Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 6_ Further Mechanics

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Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

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 car is fitted with an airbag which will inflate if the car stops very suddenly.



(Source: © KAIROS, LATIN STOCK/SCIENCE PHOTO LIBRARY)

Which of the following is increased if the airbag inflates because the car suddenly stops?

☒ **A** change in momentum of the driver
☒ **B** change in velocity of the driver
☒ **C** force on the driver
☒ **D** time that the driver takes to stop

(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 blade of a lawnmower rotates at a speed of 50 revolutions per second.

Which of the following is the angular speed of the blade in rads s^{-1}?

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- ☒ **A** 7.96
- ☒ **B** 15.9
- ☒ **C** 157
- ☒ **D** 314

(Total for question = 1 mark)

Q3.

A particle moving in a circular path completes 8.0 revolutions in 5.0 s.
Its angular velocity in rad s^{-1} is

- ☒ **A** 1.6
- ☒ **B** 10
- ☒ **C** 40
- ☒ **D** 250

(Total for question = 1 mark)

Q4.
A fairground roundabout makes 8 revolutions in 1 minute. The angular velocity of the roundabout is

- ☒ **A** 0.10 rad s^{-1}
- ☒ **B** 0.42 rad s^{-1}
- ☒ **C** 0.84 rad s^{-1}
- ☒ **D** 0.94 rad s^{-1}

(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 (☒).

Which of the following are the base units for impulse?

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

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(Total for question = 1 mark)

Q6.
The drum of a washing machine rotates with an angular velocity of 8.5 rad s^{-1}.

The time to complete 10 revolutions is

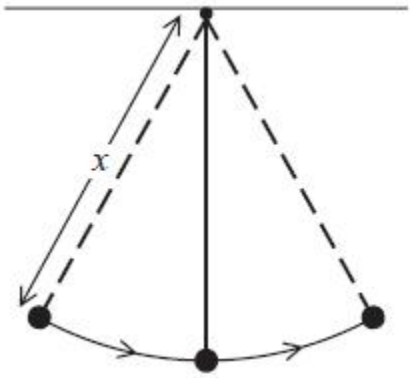
- ☒ **A** 0.85 s
- ☒ **B** 1.3 s
- ☒ **C** 3.7 s
- ☒ **D** 7.4 s

(Total for Question = 1 mark)

Q7.

A pendulum consists of a bob of mass *m* and a string of length *x*.

The diagram shows the pendulum swinging through the arc of a circle. At the bottom of its swing the tension in the string is *T* and the velocity of the bob is *v*.



Which of the following is correct for the bob at the bottom of the swing?

- ☒ **A** $T = \frac{mv^2}{x} - mg$
- ☒ **B** $T = \frac{mv^2}{x} + mg$
- ☒ **C** $T = mg - \frac{mv^2}{x}$
- ☒ **D** $T = \frac{mv^2}{x}$

(Total for question = 1 mark)

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Q8.
A racing car of mass 1200 kg travels at 0.63 rad s^{-1} around a bend of radius 50 m. The force on the car necessary for this motion is

- ☒ **A** 2.4×10^4 N away from the centre of the circle.
- ☒ **B** 2.4×10^4 N towards the centre of the circle.
- ☒ **C** 3.8×10^4 N away from the centre of the circle.
- ☒ **D** 3.8×10^4 N towards the centre of the circle.

(Total for Question = 1 mark)

Q9.

Which of the following statements is always true for an inelastic collision?

- ☒ **A** Both momentum and kinetic energy are conserved.
- ☒ **B** Neither momentum nor kinetic energy is conserved.
- ☒ **C** Kinetic energy is not conserved.
- ☒ **D** Momentum is not conserved.

(Total for question = 1 mark)

Q10.

A bullet is fired into a block of wood. Select the line of the table that applies to this situation.

	Collision	Kinetic energy	Momentum
☒ **A**	elastic	conserved	conserved
☒ **B**	inelastic	not conserved	conserved
☒ **C**	elastic	conserved	not conserved
☒ **D**	inelastic	not conserved	not conserved

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(Total for question = 1 mark)

Q11.

Select the row of the table which correctly identifies the quantities conserved in an inelastic collision.

	Momentum	Kinetic energy	Total energy
☒ **A**	conserved	conserved	conserved
☒ **B**	conserved	not conserved	conserved
☒ **C**	conserved	not conserved	not conserved
☒ **D**	not conserved	not conserved	not conserved

(Total for question = 1 mark)

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Q12.

A footballer kicks a football from the penalty spot. A graph of force on the ball against time is drawn.

