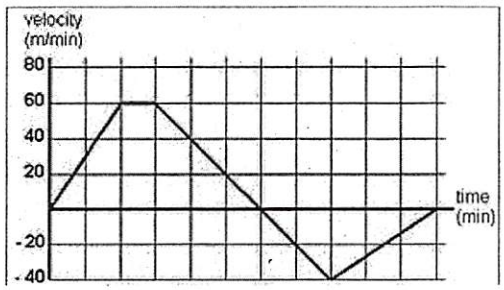
To be successful you must accept all challenges that come your way. You can't just accept the ones you like. *~Mike Gafka*

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?

$\int_0^6 |v(t)| =$ 210

- What is the total distance traveled from t =0 to t = 8?

$\int_0^8 |v(t)|$ 250

- What is the total distance traveled from t =0 to t = 11?

$\int_0^{11} |v(t)|$ 310

- What is the displacement of the particle from t =0 to t = 6?

$\int_0^6 v(t)$ 210

- What is the displacement of the particle from t =0 to t = 8?

$\int_0^8 v(t)$ 170

- What is the displacement of the particle from t =0 to t = 11?

$\int_0^{11} v(t)$ 110

- Where is the particle at t = 6? At t = 11?

213M 113

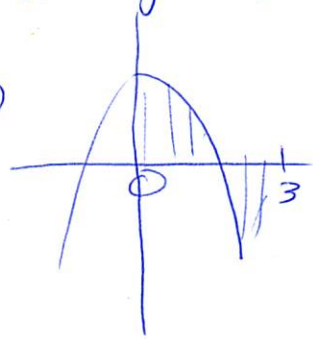
$3 + \int_0^6 v(t) = 213M$ $3 + \int_0^{11} v(t) = 113$

No calc

2. Given $v(t) = 4 - t^2$ and $s(0) = -4$ units (Don't forget to integrate)

- Find the total distance the particle traveled from t = 0 to 3 seconds.

$\int_0^2 v(t) + \int_2^3 |v(t)| = 23/3$ $4t - \frac{t^3}{3}\Big|_0^2$ $8 - \frac{8}{3} - (0)$



- Find the displacement of the particle from t = 0 to 3 seconds.

$\int_0^3 4 - t^2 = 3$

- Where is the particle at t = 3 sec?

$-4 + \int_0^3 v(t) = -1$

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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 = $s(o) + \int_0^a v(t)dt$

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):

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

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

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

Calculator Question:

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

$V(t)=0$
$V(t)=+$

a) When is the particle at rest? 2.718
b) For what values of t is the particle moving to the right? $(2.718, \infty)$
c) Find the acceleration of the particle at time t = 5. 1.609
d) When is the particle's acceleration zero? 1
e) Find the total distance traveled by the particle from t = 1 to t = 8. $\int_1^8 |v(t)| = 21.864$
f) Find the displacement of the particle from t = 1 to t = 8. $\int_1^8 v(t) = 19.292$
g) Find the position of the particle at t = 5. $6 + \int_1^5 v(t) = 8.117$
h) Find the position of the particle at t = 0.3. $6 - \int_{.3}^1$ $6 - .628 = 6.628$
i) For what values of t is the particle slowing down? Speeding up?

I slowing down
$v(t) + a(t)$
different signs
$(1, e)$

I speeding up
$v(t) + a(t)$
same sign
$(0,1)(e,\infty)$

$a(t) = x\frac{1}{x} + 1\ln x - 1$

$a(t) = \ln x$