

Particle Motion

1. The position of a particle moving along the x-axis is $x(t) = \sin(3t) - \cos(2t)$ for $t \geq 0$. When $t = \frac{\pi}{2}$, the acceleration of the particle is?
2. A particle moves along a line so that at time t its position is given by $s(t) = -5 \sin t - \frac{t^2}{2} + 10$. What is the velocity when the acceleration is zero?
3. A particle moves in a straight line with velocity $v(t) = 2t^2 + 1$. How far does the particle move between time $t=1$ and $t=3$?
4. The acceleration of a body moving in a straight line is given by $a(t) = 6 - 8t$. If the velocity is 20 at $t = 2$, what is $s(4) - s(1)$?
5. A points moves in a straight line so that its distance $x(t) = 9t - 3t^2$. What is the total distance covered by the point between $t = 1$ and $t = 2$?

6. At $t = 0$ a particle starts at rest and moves along a line in such a way that at time t , $a(t) = 48t^2 \text{ ft/sec}^2$. Through how many feet does the particle move during the first 3 seconds?
7. The acceleration of a particle moving along the x-axis at time $t > 0$ is $a(t) = 2t + 3 \text{ ft/sec}^2$. If the velocity is 5 ft/sec at $t = 1$ sec and $x(0) = 1$, then $x(2)$ is?
8. A particle moves along the x-axis so that at any time $t \geq 0$ its position is given by $x(t) = (t-1)(t-3)^3$. For what values of t is the velocity increasing?
9. An object moves along the x-axis so that at any time $t > 0$ its position is given by $x(t) = t^4 + t^3 - 9t^2 + 16t$. At the instant when the acceleration becomes 0, the velocity is?
10. At $t = 0$, a particle starts at the origin with a velocity of 4 ft/sec and moves along the x-axis so that $a(t) = 24t^2 \text{ ft/sec}^2$. Through how many feet does the particle move during the first 2 seconds?