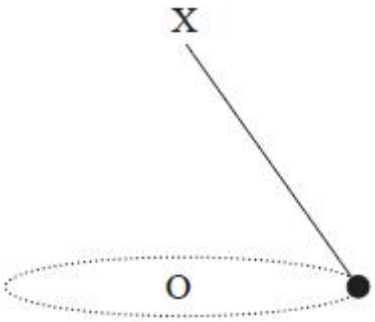
The area under the force-time graph represents

- ☒ **A** acceleration
- ☒ **B** change in kinetic energy
- ☒ **C** change in momentum
- ☒ **D** displacement

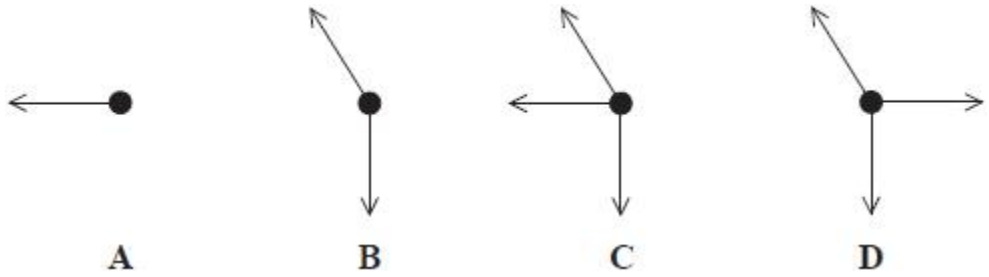
(Total for question = 1 mark)

Q13.

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.



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



(1)

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

(Total for question = 1 mark)

Q14.
Select the row in the table that correctly identifies what happens in an inelastic collision.

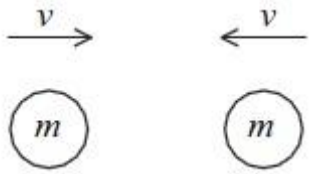
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		Momentum	Kinetic energy	Total energy
☒	**A**	conserved	conserved	conserved
☒	**B**	not conserved	conserved	conserved
☒	**C**	conserved	not conserved	conserved
☒	**D**	conserved	not conserved	not conserved

(Total for Question = 1 mark)

Q15.

Two identical spheres of mass *m* are both travelling with a speed *v* towards each other.



The spheres collide head-on.
Which of the following statements **must** be true after the collision?

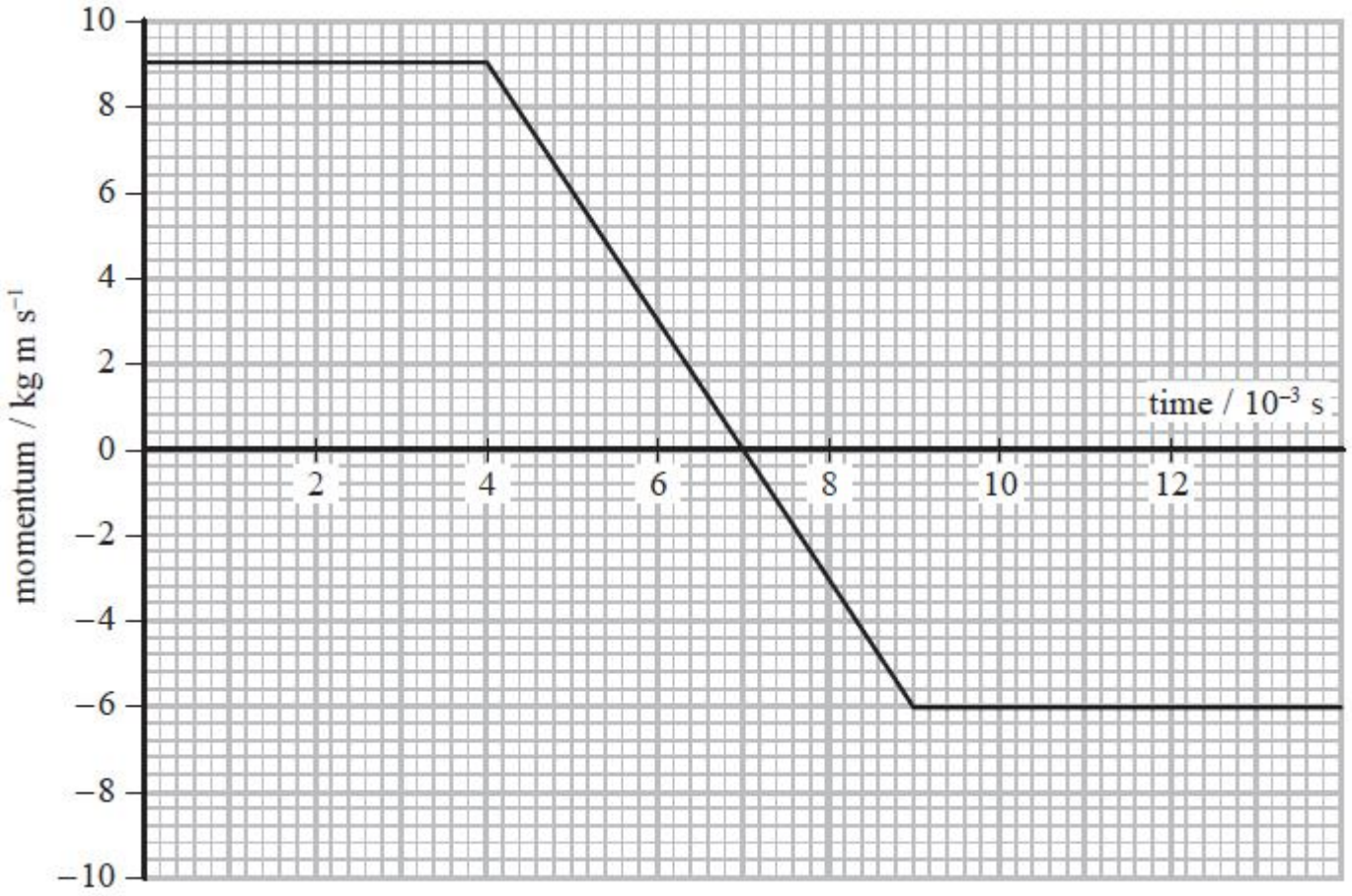
☒ **A** total momentum = $2mv$
☒ **B** total momentum = 0
☒ **C** total kinetic energy = mv^2
☒ **D** total kinetic energy = 0

