Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 2 (Mechanics)

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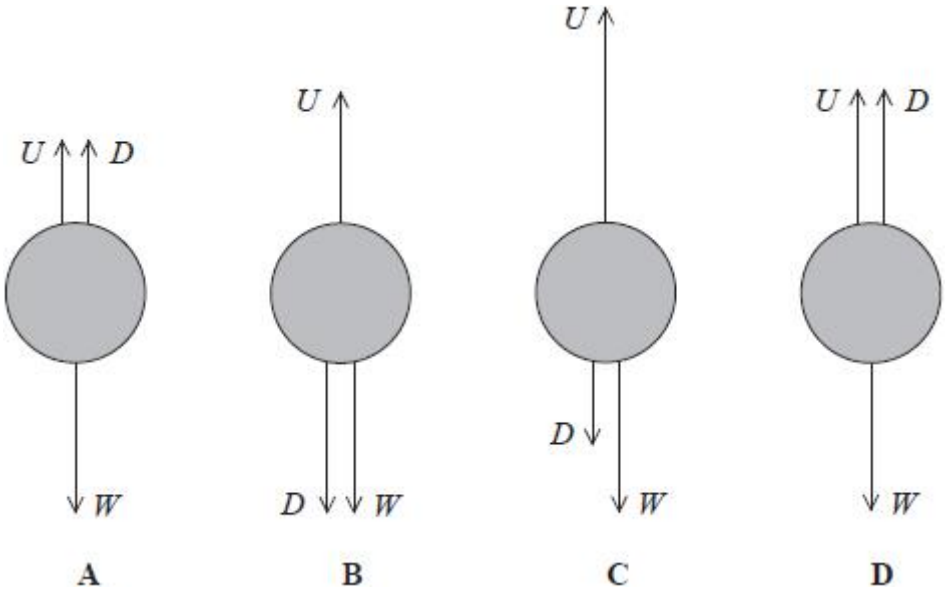
Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

A small plastic bead is released below the surface of water and rises towards the surface.

The diagrams show the forces acting on the bead as it rises with constant velocity.

U = upthrust, *D* = drag, *W* = weight



Which diagram correctly represents the directions and relative magnitudes of the forces?

(1)

☒ **A**
☒ **B**
☒ **C**
☒ **D**

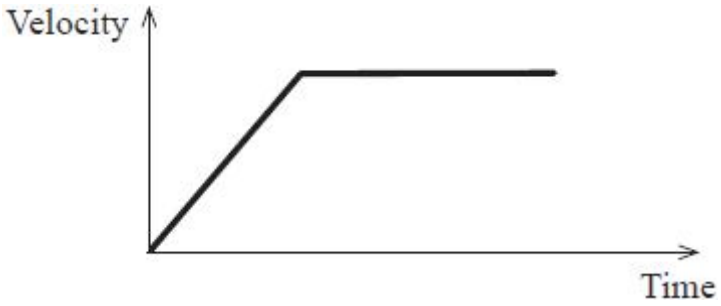
(Total for question = 1 mark)

Q2.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

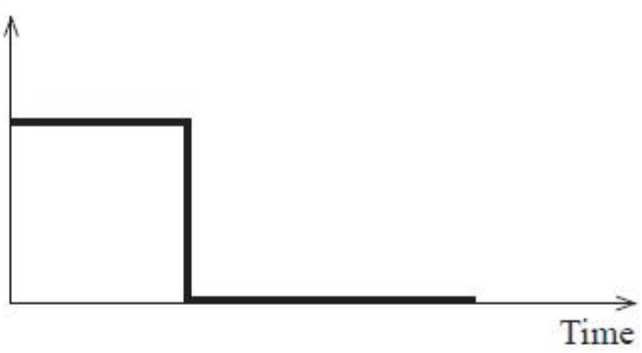
The graph shows how the velocity varies with time for an object.

