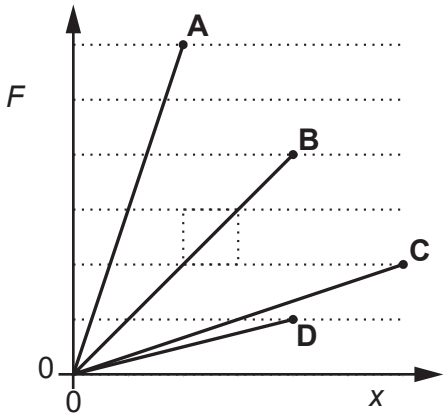
OCR
Oxford Cambridge and RSA

AS Level Physics A

H156/01 Breadth in Physics

Question Set 2 – Module 3 MCQ

1 The force *F* against extension *x* graphs for four different wires **A**, **B**, **C** and **D** up to their breaking points are shown below.



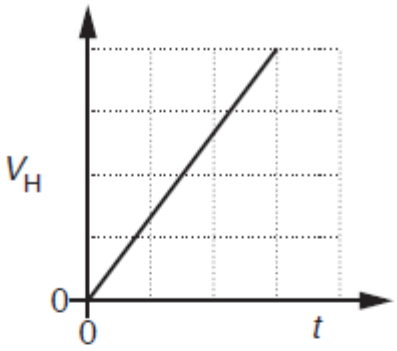
Which wire has the greatest work done on it before it breaks?

Your answer ☐ **[1]**

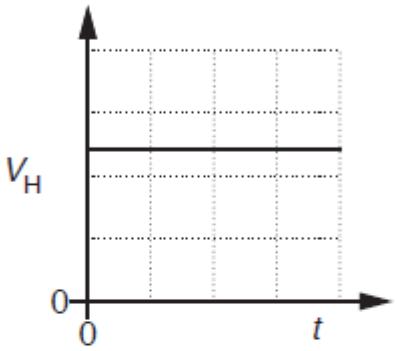
2 A projectile is fired in a horizontal direction at time $t = 0$.
Ignore air resistance.

Which graph correctly shows the horizontal component of the velocity V_H of the projectile against time t?

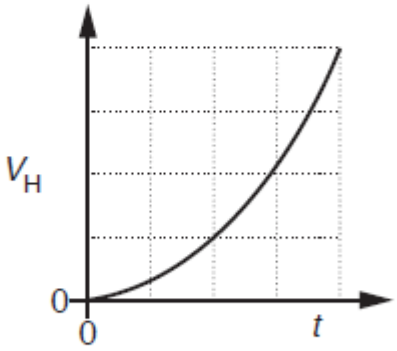
A



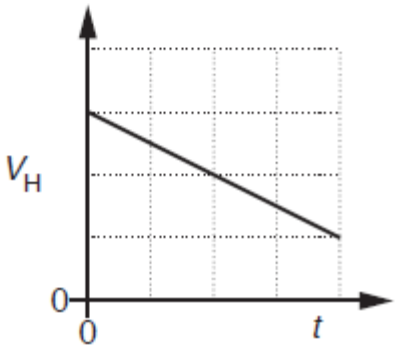
B



C



D



Your answer ☐ **[1]**

3 A ball, initially at rest, is struck by a hockey stick. It leaves the hockey stick at speed *v*.

Which quantity, together with the mass of the ball, can be used to determine *v*?

A The time of the impact.

B The weight of the hockey stick.

C The impulse of the force.

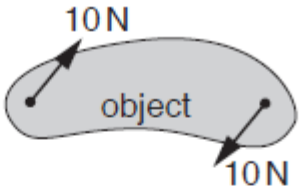
D The final momentum of the hockey stick.

Your answer ☐ **[1]**

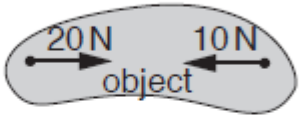
4 Two forces act on an object in the same plane.

Which diagram shows a couple?

