P. 228 Dr. Bob

1. a) A pencil at rest on a table.

b) A car moving in a straight line with constant velocity.

c) A falling object.

d) An object thrown upwards at the moment it reaches the top of its trajectory.

2. It is decelerating - slowing down.

3. a) True. The average velocity is zero ($v_{avg}=0$) when the displacement is zero ($\Delta x = 0$). The object returns to its starting point even if it had a non-zero velocity during its trajectory.

b) False. While is true for an object at rest, it is not true in all circumstances. An object moving at constant velocity ($\vec{v} \neq 0$) would have a zero acceleration ($a=0$).

c) False. Again while true for an object @ rest it is not true in all cases. An object thrown vertically upwards would have zero velocity ($v=0$) at the top of the trajectory before it starts back down.

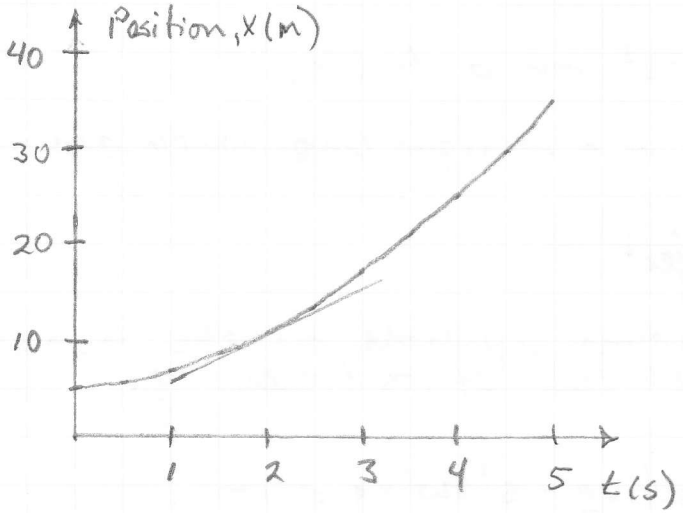
d) False. An object at rest has $a=0$ & $v=0$.

4. a) Uniform Rectilinear Motion (2.) (5.)

b) Uniformly accelerated rectilinear motion. (1.) (4.)

c) A motion or object reversing its direction (3.) (6.)

5.




a) $v = ?$ @ $t = 2s$

Tangent line: (7m, 1s) & (16m, 3s)

$$v = \frac{\Delta x}{\Delta t} = \frac{16m - 7m}{3s - 1s} = 4.5 m/s$$

$$\boxed{v = 4.5 m/s \text{ @ } 2s}$$

b) $v_{avg} = ?$ between (7m, 1s) & (35m, 5s)

$$v_{avg} = \frac{35m - 7m}{5s - 1s} = \frac{28m}{4s}$$

$$\boxed{v_{avg} = 7 m/s}$$

6. a) $v_i = 5 m/s$ $\quad v_f = -5 m/s$

$t_i = 1s$ $\quad t_f = 3s$

The slope and therefore the acceleration is constant during the time period of 1s to 2s. The acceleration will be the same throughout this time period including at 2s.

$$a = \frac{-5 m/s - 5 m/s}{3s - 1s} = -5.0 \ m/s^2$$

$$\boxed{a = -5.0 m/s^2 \text{ @ } 2s}$$

6 (cont'd.)

b) $a = 0$ @ 3.5 s since the velocity is constant during this portion of the graph.

c) $a_i = 0$ $\quad a_f = 10\ m/s$
$t_i = 2s$ $\quad t_f = 6s$

$$a_{avg} = \frac{10\ m/s - 0\ m/s}{6s - 2s} = 2.5\ m/s^2$$

$$\boxed{a_{avg} = 2.5\ m/s^2}$$

7. a) (1.)

b) (4.)

c) (2.)

d) (3.)

8. a) $1 \to 2s$ ; $d = (-10\ m/s)(1s) = -10\ m$

$2 \to 3s$ ; $d = \frac{1}{2}(-10\ m/s)(1s) = -5\ m$

$3 \to 5s$ ; $d = \frac{1}{2}(20\ m/s)(2s) = 20\ m$

$5 \to 6s$ ; $d = (20\ m/s)(1s) = 20\ m$

$$\boxed{d_{tot} = 25\ m}$$

b) $$v_{avg} = \frac{d_{tot}}{6s - 1s} = \frac{25\ m}{6s - 1s} = 5.0\ m/s$$

$$\boxed{v_{avg} = 5.0\ m/s}$$

c) $a = ?$ @ 2.5 s $\quad v_i = -10\ m/s \quad v_f = 0\ m/s$ $\quad t_i = 2s \quad t_f = 3s$

$$a = \frac{0\ m/s - -10\ m/s}{3s - 2s}$$

$$\boxed{a = 10\ m/s^2}$$

8. (cont'd)

d) $\boxed{v = 10\,m/s \quad @ \quad 4s}$