(Total for question = 1 mark)

Q16.

A football is kicked horizontally to hit a wall. Its momentum just before it hits the wall is 9.0 kg m s^{-1}.
It rebounds horizontally from the wall with a momentum of −6.0 kg m s^{-1}. The graph shows how the momentum of the football varies during the impact with the wall.

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The force exerted by the wall on the football is

- **A** 3.0 N
- **B** 15 N
- **C** 600 N
- **D** 3000 N

(Total for question = 1 mark)

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Q17.

The photograph shows cars driving around a roundabout at a constant speed.



The resultant force *F* on a car causes it to follow a circular path.

Which of the following statements about *F* is **incorrect**?

- ☒ **A** *F* is equal to the product of the mass and angular velocity of the car.
- ☒ **B** *F* is equal to the product of the momentum and angular velocity of the car.
- ☒ **C** *F* is in the same direction as the acceleration of the car.
- ☒ **D** *F* is perpendicular to the momentum of the car.

(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 roundabout completes 5.0 revolutions in 20 s.

Which of the following is the angular velocity of the roundabout?

- ☒ **A** 1.6 rad s^{-1}
- ☒ **B** 16 rad s^{-1}
- ☒ **C** 25 rad s^{-1}
- ☒ **D** 630 rad s^{-1}

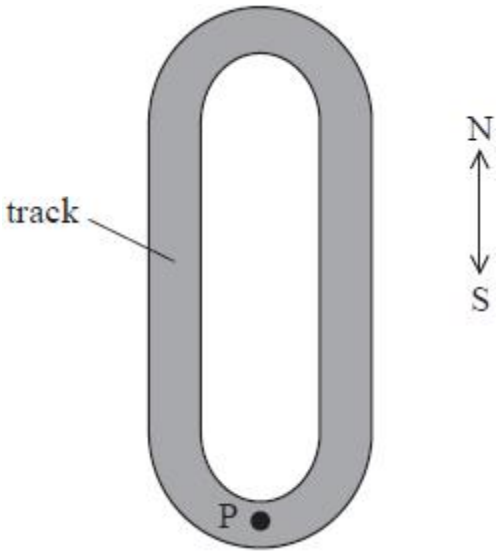
(Total for question = 1 mark)

Q19.

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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 ☒.

The plan view of a model racing car track is shown. Friction acts between a model racing car and the track. A car is moving round the track with a constant speed and reaches point P. Arrows indicating directions North and South are also shown.



The car then slides off the track at P.

Which of the following is the reason why the car slides off the track?

☒ **A** The centripetal force is acting in the N direction.

☒ **B** The centripetal force is acting in the S direction.

☒ **C** The frictional force is equal to the centripetal force.

☒ **D** The frictional force is not large enough.

(Total for question = 1 mark)

Q20.

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)

Q21.

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

☒ **A** kg m s^{-1}

☒ **B** kg m s^{-2}

☒ **C** N s

☒ **D** N s^{-1}

(Total for question = 1 mark)

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