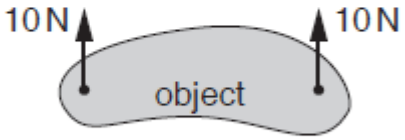
A



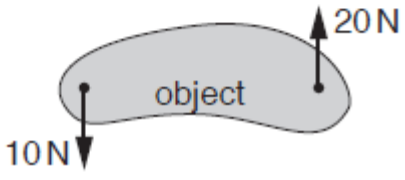
B



C



D



Your answer ☐ **[1]**

5 A cable is attached to an object of weight 30 N. The object is pulled vertically upwards with an acceleration of 6.0 $m s^{-2}$.

What is the tension in the cable?

A 12 N

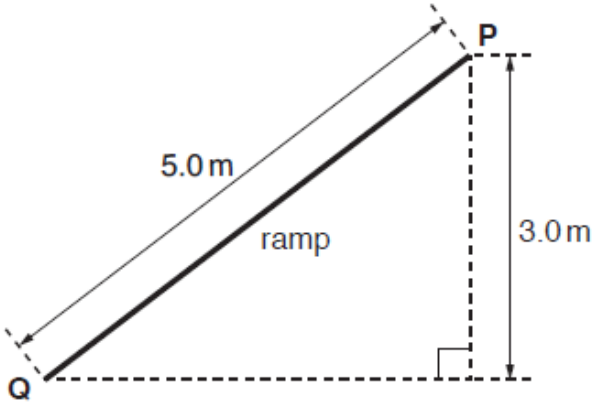
B 18 N

C 30 N

D 48 N

Your answer ☐ **[1]**

6 An object is at the top of a ramp at point **P**. The gravitational potential energy of the object at **P** is 100 J. The object is released from rest at **P**. It travels down the ramp. The kinetic energy of the object at the bottom of the ramp at point **Q** is 60 J.



What is the average resistive force acting on the object as it travels down the ramp?

A 8.0 N

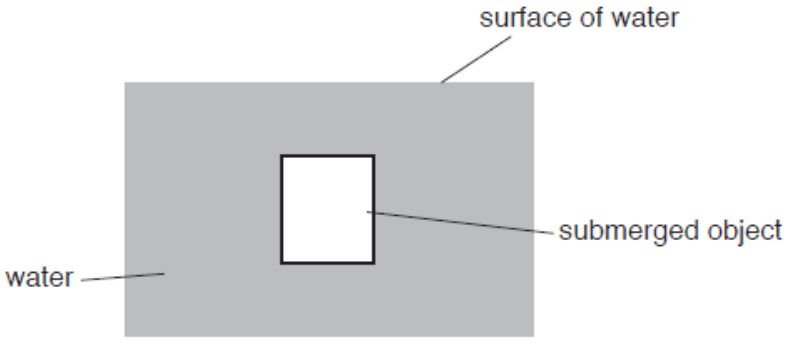
B 10 N

C 12 N

D 20 N

Your answer ☐ **[1]**

7 The diagram below shows an object submerged in water.



The object is stationary in the water.

Which statement about the upthrust acting on the object is correct?

A It is zero.

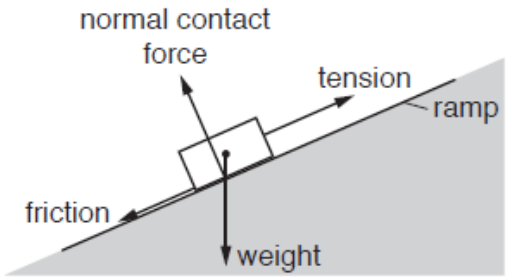
B It is equal to the mass of the object.

C It is equal to the weight of the object.

D It is equal to the volume of the water displaced.

Your answer ☐ **[1]**

8 A block moves at **constant** speed up a ramp.
The diagram below shows all the forces acting on the block.



Which force does no work on, or against, the object as it travels up the ramp?