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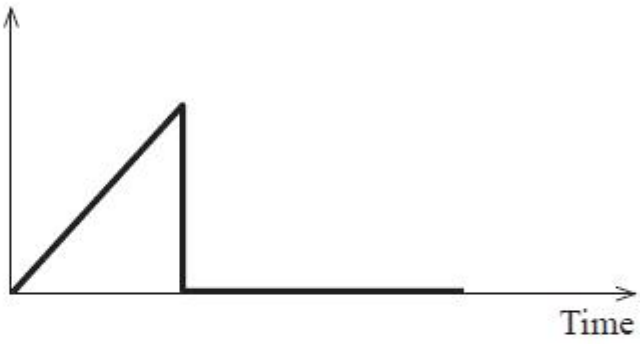


Which of the following graphs shows how the displacement varies with time for this object?

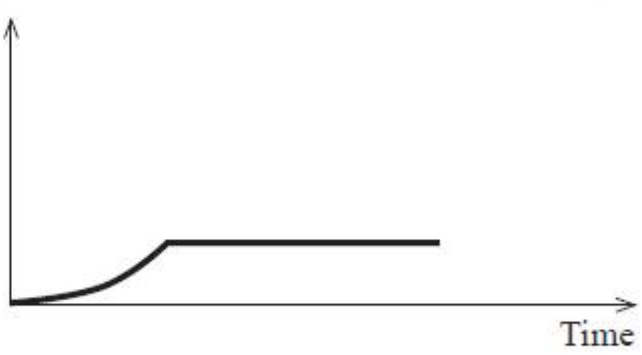
☒ **A**



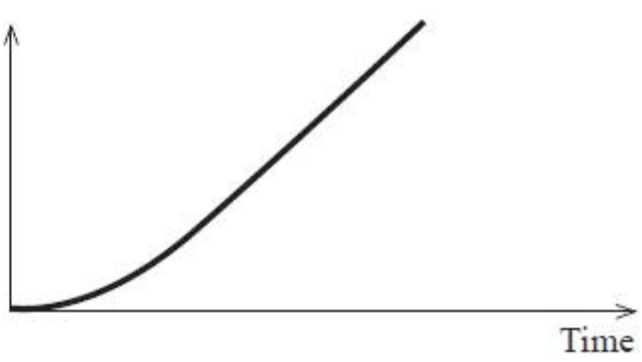
☒ **B**



☒ **C**



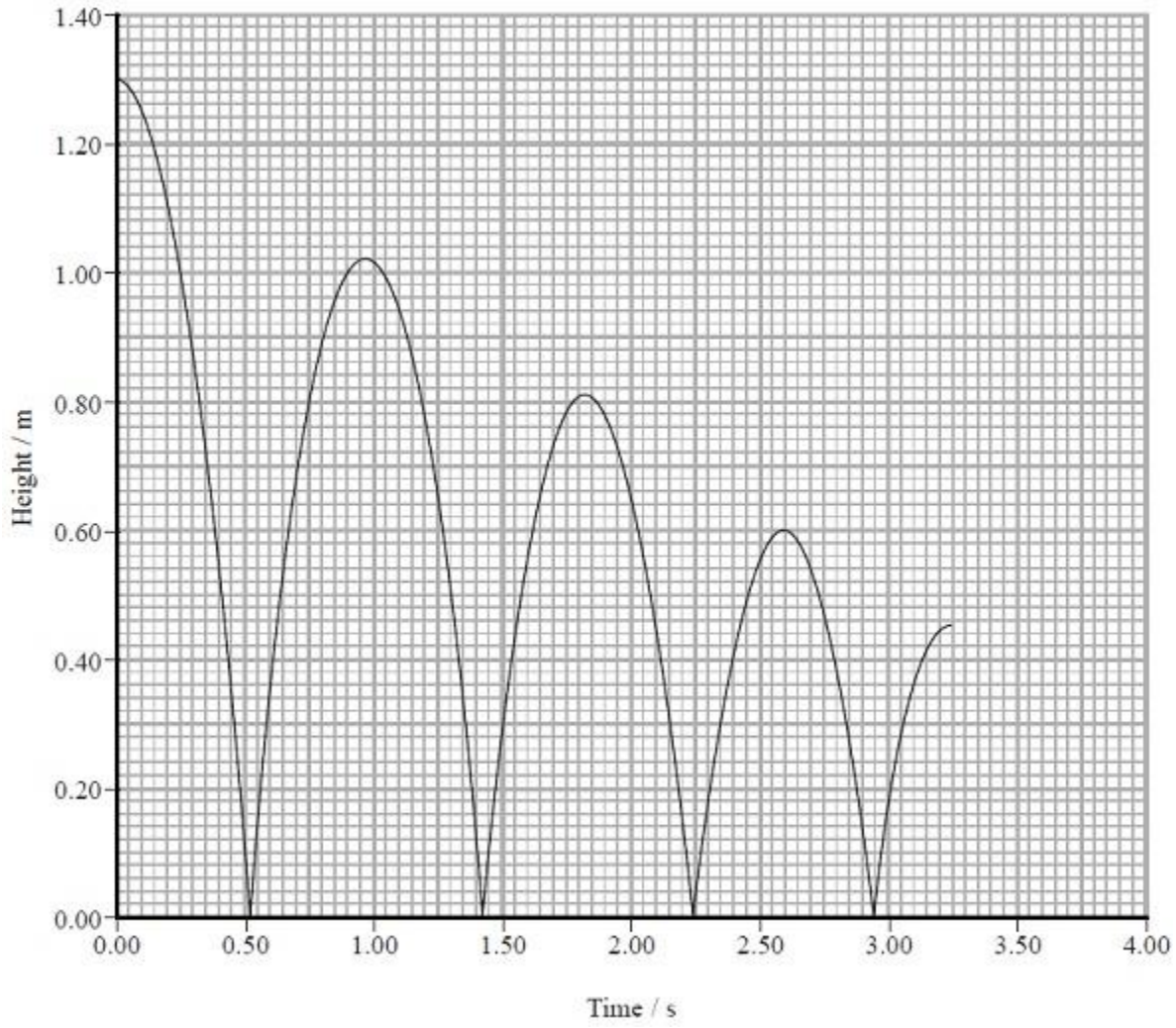
☒ **D**



(Total for question = 1 mark)

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Q3.
A ball is dropped from a height of 1.3 m. The graph shows how the height above the ground varies with time for several bounces.



