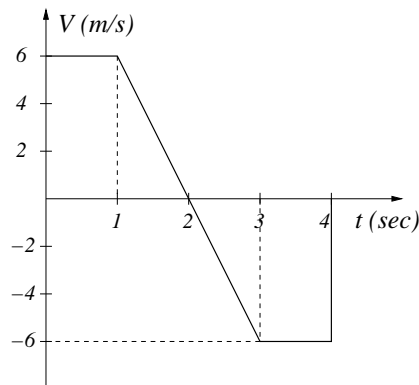


Problem 1: Kinematics (15 pts)

A particle moves along a *straight line* x . At time $t = 0$, its position is at $x = 0$. The *velocity*, V , of the object changes as a function of time, t , as shown in the figure. V is in m/s, x is in meter, and t is in seconds.

- (a) What is x at $t = 1$ sec?
- (b) What is the *acceleration* (m/s^2) at $t = 2$ sec?
- (c) What is x at $t = 4$ sec?
- (d) What is the *average speed* (m/s) between $t = 0$ and $t = 3$ sec?



Solution:

- (a) From the area below the velocity curve, we find $x = 6\text{m}$ at $t = 1$.
- (b) From the slope of the velocity curve at $t = 2$, we find $a = (-6 - 6)/2 = -6\text{m/s}^2$.
- (c) The area below the $v = 0$ -line has a negative contribution to the displacement. We find $x = 0$ at $t = 4$.
- (d) The area below the $v = 0$ -line has a negative contribution to the total distance traveled. Average speed $= (6 + 3 + 3)/3 = 4\text{m/s}$. (Different from average velocity which is $(6 + 3 - 3)/3 = 2\text{m/s}$)