


A Level • OCR • Physics

 12 mins 12 questions

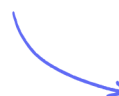
Multiple Choice Questions

Dynamics

Force & Acceleration / Weight / Tension, Normal force, Upthrust & Friction / Motion in One & Two Dimensions / Drag Forces / Terminal Velocity / Investigating Terminal Velocity

Easy (2 questions)	/2
Medium (5 questions)	/5
Hard (5 questions)	/5
Total Marks	/12

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Easy Questions

- 1 A paper cone is held above the ground and dropped. It falls vertically and reaches terminal velocity before it hits the ground.



Which statement correctly describes the **resultant** force on the falling cone before it reaches terminal velocity?

- A. decreasing and upwards
- B. decreasing and downwards
- C. increasing and downwards
- D. increasing and upwards

(1 mark)

- 2 A tennis ball is hit with a racket. The force applied by the racket on the ball is F . The ball has a vertical path through the air.

Which statement is correct when the ball is at its **maximum** height?

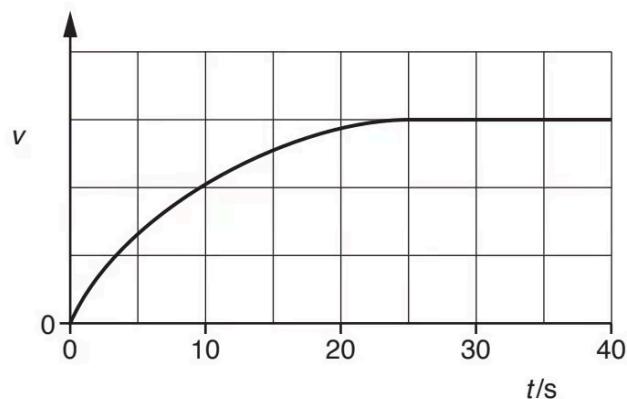
- A. The ball has a downward acceleration.
- B. The force acting on the ball is F .
- C. The ball experiences greatest drag.
- D. The weight of the ball is equal to the drag.

(1 mark)

Medium Questions

- 1 An object is dropped from rest at time $t = 0$. It falls vertically through the air.

The variation of the velocity v with time t is shown below.

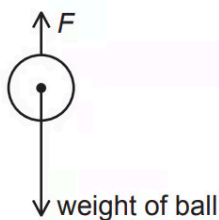


Which statement is **correct** about this object?

- A. It has constant acceleration.
- B. It experiences zero drag at $t = 30$ s.
- C. It has an acceleration of 9.81 m s^{-2} at $t = 0$ s.
- D. It travels the same distance in every successive 10 s.

(1 mark)

- 2 A ball of mass m is falling vertically through the air.



The total upward force acting on the ball is F . The force F is less than the weight of the object. The acceleration of free fall is g .

Which expression is correct for the acceleration a of the ball?

A. $a = 0$

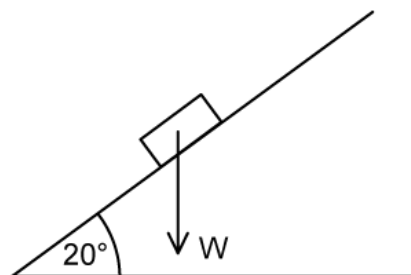
B. $a = \frac{mg - F}{m}$

C. $a = \frac{mg + F}{m}$

D. $a = g$

(1 mark)

- 3** The diagram below shows a 600 g wooden block that is placed on a smooth surface which makes an angle of 20° to the horizontal.



What is the acceleration of the block as it moves down the surface?

A. 2.0 m s^{-2}

B. 5.5 m s^{-2}

C. 3.4 m s^{-2}

D. 9.2 m s^{-2}

(1 mark)

- 4** A car has mass, m , and has constant positive acceleration, a . It experiences a resistive force, R , and has a driving force, F .

Which of the following statements are true?

