Good afternoon: Today's mini lesson is continuing
our discussion of Position, Velocity, and Acceleration

Remember the AP packets will be collected tomorrow
or today if it's ready :)

9. Particle Motion The accompanying figure shows the velocity
$v = f(t)$ of a particle moving on a coordinate line.

(a) When does the particle move forward? move backward? speed up? slow down?

(b) When is the particle's acceleration positive? negative? zero?

(c) When does the particle move at its greatest speed?

(d) When does the particle stand still for more than an instant?

$v = f(t)$
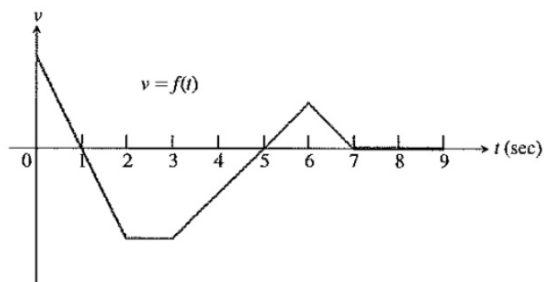
a.) fwd (means positive velocity)
(0,1) and (5,7)

backward (neg. velocity)
(1,5)

speed up (vel and acceleration (velocity's slope) have same sign)
(1,2) and (5,6)

slow down (diff. signs)
(0,1) and (3,5) and (6,7)

b.) remember, acceleration is change in velocity per change in time. aka, slope/deriv. of velocity
positive accel: (3,6)   negative accel: (1,2) and (6,7)   zero accel: (2,3) and (7,9)

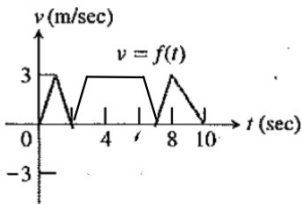c.) (2,3) (farthest away from 'rest' (velocity of 0, or the t-axis)
d.) (7,9)

11. Particle Motion The accompanying figure shows the velocity $v = ds/dt = f(t)$ (m/sec) of a body moving along a coordinate line.
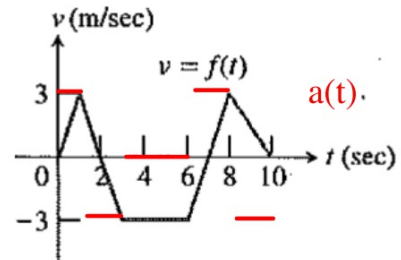

v (m/sec)

$v = f(t)$

3

t (sec)

0   2   4   6   8   10

-3
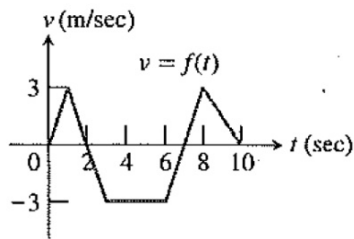
(a) When does the body reverse direction?

(b) When (approximately) is the body moving at a constant speed?

(c) Graph the body's speed for $0 \leq t \leq 10$.

(d) Graph the acceleration, where defined.

d.) accel is derivative of velocity

a.) 2 and 7 seconds

b.) (3,6)

c.)

v (m/sec)

$v = f(t)$

3

t (sec)

0   4   8   10

-3

speed is always positive
so its |velocity|

v (m/sec)

$v = f(t)$

3

t (sec)

0   2   4   6   8   10

-3

a(t).

19. *Particle Motion* A particle moves along a line so that its position at any time $t \geq 0$ is given by the function

$$s(t) = t^2 - 3t + 2,$$

where s is measured in meters and t is measured in seconds.

(a) Find the displacement during the first 5 seconds.

(b) Find the average velocity during the first 5 seconds.

(c) Find the instantaneous velocity when $t = 4$.

(d) Find the acceleration of the particle when $t = 4$.

(e) At what values of t does the particle change direction?

(f) Where is the particle when s is a minimum?