

To be successful you must accept all challenges that come your way. You can't just accept the ones you like. ~Mike Gafka

Velocity for chapter 6

AP Calculus AB

NOTES:

Displacement of the particle on $[a,b] = \int_a^b v(t) dt$

Total distance traveled of the particle on $[a,b] = \int_a^b |v(t)| dt$

Position of the particle at $t = a$: initial position + displacement = $s(0) + \int_0^a v(t) dt$

If given a position other than at $t = 0$ just set up a definite integral of $v(t)$ with the position you are given and the one you are looking for and use FTC and algebra to solve for the position you are looking for.

Ex. If given $s(3) = 8$ and you want to find $s(10)$:

$$\int_3^{10} v(t) dt = s(10) - s(3) \quad \text{so then} \quad s(10) = s(3) + \int_3^{10} v(t) dt = 8 + \int_3^{10} v(t) dt$$

If instead you want to find $s(1)$ still knowing that $s(3) = 8$:

$$\int_1^3 v(t) dt = s(3) - s(1) \quad \text{so then} \quad s(1) = s(3) - \int_1^3 v(t) dt = 8 - \int_1^3 v(t) dt$$

Calculator Question:

A particle moves along the x-axis so that at any time $t > 0$ its velocity is given by $v(t) = t \ln t - t$. At time $t = 1$, the position of the particle is $x(1) = 6$.

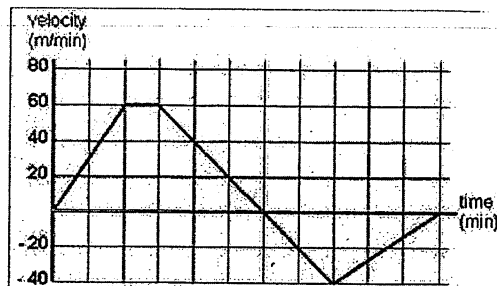
- When is the particle at rest?
- For what values of t is the particle moving to the right?
- Find the acceleration of the particle at time $t = 5$.
- When is the particle's acceleration zero?
- Find the total distance traveled by the particle from $t = 1$ to $t = 8$.
- Find the displacement of the particle from $t = 1$ to $t = 8$.
- Find the position of the particle at $t = 5$.
- Find the position of the particle at $t = 0.3$.
- For what values of t is the particle slowing down? Speeding up?

To be successful you must accept all challenges that come your way. You can't just accept the ones you like. ~Mike Gafka

Velocity for chapter 6

AP Calculus AB

1. The velocity of a particle is given on the right. The position of the particle at $t=0$ is 3.



- What is the total distance traveled from $t=0$ to $t=6$?
 - What is the total distance traveled from $t=0$ to $t=8$?
 - What is the total distance traveled from $t=0$ to $t=11$?
 - What is the displacement of the particle from $t=0$ to $t=6$?
 - What is the displacement of the particle from $t=0$ to $t=8$?
 - What is the displacement of the particle from $t=0$ to $t=11$?
 - Where is the particle at $t=6$? At $t=11$?
2. Given $v(t) = 4 - t^2$ and $s(0) = -4$ units
- Find the total distance the particle traveled from $t=0$ to 3 seconds.
 - Find the displacement of the particle from $t=0$ to 3 seconds.
 - Where is the particle at $t=3$ sec?