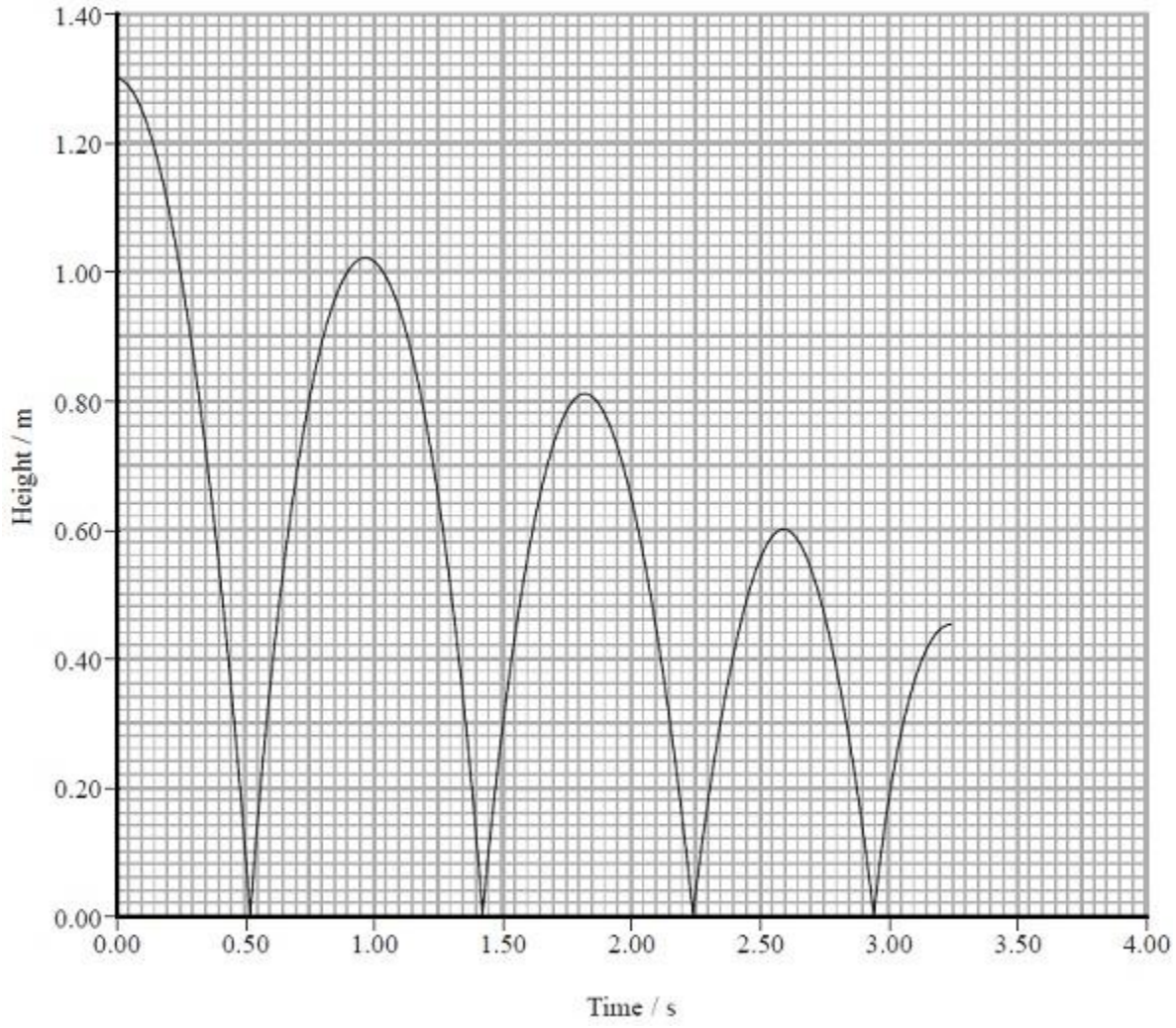
At 2.6 s the magnitude of the displacement from the starting position is

- **A** 0.20 m
- **B** 0.60 m
- **C** 0.70 m
- **D** 1.30 m

(Total for Question = 1 mark)

Q4.
A ball is dropped from a height of 1.3 m. The graph shows how the height above the ground varies with time for several bounces.

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How can the velocity of the ball at time t = 2.5 s be determined from the graph?

- ☒ **A** Calculate the area between the graph and the time axis up to t = 2.5 s.
- ☒ **B** Divide the displacement at t = 2.5 s by 2.5 s.
- ☒ **C** Divide the height at t = 2.5 s by 2.5 s.
- ☒ **D** Draw a tangent to the graph at t = 2.5 s and calculate its gradient.

(Total for Question = 1 mark)

