 1300 J.
How much power does the motor waste?
- A** 15 W **B** 50 W **C** 65 W **D** 115 W

26 An image formed in a plane mirror is virtual because

- (1) it cannot be captured on a screen.
- (2) it cannot be seen with the naked eye.
- (3) the image formed cannot be photographed.

- A** (1) only
- B** (2) only
- C** (3) only
- D** (1) and (3) only

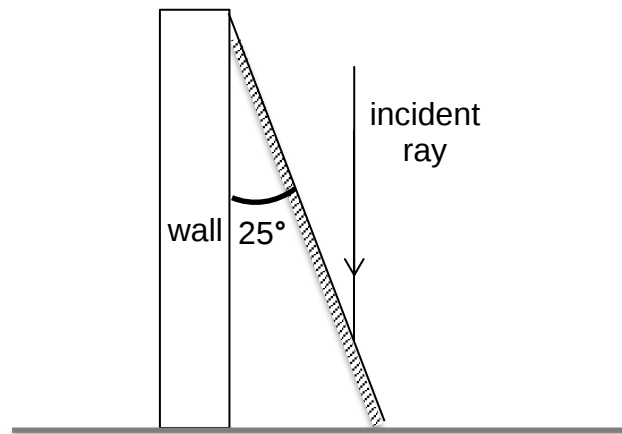
27 The diagram shows an image of a clock on a wall that is seen in a vertical plane mirror.



What is the actual time on the clock?

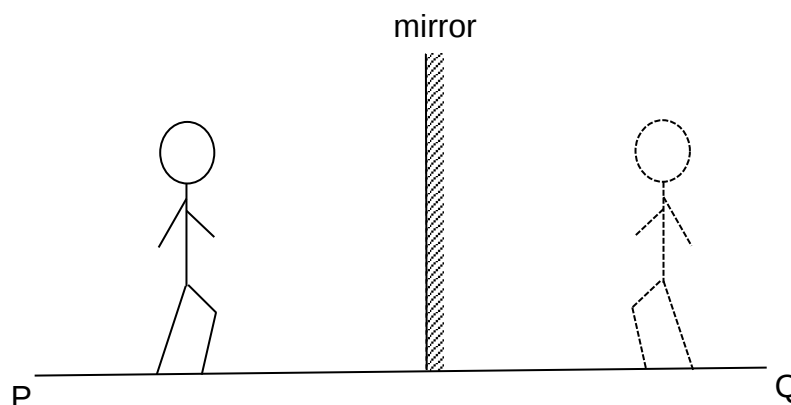
- A** 5:20
- B** 5:40
- C** 6:20
- D** 6:40

- 28** The diagram shows a mirror tilted at an angle of 25° to a wall. An incident ray of light is directed vertically downward at the mirror as shown below.



What is the angle of reflection?

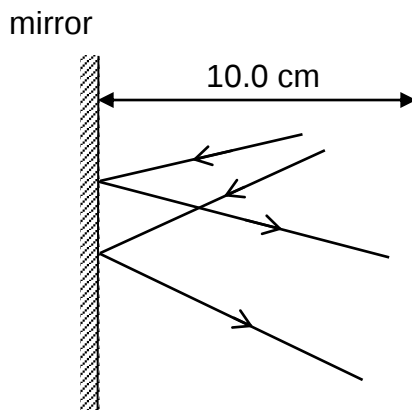
- A** 25° **B** 50° **C** 65° **D** 70°
- 29** A man stands in front of a vertical plane mirror. When the mirror is moved with a constant speed along the surface PQ, his image in the mirror moves away from him with a speed of 3.0 m s^{-1} .



How is the mirror moved from the man?

- A** It is moved towards him at a speed of 1.5 m s^{-1} .
B It is moved away from him with a speed of 1.5 m s^{-1} .
C It is moved towards him at a speed of 3.0 m s^{-1} .
D It is moved away from him with a speed of 3.0 m s^{-1} .

- 30** The scaled diagram shows a plane mirror with incomplete incident rays from a point object and the corresponding reflected rays.



What is the possible distance of the object and of the image from the mirror?

	distance of object from mirror / cm	distance of image from mirror / cm
A	5.0	5.0
B	5.0	10.0
C	10.0	5.0
D	10.0	10.0

End of Paper