P2.2-2) The velocity of a particle is given by $v(t) = at - b$, where v is in m/s, t is in seconds, a = 2 and b = 8. Plot the position, velocity and acceleration of the particle between t = 0 and t = 5 seconds. Determine the position, velocity and acceleration of the particle at t = 2 seconds if the position of the particle is at the origin when t = 0. Also, determine the displacement of the particle and total distance traveled by the particle between t = 0 seconds and 5 seconds.

Given:

Find:

Solution:

Derive the Position

Circle the equation that you will use?

$v = \frac{ds}{dt}$ $\quad a = \frac{dv}{dt}$ $\quad a\,ds = v\,dv$

What are your limits of integration?

Position limits
- Low _____
- High _____

Time limits
- Low _____
- High _____

$s(t)$ = _____

$s_{t = 2\text{ s}}$ = _____

Calculate the Velocity at 2 seconds.

$v_{t = 2\text{ s}}$ = _____

Derive the Acceleration

Circle the equation that you will use?

$v = \frac{ds}{dt}$ $\quad a = \frac{dv}{dt}$ $\quad a\,ds = v\,dv$

$a(t)$ = _____

$a_{t = 2\text{ s}}$ = _____

Does the particle turn within 0 and 5 seconds?

Yes No

If the particle turns, at what time does it turn?

t_{turn} = _____

Calculate the displacement between 0 and 5 seconds.

$s_{t = 0\ s}$ = _____

$s_{t = 5\ s}$ = _____

$\Delta s_{t=0 \text{ to } 5}$ = _____

Calculate the Total Distance traveled between 0 and 5 seconds

$s_{t = \text{turn}}$ = _____

Draw a line graph for the position of the particle.

s_{total} = _____

Plot the position, velocity and acceleration