Q5.

A ball is kicked, giving it an initial velocity v at an angle of 35° to the vertical. The ball remains in the air for a time t.

Which of the following gives the distance travelled over the ground?

(1)

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☒ **A** $vt\cos 35°$

☒ **B** $\frac{v\cos 35°}{t}$

☒ **C** $vt\sin 35°$

☒ **D** $\frac{v\sin 35°}{t}$

(Total for question = 1 mark)

Q6.
An electric motor with potential difference *V* and current *I* lifts a mass *m* through a height *h* in time *t* at a steady speed *v*.

The efficiency of the motor is given by

☒ **A** $\frac{½mv^2}{VIt}$

☒ **B** $\frac{VI}{mg}$

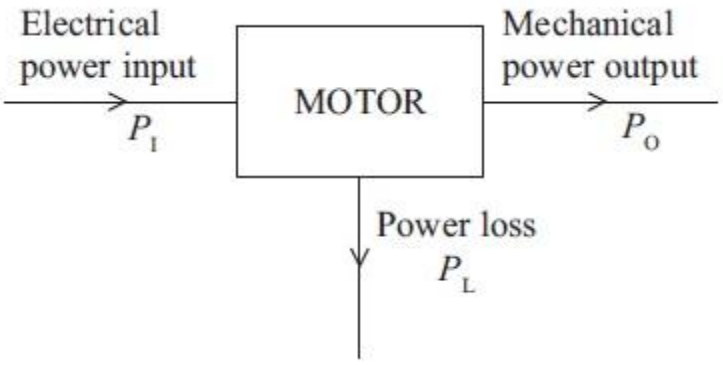
☒ **C** $\frac{VIt}{mv}$

☒ **D** $\frac{mgh}{VIt}$

(Total for Question = 1 mark)

Q7.

