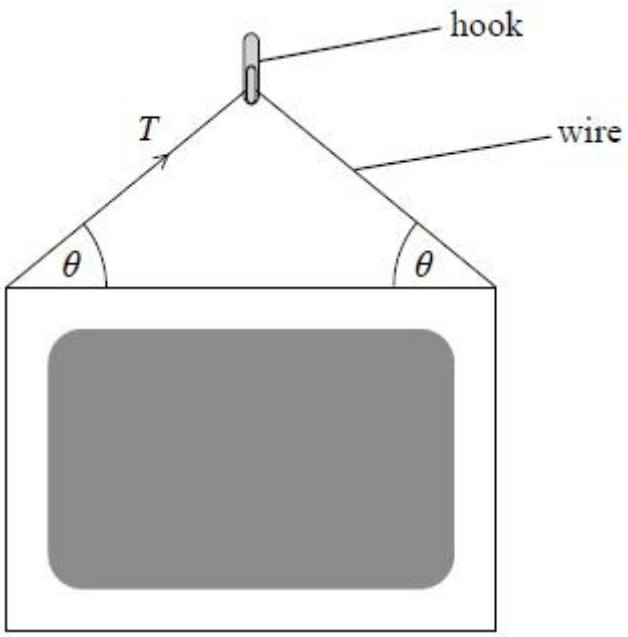
Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 2 (Mechanics)

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

Q1.

A picture with mass *m* hangs from a hook by a single length of wire. The hook is at the midpoint of the wire.



The tension *T* in the wire is given by

☐ **A** $\frac{mg}{2\sin\theta}$

☐ **B** $\frac{mg}{2\cos\theta}$

☐ **C** $\frac{mg}{\sin\theta}$

☐ **D** $\frac{mg}{\cos\theta}$

(Total for question = 1 mark)

Q2.

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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 (☒).

An object is falling at terminal velocity.

Which of the following is **not** a valid conclusion from this statement?

☐ **A** The acceleration of the object is zero.

☐ **B** There is a resistive force acting on the object.

☐ **C** There is a resultant force acting on the object.

☐ **D** The object has weight.

(Total for question = 1 mark)

Q3.

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 ball is thrown vertically upwards at a velocity of 6.0 m s^{-1}.

Which of the following gives the maximum height, in m, reached by the ball?

☐ **A** $\frac{6.0^2}{2 \times 9.81}$

☐ **B** $\frac{6.0^2}{2 \times (-9.81)}$

☐ **C** $\frac{6.0}{2 \times 9.81}$

☐ **D** $\frac{6.0}{2 \times (-9.81)}$

(Total for question = 1 mark)

Q4.

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 ☒.

In a boiler, energy is transferred to water at a rate of 40 kW. The corresponding power loss from the boiler to the surroundings is 4.0 kW.

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Which of the following is the efficiency of this boiler?

☒ **A** 0.10

☒ **B** 0.11

☒ **C** 0.90

☒ **D** 0.91

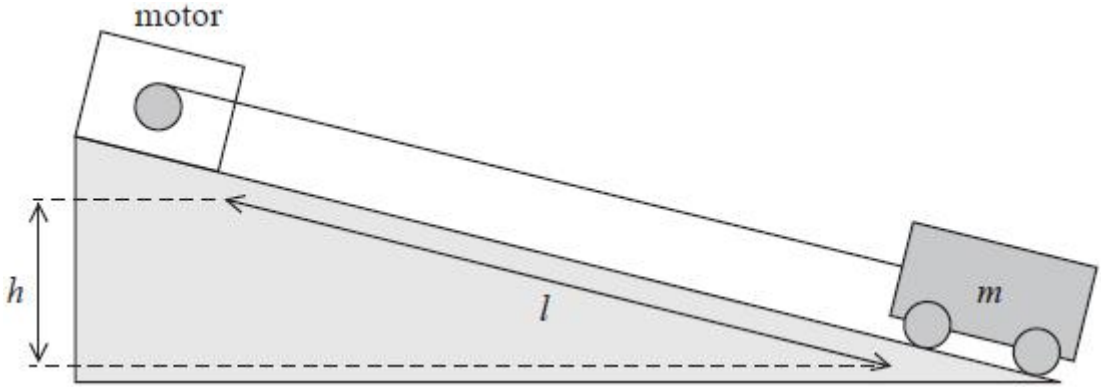
(Total for question = 1 mark)

Q5.

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 diagram shows an electric motor pulling a truck of mass *m* along a slope. The truck moves through a vertical height *h* and a distance *l* along the slope, during a time *t*.

There is a potential difference *V* across the motor and a current *I* in the motor.