1. The resistive force on the car is greater than the driving force
2. The driving force of the car is greater than the resultant force

3. The acceleration of the car is equal to $\frac{F - R}{m}$

4. The resultant force of the car is equal to $F - R - mg$

- A.** 1 and 4
- B.** 2 and 3
- C.** 2, 3 and 4
- D.** Only 3

(1 mark)

- 5** The Lunar Rover had a weight of 2060 N on the Earth and the weight on the Moon was 342 N.

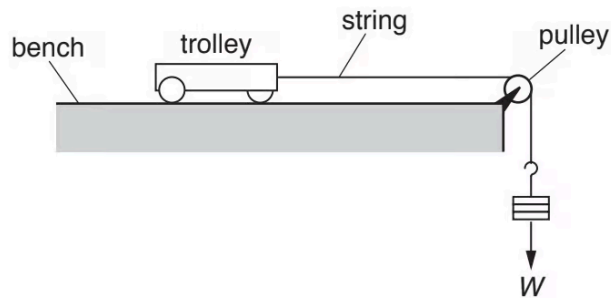
What is the acceleration of free fall on the Moon?

- A.** 9.81 m s^{-2}
- B.** 1.63 m s^{-2}
- C.** 6.02 m s^{-2}
- D.** 16.0 m s^{-2}

(1 mark)

Hard Questions

- 1 A trolley of mass M is pulled along a horizontal table by a force W provided by a mass hanging from the end of a string as shown.



Frictional forces are negligible. The acceleration of free fall is g .

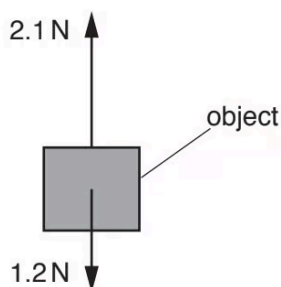
What is the correct equation for the acceleration a of the trolley?

- A. $a = \frac{W}{M}$
- B. $a = g$
- C. $a = \frac{W}{2M}$
- D. $a = \frac{W}{M + \frac{W}{g}}$

(1 mark)

- 2 The diagram shows two opposite vertical forces of magnitude 1.2 N and 2.1 N acting on

an object.



Which of the following statements could be correct?

1. The object is accelerating and moving up.
2. The object is decelerating and moving down.
3. The magnitude of the resultant force is 0.9 N.

- A.** Only 3
- B.** Only 1 and 3
- C.** Only 2 and 3
- D.** 1, 2 and 3

(1 mark)

- 3** Below is a table of values for the drag force D and the velocity v a skydiver experiences where: $D \propto v^2$.

What is the velocity of the skydiver when they experience a drag force of 56 N?

Drag force (N)	Velocity (m s^{-1})
100	20
225	30

- A. 17 m s^{-1}
- B. 3.3 m s^{-1}
- C. 2.7 m s^{-1}
- D. 15 m s^{-1}

(1 mark)

- 4 A lift has a mass of 600 kg, which is suspended from a cable with a tension of 5600 N. The lift starts at rest and accelerates downwards at a constant rate for 7 s.

How far does the lift travel?

- A. 23 m
- B. 12 m
- C. 470 m
- D. 1.7 m

(1 mark)

- 5 A 50,000 year old crater found in the Arizona desert is 170 m deep. It was formed by a meteorite that had a mass of $3.0 \times 10^8 \text{ kg}$ and an initial impact speed of $1.3 \times 10^4 \text{ m s}^{-1}$.

Assuming that the meteorite was under constant acceleration, which one of the following statements are **true**?

- A. The average force from the Earth which acted on the meteorite was $1.5 \times 10^{14} \text{ N}$
- B. The average force exerted by the Earth was greater than the average force exerted by the meteorite
- C. The average force from the meteorite which acted on the Earth was $2.9 \times 10^9 \text{ N}$
- D. The average force exerted by the meteorite was greater than the average force exerted by the Earth

(1 mark)