Electrical power is transferred in a motor as shown.



What is the efficiency of the motor?

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A $\frac{P_L}{P_I}$ $\frac{P_O + P_L}{P_I}$

B $\frac{P_L}{P_I}$ $\frac{P_I}{P_O}$

C $\frac{P_L}{P_I}$

D $\frac{P_L}{P_I}$ $\frac{P_O}{P_I}$

(Total for question = 1 marks)

Q8.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

A power station provides electrical power at a mean rate of 3500 MW.

Which of the following gives the best estimate of the energy provided to consumers over a period of a year?

1 year = 3.2×10^7s

☐ **A** 1×10^6 J

☐ **B** 1×10^{11} J

☐ **C** 1×10^{13} J

☐ **D** 1×10^{17} J

(Total for question = 1 mark)

Q9.

A student is asked to solve the following problem:
An object is thrown upwards with a speed of 25 m s^{-1}. How high will it be when the speed is 12 m s^{-1}?
Which equation will allow the problem to be solved in a single calculation?

☐ **A** $s = ut + ½ at^2$

☐ **B** $s = (u + v)t/2$

☐ **C** $v = u + at$

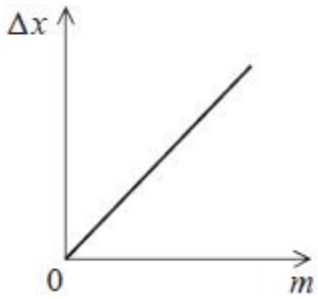
☐ **D** $v^2 = u^2 + 2as$

(Total for question = 1 marks)

Q10.

A spring is hung vertically and masses are added to the lower end.
The graph shows how the extension Δx of the spring varies with the mass m added.

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The work done in extending the spring can be expressed as

(1)

☒ **A** $mg\Delta x$

☒ **B** $\frac{mg}{\Delta x}$

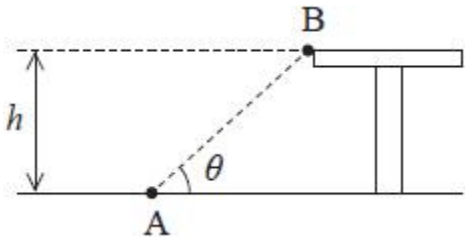
☒ **C** $\frac{1}{2}mg\Delta x$

☒ **D** $\frac{mg}{2\Delta x}$

(Total for question = 1 mark)

Q11.

An object of mass *m* is moved from point A on the ground, to point B on a bench of height *h* as shown in the diagram.



Which of the following is a correct expression for the work done on the object?

(1)

☒ **A** $\frac{mgh}{\sin\theta}$

☒ **B** $\frac{mgh}{\cos\theta}$

☒ **C** mgh

☒ **D** $mgh\sin\theta$

(Total for question = 1 mark)

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Q12.

The force between two identical point charges, X and Y, is *F*.

Charge X is doubled; charge Y remains the same.

Which row of the table gives the force on each charge?

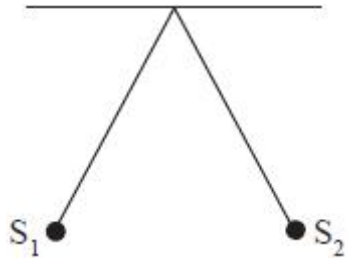
	X	Y
☐ A	*F*	*F*
☐ B	*F*	*2F*
☐ C	*2F*	*F*
☐ D	*2F*	*2F*

(Total for question = 1 mark)

Q13.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

This question refers to two small positively charged spheres S_1 and S_2 suspended by threads, as shown.