Which of the following expressions gives the efficiency of the motor?

☒ **A** $\frac{VIt}{mgl}$

☒ **B** $\frac{VIt}{mgh}$

☒ **C** $\frac{mgl}{VIt}$

☒ **D** $\frac{mgh}{VIt}$

(Total for question = 1 mark)

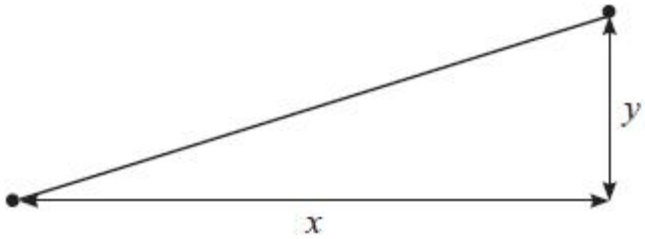
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Q6.

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 ☒.

An object of mass *m* is moved from the bottom to the top of a slope. The vertical height of the slope is *y*.

The horizontal distance between the bottom and top of the slope is *x*.



Which of the following gives the gain of gravitational potential energy of the object as it moves from the bottom to the top of the slope?

☐ **A** mgx

☐ **B** mgy

☐ **C** $mg(x + y)$

☐ **D** $mg\sqrt{(x^2 + y^2)}$

(Total for question = 1 mark)

Q7.

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 ☒ .

An object was thrown so that it followed the path shown. Assume drag forces were negligible.



The object was thrown with an initial vertical component of velocity *u*. The time taken to reach maximum height is *t*.

Which of the following could **not** be used to determine the maximum vertical height *s* reached by the object?

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☒ **A** $s = ut - \frac{1}{2}gt^2$

☒ **B** $s = ut$

☒ **C** $s = \frac{1}{2}ut$

☒ **D** $s = \frac{u^2}{2g}$

(Total for question = 1 mark)

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 person of mass 70 kg is standing on the floor of a lift, as shown. The lift is accelerating downwards at 1.5 m s^{-2}.



Which of the following gives the normal reaction *R*, in N, acting on the person?

☒ **A** $R = 70 \times 9.81$

☒ **B** $R = 70 \times 1.5$

☒ **C** $R = (70 \times 9.81) + (70 \times 1.5)$

☒ **D** $R = (70 \times 9.81) – (70 \times 1.5)$

(Total for question = 1 mark)

Q9.

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 ☒ .

Two ice skaters, P and Q, are close together and stationary on an ice rink. P pushes Q and they move away from each other.

The mass of P is greater than the mass of Q.

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Assume the frictional force between the ice and the skates is negligible.

Which of the following statements is correct?

☒ **A** P and Q both move at the same speed.

☒ **B** P and Q have the same magnitude of momentum.

☒ **C** P has a greater magnitude of momentum than Q.

☒ **D** P moves faster than Q.

(Total for question = 1 mark)

Q10.

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 raindrop is falling through the air with an increasing velocity. The forces on the raindrop are weight *W*, upthrust *U* and viscous drag *F*.

Which of the following shows the relationship between these forces?

☒ **A** $F + U = W$

☒ **B** $F = W + U$

☒ **C** $F + W < U$

☒ **D** $F + U < W$

(Total for question = 1 mark)

Q11.

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 velocity *v* of a non-relativistic particle can be expressed in terms of combinations of the following quantities: kinetic energy E_k, momentum *p* and mass *m.*

Which of the following expressions is correct?

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☒ **A** $v = \frac{p^2}{m}$

☒ **B** $v = \sqrt{\frac{2E_k}{m}}$

☒ **C** $v = \frac{E_k}{2p}$

☒ **D** $v = \frac{2E_k}{pm}$

(Total for question = 1 mark)

Q12.

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 toy car moves up a slope at a constant speed, as shown. The car is moved by a motor with a power output of 5.2 W. The car gains a gravitational potential energy of 0.40 J in a time of 1.1 s.



Which of the following expressions gives the work done, in J, against resistive forces?

☒ **A** 5.2 − (0.40 × 1.1)

☒ **B** (5.2 × 1.1) − 0.40

☒ **C** (5.2 ÷ 1.1) + 0.40

☒ **D** (5.2 × 1.1) + 0.40

(Total for question = 1 mark)

Q13.

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A trolley, mass 0.50 kg, has a speed of 2.0 m s^{-1}. A second trolley, mass 1.0 kg, has a speed of 2.0 m s^{-1}. The two trolleys are travelling in opposite directions and collide.

Which of the following could be a correct value of total momentum, in kg m s^{-1}, after the collision?

