

# Average and Instantaneous Velocity

Thursday, 28 January, 2021 16:01

A particle moves along the x axis. Its position varies with time according to the expression  $x = -4t + 2t^2$ , where (x) is in meters and (t) is in seconds.

- Determine the displacement of the particle in the time intervals (t = 0) to (t = 1 s) and (t = 1 s) to (t = 3 s).
- Calculate the average velocity during these two time intervals.
- Find the instantaneous velocity of the particle at (t = 2.5 s).

# Average and Instantaneous Acceleration

Friday, 29 January, 2021 21:33

The velocity of a particle moving along the x axis varies according to the expression:  $v = 40 - 5t^2$ , where (v) is in (m/s) and (t) is in seconds.

- Find the average acceleration in the time interval (t = 0) to (t = 2 s).
- Determine the acceleration at (t = 2 s).

# Carrier Landing

Friday, 29 January, 2021 21:33

A jet lands on an aircraft carrier at a speed of  $63 \text{ m/s}$ .

- What is its acceleration if it stops in  $2 \text{ s}$ ?
- What is its final position?

# Uniform acceleration

Friday, 29 January, 2021 21:33

A car accelerates uniformly from rest to a speed of  $100 \text{ km/h}$  in  $18 \text{ s}$ .

- Find the acceleration of the car.
- Find the distance that the car travels.
- If the car brakes to a full stop over a distance of  $100 \text{ m}$ , then find its uniform deceleration.

# Two bodies with different Accelerations

Friday, 29 January, 2021 21:33

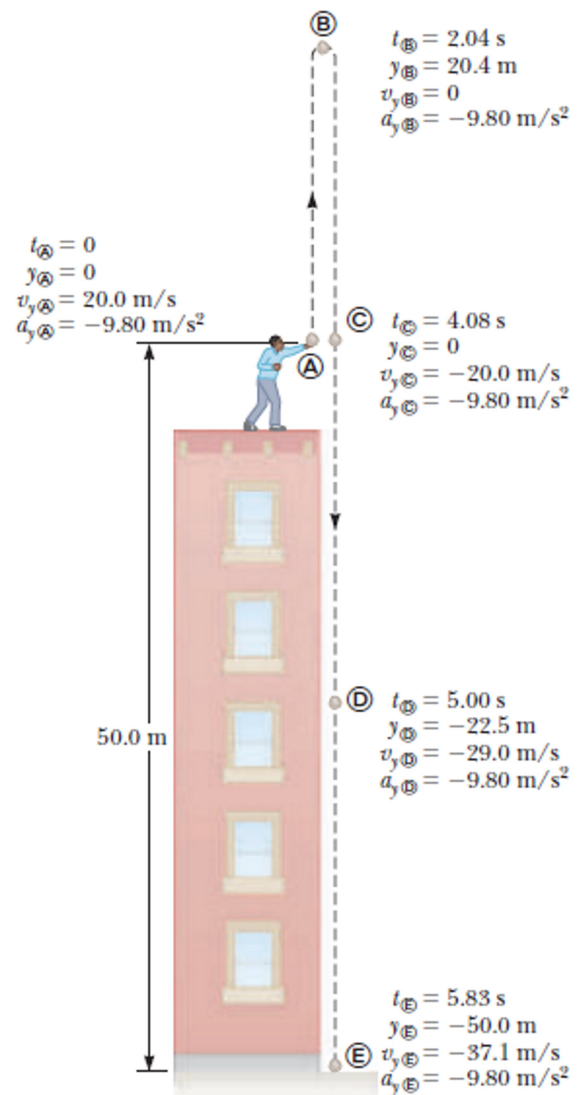
A motorist traveling at a constant  $15 \text{ m/s}$  passes a school crossing where the speed limit is  $10 \text{ m/s}$ . Just as the motorist passes the school-crossing sign, a police officer on a motorcycle stopped there, starts in pursuit with constant acceleration  $3 \text{ m/s}^2$ . How much time elapses before the officer passes the motorist?

# Free Falling - 1

Friday, 29 January, 2021 21:33

A stone is thrown from the top of a building and is given an initial velocity of  $20 \text{ m/s}$  straight upward. The stone is launched  $50 \text{ m}$  above the ground, and the stone just misses the edge of the roof on its way down as shown.

- Determine the time at which the stone reaches its maximum height.
- Find the maximum height of the stone.
- Determine the velocity of the stone when it returns to the height from which it was thrown.
- Find the position of the stone at  $t = 5 \text{ s}$ .
- Find the velocity of the stone at  $t = 5 \text{ s}$ .
- How long does the stone take to reach the ground?
- How long does the stone take to reach a point  $15 \text{ m}$  above its release point?



## Free Falling - 2

Friday, 29 January, 2021 21:33

A boy throws a ball upwards, giving it an initial speed  $v_i = 15 \text{ m/s}$ .  
How long does the ball take to return to the boy's hand?