The electrostatic force between the two charges is initially *F*.

The charge on S_1 is doubled whilst the charge on S_2 is unchanged. The distance between S_1 and S_2 doubles.

Which of the following is the new force on S_2?

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☒ **A** $\frac{F}{4}$

☒ **B** $\frac{F}{2}$

☒ **C** F

☒ **D** $2F$

(Total for question = 1 mark)

Q14.

A space rocket lifts off vertically.



The rocket lifts off because

☒ **A** the exhaust gases exert a force on the ground.

☒ **B** the exhaust gases exert a force on the rocket.

☒ **C** the ground exerts a force on the rocket.

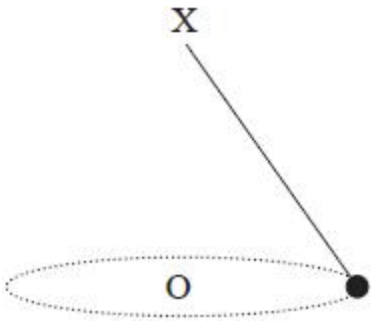
☒ **D** the rocket exerts a force on the ground.

(Total for question = 1 mark)

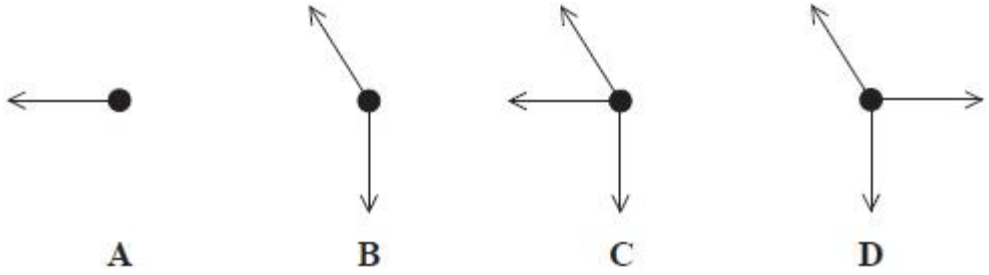
Q15.

A mass is attached to a light thread which is fixed at X.
The mass is moving at constant speed in a horizontal circle, centre O.

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Which of the following is a correct free-body force diagram for this mass?



(1)

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

(Total for question = 1 mark)

Q16.
The diagram shows the forces acting on a hot air balloon when at a constant height.



Select the row in the table that correctly describes the situation when the air in the balloon is heated.

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	Observation	Reason
☒ A	Balloon rises	Weight > Upthrust
☒ B	Balloon falls	Weight > Upthrust
☒ C	Balloon rises	Weight < Upthrust
☒ D	Balloon falls	Weight < Upthrust

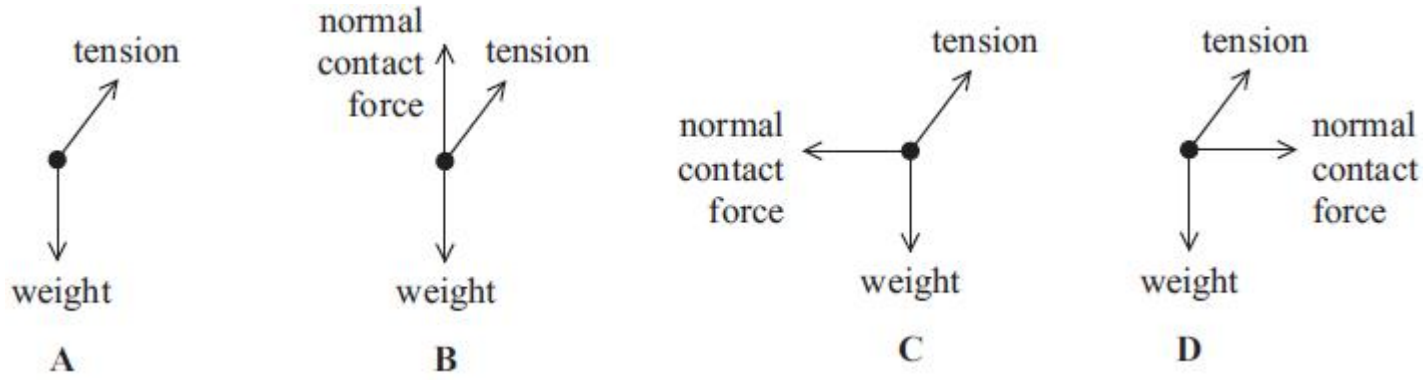
(Total for Question = 1 mark)

Q17.