A weight

B friction

C tension

D normal contact force

Your answer ☐ **[1]**

9 What is a reasonable estimate for the momentum of a car travelling at $10\,m\,s^{-1}$?

A $10^2\,kg\,m\,s^{-1}$

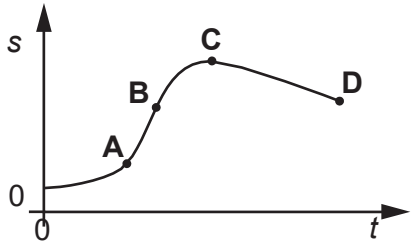
B $10^4\,kg\,m\,s^{-1}$

C $10^6\,kg\,m\,s^{-1}$

D $10^8\,kg\,m\,s^{-1}$

Your answer ☐ **[1]**

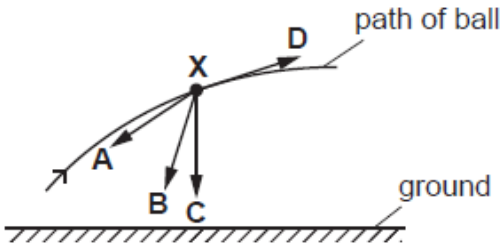
10 The graph below shows the variation of displacement *s* with time *t* for an object.



At which point, **A**, **B**, **C** or **D**, does the object have maximum velocity?

Your answer ☐ **[1]**

11 A ball is thrown through the air. The ball experiences a small amount of drag compared to its weight.
At a particular time the ball is at point **X**.
Which arrow best represents the direction of the resultant force on the ball when it is at **X**?



Your answer ☐ **[1]**

12 An object **P** is travelling to the right with a momentum of 40 kg m s^{-1}. It collides with another object **Q** travelling to the left along the same path.

The final momentum of **P** is 10 kg m s^{-1} to the right.

What is the change in the momentum of **Q**?

A 0 kg m s^{-1}

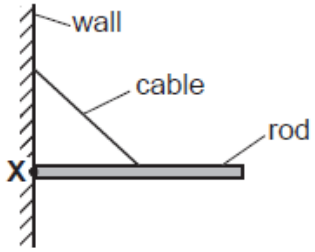
B 10 kg m s^{-1}

C 30 kg m s^{-1}

D 50 kg m s^{-1}

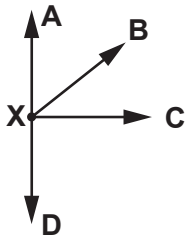
Your answer ☐ **[1]**

13 The diagram shows a uniform rod at rest in a horizontal position.



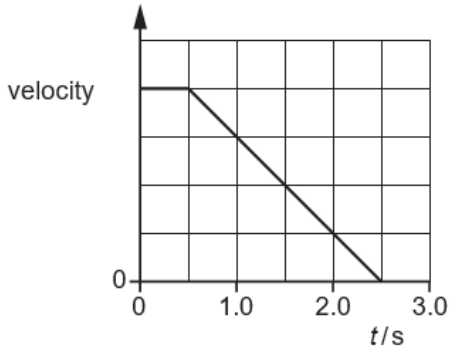
The rod is hinged at point **X**. A cable is attached to a vertical wall and the midpoint of the rod.

Which arrow best represents the direction of the force on the rod at point **X**?



Your answer ☐ **[1]**

14 A car is driven at constant velocity until the driver sees an obstruction ahead at time $t = 0$. The velocity against time graph below shows the motion of the car as the driver brings it to a stop.



The thinking distance is 10 m.
What is the stopping distance for the car?

A 20 m

B 30 m

C 40 m

D 50 m

Your answer ☐ **[1]**

15 A javelin thrower exerts a force of 100 N on a javelin for a time of 0.30 s.
The javelin has a mass of 0.80 kg.

What is the rate of change of the momentum of the javelin?

A 24 kg m s^{-2}

B 30 kg m s^{-2}

C 100 kg m s^{-2}

D 125 kg m s^{-2}

Your answer ☐ **[1]**

16 One end of a wire is fixed to the ceiling and a 3.0 kg object is suspended from its other end. The wire has diameter 0.62 mm and negligible mass.

What is the tensile stress in the wire?

A 1.5×10^4 Pa

B 2.5×10^6 Pa

C 2.4×10^7 Pa

D 9.7×10^7 Pa

Your answer ☐ **[1]**

17 A trolley of mass 1.0 kg is moving on a horizontal surface at a constant velocity of 2.0 $m s^{-1}$. A force of 3.0 N is applied to the trolley in the opposite direction to its motion for a time of 1.5 s and then the force is removed.