(1)

☒ **A** 0

☒ **B** 1.0

☒ **C** 2.0

☒ **D** 3.0

(Total for question = 1 mark)

Q14.

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 (☒).

Two balls, X and Y, are kicked across a football pitch.

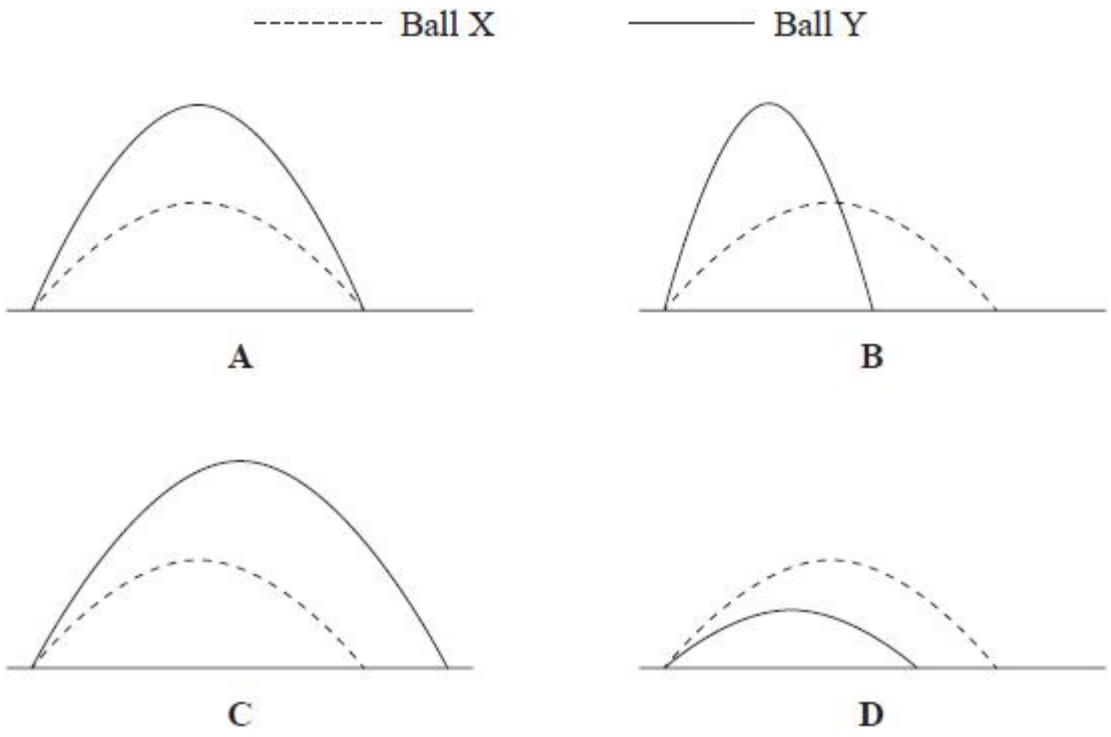
Ball X is kicked at an angle of θ to the horizontal, where θ is greater than 45°.

The trajectory for the motion of ball X is shown.



Ball Y is kicked with the same speed at an angle greater than θ to the horizontal.

Which diagram correctly shows the trajectory of ball Y?



☒ **A**

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☒ **B**
☒ **C**
☒ **D**

(Total for question = 1 mark)

Q15.

A particle of mass m, has a velocity v and momentum p.

Which of the following is correct for this particle?

☒ **A** $mv^2/2 = p^2$

☒ **B** $m^2v^2/2 = p^2$

☒ **C** $m^2v^2 = p^2/m$

☒ **D** $mv^2 = p^2/m$

(Total for question = 1 mark)

Q16.

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 ball rolls along a table of height 0.83 m. The ball has a horizontal velocity of 1.72 m s^{-1} as it falls off the edge of the table.

Which of the following is an expression for the speed of the ball, in m s^{-1}, as it hits the floor?

☒ **A** $\sqrt{(2 \times 9.81 \times 0.83)^2 + 1.72^2}$

☒ **B** $(2 \times 9.81 \times 0.83)^2 + 1.72^2$

☒ **C** $\sqrt{(2 \times 9.81 \times 0.83) + 1.72^2}$

☒ **D** $(2 \times 9.81 \times 0.83) + 1.72^2$

(Total for question = 1 mark)

Q17.