A climber slides down a rope attached to a rock face, as shown in the photograph.



Select a possible free-body force diagram for the climber.



☒ **A**

☒ **B**

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☒ **C**

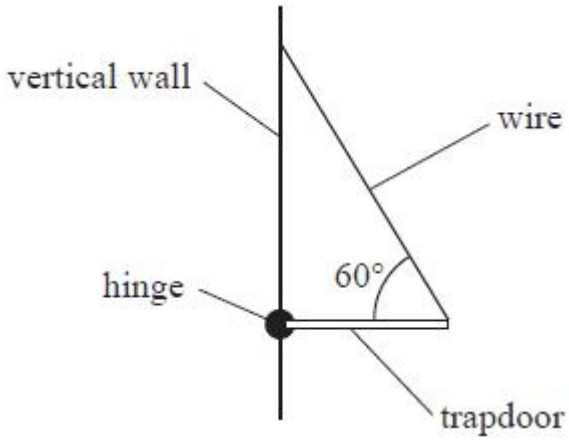
☒ **D**

(Total for question = 1 mark)

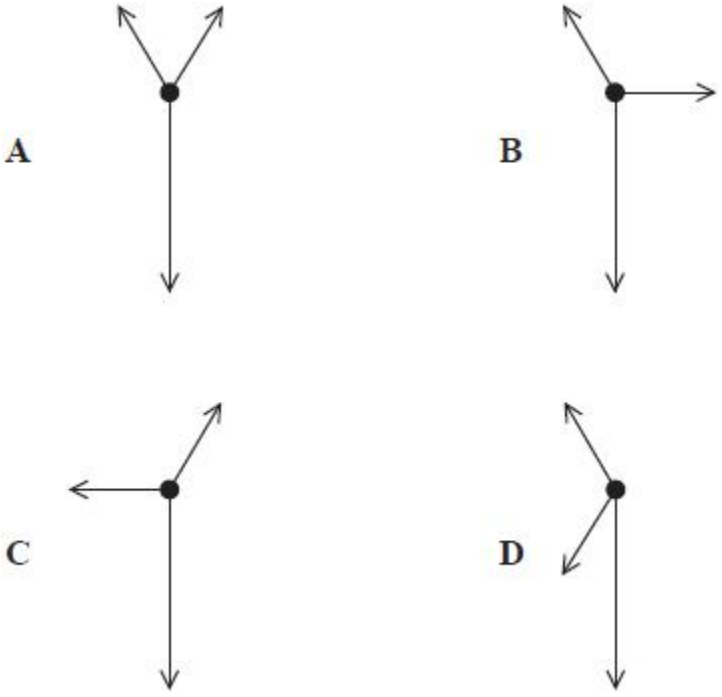
Q18.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

A trapdoor is fixed to a vertical wall with a hinge. A wire is attached to the other end of the trapdoor and inclined at an angle of 60°, as shown. The wire holds the trapdoor horizontal.



Which of the following shows the free-body force diagram for the trapdoor?



☒ **A**

☒ **B**

☒ **C**

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☒ **D**

(Total for question = 1 mark)

Q19.

An object of weight 7 N is raised from a height of 2 m to a height of 8 m.
The change in gravitational potential energy is

☒ **A** 42 J
☒ **B** 56 J
☒ **C** 412 J
☒ **D** 549 J

(Total for question = 1 marks)

Q20.

Which of the following is a possible unit for rate of change of momentum?

☒ **A** kg m s^{-2}
☒ **B** kg m s^{-1}
☒ **C** N s^{-1}
☒ **D** N s

(Total for question = 1 mark)

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