

APOLLO

Kinematics

HL

Physics

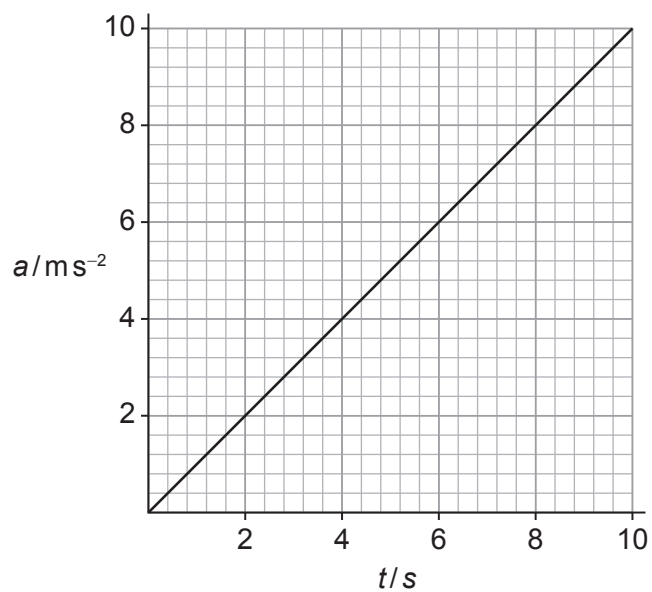
First assessment 2025

13 questions | questions

1. Instantaneous velocity is defined as...

- A. $\frac{\text{displacement}}{\text{time taken}}$.
- B. rate of change of position.
- C. $\frac{\text{distance moved}}{\text{time taken}}$.
- D. rate of change of distance.

2. The variation with time t of the acceleration a of an object is shown. At $t = 0$ the object is at rest.



What is the speed of the object when $t = 8.0$ s?

- A. 1.0 ms^{-1}
- B. 32 ms^{-1}
- C. 50 ms^{-1}
- D. 64 ms^{-1}

5. A satellite undergoes one circular orbit of the Earth every 24 hours.

What is the angular velocity of the satellite?

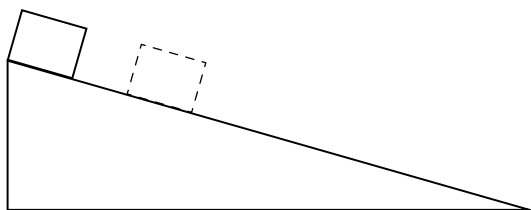
- A. $4.4 \times 10^{-3} \text{ rad s}^{-1}$
- B. $1.7 \times 10^{-3} \text{ rad s}^{-1}$
- C. $7.3 \times 10^{-5} \text{ rad s}^{-1}$
- D. $1.2 \times 10^{-5} \text{ rad s}^{-1}$

1. A ball is initially 50 m above the ground. The ball is thrown vertically upwards and takes 5.0 s to reach the ground. Air resistance is negligible.

What is the initial speed of the ball?

- A. 10 ms^{-1}
- B. 15 ms^{-1}
- C. 25 ms^{-1}
- D. 35 ms^{-1}

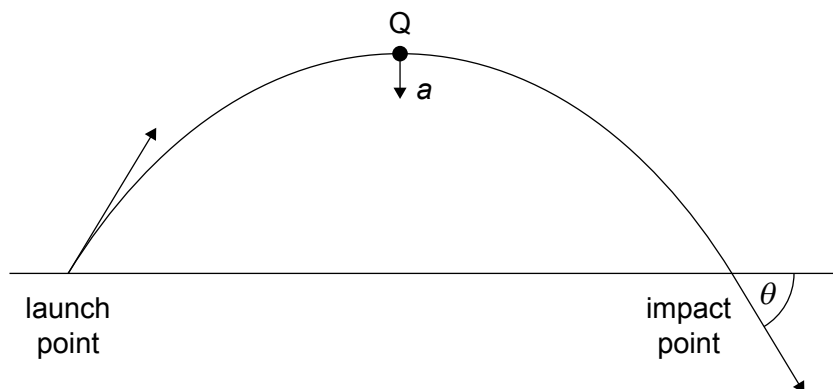
2. An object is sliding from rest down a frictionless inclined plane. The vertical displacement of the object is 1.5 m during the first second.



