

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).

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

□□ R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.

□□ J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY, 2014.

□□ H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.

□□ H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

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).

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📖 R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.

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
📖 H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.

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Carrier Landing

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A jet lands on an aircraft carrier at a speed of 63 m/s .

- What is its acceleration if it stops in 2 s ?
- What is its final position?

Uniform acceleration

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A car accelerates uniformly from rest to a speed of 100 km/h in 18 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 m , then find its uniform deceleration.


Two bodies with different Accelerations


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A motorist traveling at a constant 15 m/s passes a school crossing where the speed limit is 10 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 m/s^2 . How much time elapses before the officer passes the motorist?

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Free Falling - 1

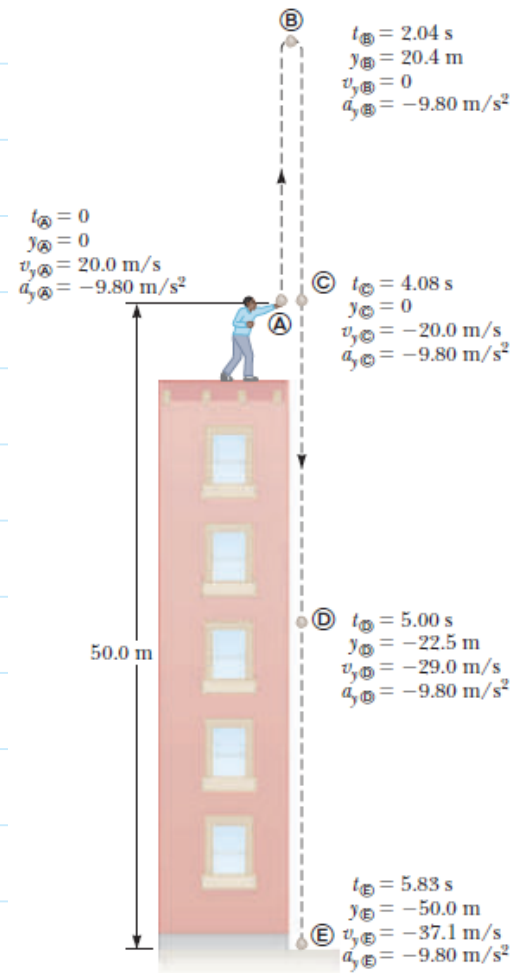
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A stone thrown from the top of a building is given an initial velocity of 20 m/s straight upward. The stone is launched 50 m above the ground, and the stone just misses the edge of the roof on its way down as shown.





- 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 m above its release point?



Free Falling - 2

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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?