

Kinematics Practice Items

1. This portion of mechanics treats phenomena which can be quantitatively expressed in terms of space and time and does not encompass the causes of motion.

- A. statics
- B. dynamics
- C. kinematics
- D. quantum mechanics

2. How long does it take a ball thrown straight upwards at 10 m/s to reach its maximum height (neglecting air resistance)

- A. 5 s
- B. 0.5 s
- C. 1 s
- D. 10 s

3. Speed...

- A. is the magnitude of the change per unit time of the velocity vector.
- B. can never be negative.
- C. is equivalent to the slope of the line tangent to the displacement curve.
- D. has both magnitude and direction.

4. An automobile travels in a straight line for 10 seconds at 20 m/s then accelerates uniformly to a speed of 30 m/s in the next 10 seconds. Find the total displacement.

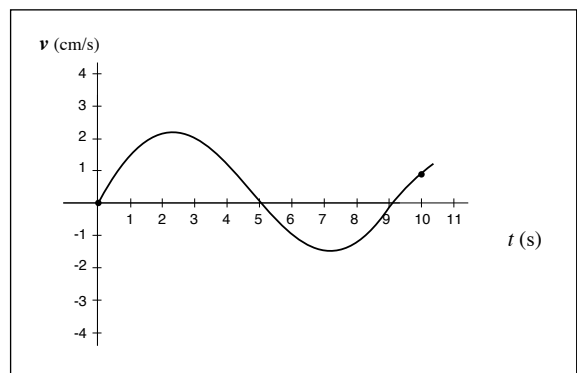
- A. 800 m
- B. 450 m
- C. 500 m
- D. 550 m

5. At time $t = 10$ s a dragster is moving in a straight line with a velocity of 80 m/s. At $t = 20$ s its velocity is 120 m/s. What is the average velocity of the dragster for the interval 10 s to 20 s?

- A. 95 m/s
- B. 100 m/s
- C. 110 m/s
- D. cannot be determined from given information

6. Find the average acceleration for the first ten seconds of the one dimensional motion described by the graph below.

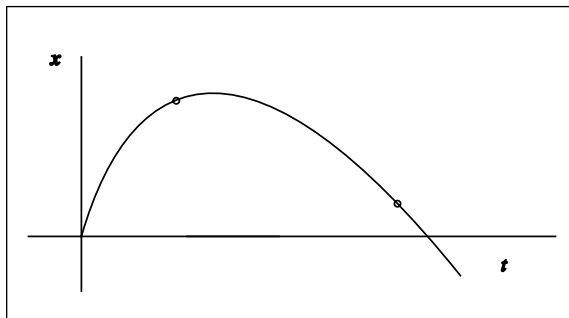
- A. 1 m/s^2
- B. 10 m/s^2
- C. 0.001 m/s^2
- D. 0.1 m/s^2



7. A car uniformly increases its speed from 30 m/s to 50 m/s over a distance of 400 meters. What is the magnitude of acceleration?

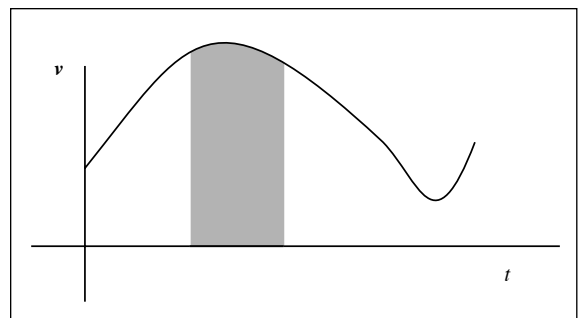
- A. 2 m/s^2
- B. 0.5 m/s^2
- C. 5 m/s^2
- D. 4 m/s^2

8. For the one dimensional motion of a particle, the curve below shows displacement vs. time. Which of the following is the best description of the motion within the time interval t_1 to t_2 ?



- A. The particle attains maximum speed then gradually decelerates.
 B. The particle comes to rest then moves away from the origin of the inertial frame.
 C. The particle comes to rest then moves with negative velocity towards the origin of the inertial frame.
 D. The particle attains maximum speed then returns to the origin of the inertial frame.
9. What is the vertical component of the velocity of a sky-diver 10 seconds after jumping? Disregard air resistance and any variation in the acceleration due to gravity caused by the high altitude.
- A. -50 m/s
 B. 50 m/s
 C. -100 m/s
 D. -500 m/s

10. For a particle in one dimensional motion, the shaded area beneath the velocity vs. time curve below corresponds to:



- A. the average velocity of the particle during the time interval t_1 to t_2
 B. the distance travelled by the particle during the time interval t_1 to t_2
 C. the average speed of the particle during the time interval t_1 to t_2
 D. the acceleration of the particle during the time interval t_1 to t_2
11. Over a distance of 3 cm an electron accelerates uniformly from a speed of 9×10^3 m/s to a speed of 6×10^6 m/s. How long does it take the electron to cross this distance?
- A. 1.0×10^{-8} s
 B. 3.6×10^{-9} s
 C. 5.0×10^{-7} s
 D. 1.0×10^{-6} s

12. The velocity of a certain particle in one dimension is described by this expression:

$$v(t) = \frac{1}{3}[(t-1)^{6+1}]$$

Find the average acceleration of the particle during the time interval $t = 1$ s to $t = 4$ s.

- A. 81 m/s²
 - B. 135 m/s²
 - C. 27 m/s²
 - D. Cannot be determined from given information
13. A projectile is launched from ground level at a 30° angle to the horizontal. Neglecting air resistance, what other information is needed to calculate its range of trajectory.
- A. v_0 , g , mass
 - B. v_0 , g
 - C. v_0 , g , height of peak
 - D. v_0 , g , v_f
14. Which of the following statements are true concerning an object undergoing uniform circular motion?
- A. The velocity and acceleration vectors are always perpendicular
 - B. The object moves with constant speed
 - C. The direction of the acceleration vector is towards the center
 - D. all of the above
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