3.4 Concepts Worksheet
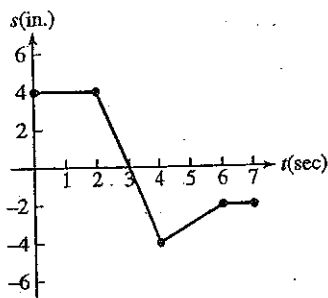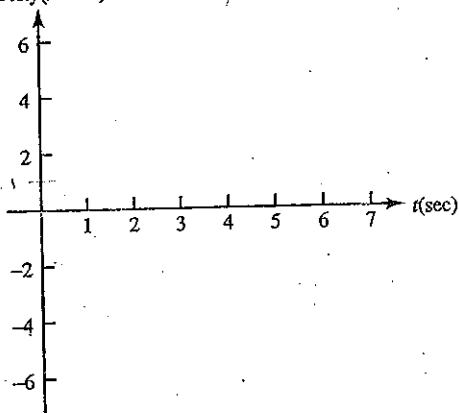
Velocity, Speed, and Acceleration

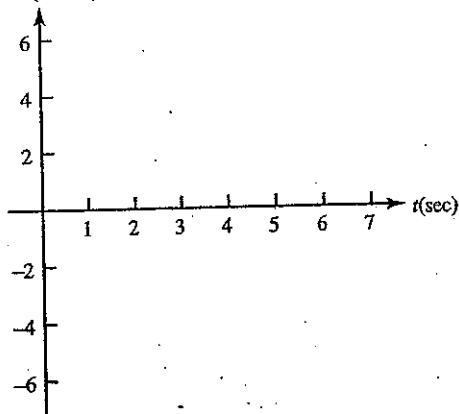**1.** The graph shows the position $s(t)$ of a particle moving along a horizontal coordinate axis.

(a) When is the particle moving to the left? _____

(b) When is the particle moving to the right? _____

(c) When is the particle standing still? _____

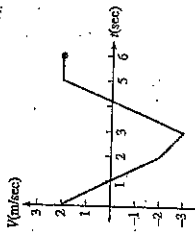(d) Graph the particle's velocity and speed (where defined).

(e) When is the particle moving fastest? _____

2. The graph shows the velocity $v = f(t)$ of a particle moving along a horizontal coordinate axis.

(a) When does the particle reverse direction? _____

(b) When is the particle moving at a constant speed? _____

(c) When is the particle moving at its greatest speed? _____

(d) Graph the acceleration (where defined).
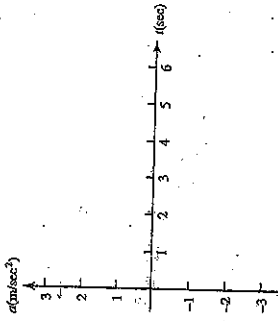
3. A particle moves along a vertical coordinate axis so that its position at any time $t \geq 0$ is given by the function $s(t) = \frac{1}{3}t^3 - 3t^2 + 8t - 4$, where s is measured in centimeters and t is measured in seconds.

(a) Find the displacement during the first 6 seconds.

_____

(b) Find the average velocity during the first 6 seconds.

_____

(c) Find expressions for the velocity and acceleration at time t.

$v(t) =$ _____ $a(t) =$ _____

(d) For what values of t is the particle moving downward?

_____

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4. The values of the coordinate s of a moving body for various values of t are given below.

t(sec)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
s(ft)	40.0	35.0	30.2	36.0	48.2	45.0	38.2	16.0	0.2

(a) Plot s versus t, and sketch a smooth curve through the given points.
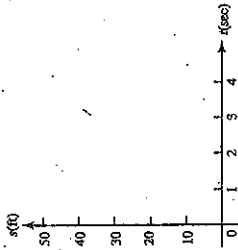
(b) Estimate the velocity at each of the following times.

At $t = 0.5$ sec, $v \approx$ _____

At $t = 2.5$ sec, $v \approx$ _____

At $t = 3$ sec, $v \approx$ _____

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

_____

(d) At what approximate value of t is the particle moving at the greatest speed?

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