What is the vertical displacement during the next second?

- A. 1.5 m
- B. 3.0 m
- C. 4.5 m
- D. 5.0 m

3. The diagram shows the path of a ball in the absence of air resistance. Q is the highest point of the ball's trajectory and a is the vertical acceleration at Q. At impact the velocity makes an angle θ to the horizontal.



Three statements about the actual motion of the ball when there is air resistance are:

- I. Q is lower.
- II. a remains the same.
- III. θ increases.

Which statements are correct?

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

Turn over

— T —

4425-0113

1. A car decelerates uniformly to rest. From an initial velocity v to a velocity $\frac{v}{2}$, it covers a distance d . How much further does it travel before coming to rest?

A. $\frac{d}{4}$

B. $\frac{d}{3}$

C. $\frac{d}{2}$

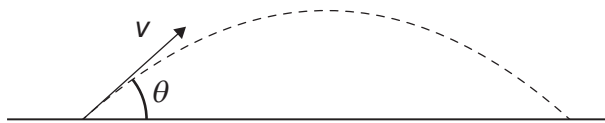
D. d

2. Two balls, P and Q, are projected from the edge of a cliff. P is projected horizontally at speed v and Q is projected vertically upwards at the same speed. The time taken for P to reach the ground is t_p and the speed at impact with the ground is v_p . **Air resistance is negligible.**

What is the time taken to reach the ground and the speed at impact with the ground for Q?

	Time taken	Speed at impact
A.	t_p	v_p
B.	t_p	Greater than v_p
C.	Greater than t_p	v_p
D.	Greater than t_p	Greater than v_p

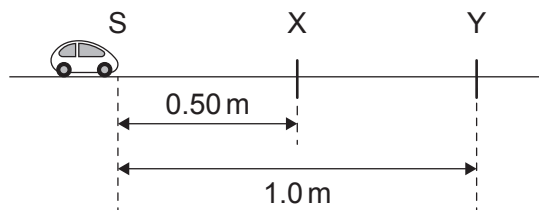
1. A projectile is launched with an initial velocity v at an angle θ above the horizontal. The projectile lands at the same height from which it was released. Air resistance is negligible.



What is the time of flight of the projectile?

- A. $\frac{v \sin \theta}{g}$
- B. $\frac{2v \sin \theta}{g}$
- C. $\frac{2v \cos \theta}{g}$
- D. $\frac{2v \sin \theta \cos \theta}{g}$

2. A cart starts from rest at point S and moves in a straight line with a constant acceleration. Two points X and Y are 0.50 m and 1.0 m from S.



The cart passes X with speed v_x and passes Y with speed v_y . What is $\frac{v_y}{v_x}$?

- A. $\sqrt{2}$
- B. 2
- C. $2\sqrt{2}$
- D. 4

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0025-0101

1. A stone is released from rest and falls vertically. Air resistance is negligible. What is correct about the stone during each consecutive second of its motion?
- A. The change in velocity is constant.
 - B. The change in displacement is constant.
 - C. The change in acceleration decreases.
 - D. The change in speed increases.

2. A projectile is launched horizontally from the top of a cliff with a speed of 10 m s^{-1} . The projectile hits the ground at a distance of 30 m from the base of the cliff. Air resistance is negligible.

What is the height of the cliff?

- A. 15 m
- B. 30 m
- C. 45 m
- D. 90 m

1. A car has an initial speed of 16 m s^{-1} . It decelerates at 4.0 m s^{-2} until it stops.

What is the distance travelled by the car?

- A. 4 m
- B. 16 m
- C. 32 m
- D. 64 m