What is the magnitude of the final momentum of the trolley?

A 2.0 $kg m s^{-1}$

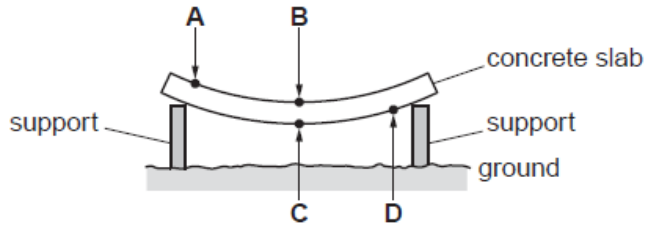
B 2.5 $kg m s^{-1}$

C 4.5 $kg m s^{-1}$

D 6.5 $kg m s^{-1}$

Your answer ☐ **[1]**

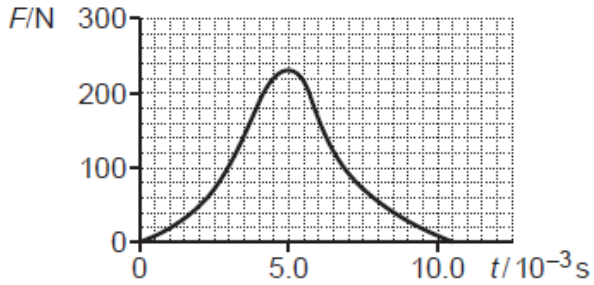
18 A uniform concrete slab is placed on two supports. The slab sags due to its own weight.



Which point, **A**, **B**, **C** or **D**, of the slab is under maximum compression?

Your answer ☐ **[1]**

19 The variation with time t of the force F acting on a ball is shown below.



Which statement is **not** correct?

A The area under the graph is equal to the work done by the force F.

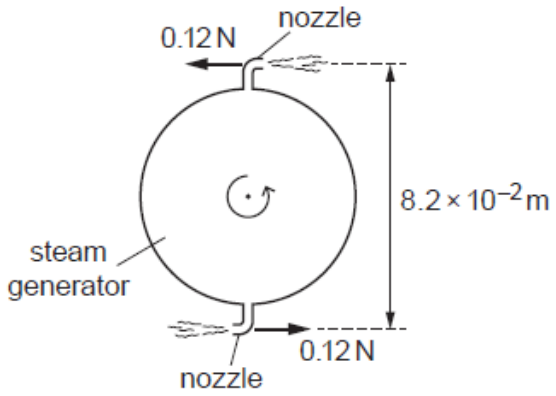
B The ball has maximum acceleration at $t = 5.0 \times 10^{-3}$ s.

C The area under the graph is equal to impulse.

D The area under the graph has units kg m s^{-1}.

Your answer ☐ **[1]**

20 The diagram below shows a rotating steam generator.



The steam ejected from the nozzles provides a couple. The force at each nozzle is 0.12 N. The perpendicular distance between the nozzles is 8.2×10^{-2} m.

What is the work done by the forces as the steam generator completes one revolution?

A 0 J

B 9.8×10^{-3} J

C 3.1×10^{-2} J

D 6.2×10^{-2} J

Your answer ☐ **[1]**

21 A force of 12 N moves an object at an angle θ to the force. The object travels 9.6 m and the work done by the force is 52 J.

What is the angle θ?

A 1.1°

B 27°

C 63°

D 90°

Your answer ☐

22 The frictional force acting on an object falling vertically through water is directly proportional to its speed squared.

What is the correct relationship between P, the rate of work done against the frictional force, and the speed v of the object?

A $P \propto v^{-1}$

B $P \propto v$

C $P \propto v^2$

D $P \propto v^3$

Your answer ☐ **[1]**

23 A ball of diameter 2.50 cm is held above the ground. The bottom of the ball is 10.2 cm above the ground. The ball is released from rest.
Air resistance has negligible effect on the motion of the ball.

What is the time taken for the ball to reach the ground?

A 0.021 s

B 0.144 s

C 0.152 s

D 0.161 s

Your answer ☐ **[1]**

Total Marks for Question Set 2: 23

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