An electron gun uses a potential difference V to accelerate electrons of mass m and charge e from rest to a

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speed *v*.
The potential difference *V* can be expressed as

☒ **A** $\frac{mv^2}{2e}$

☒ **B** $\frac{2ev^2}{m}$

☒ **C** $\sqrt{\frac{2ev}{m}}$

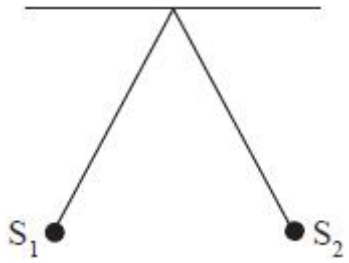
☒ **D** $\sqrt{\frac{mv}{2e}}$

(Total for question = 1 mark)

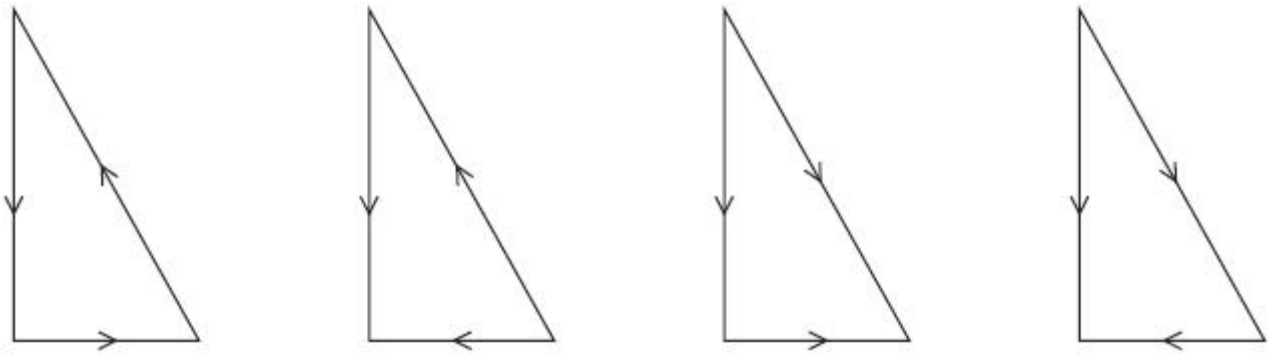
Q18.

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 ☒ .

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



Which of the following vector diagrams shows the forces acting on S_2?



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

☒ **A**

☒ **B**

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☒ **C**

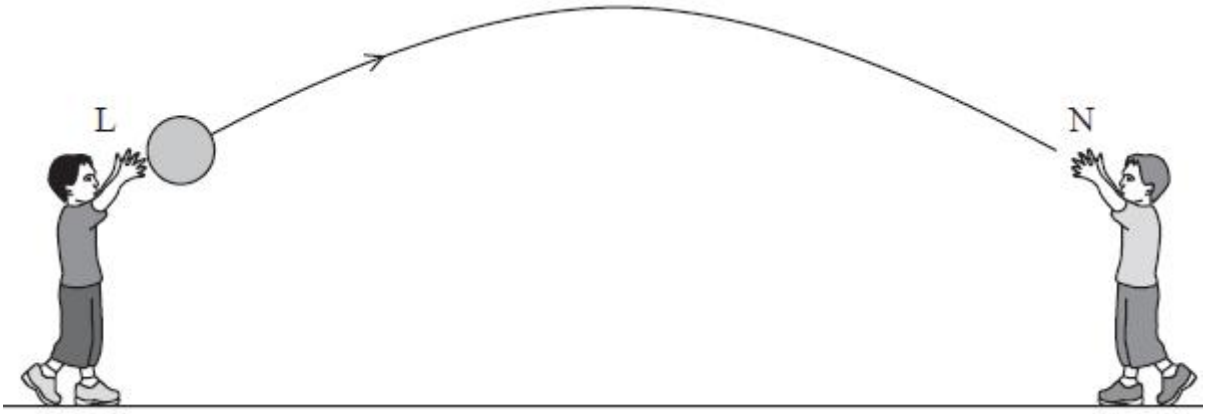
☒ **D**

(Total for question = 1 mark)

Q19.

A ball is thrown from position L and caught at position N.

L and N are the same height above the ground. The trajectory of the ball is shown.



If vectors directed upwards are taken as positive, and air resistance is neglected then the acceleration of the ball at L is $-g$ and its speed is v.

Select the row of the table that correctly gives the acceleration and speed of the ball as it reaches N.

	Acceleration	Speed
☒ **A**	$-g$	v
☒ **B**	$-g$	$-v$
☒ **C**	g	v
☒ **D**	g	$-v$

(Total for question = 1 mark)

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Q20.

Select the answer in which both quantities are vectors.

- ☒ **A** acceleration, speed
- ☒ **B** displacement, velocity
- ☒ **C** mass, time
- ☒ **D** power, weight

(Total for question = 1 mark)

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