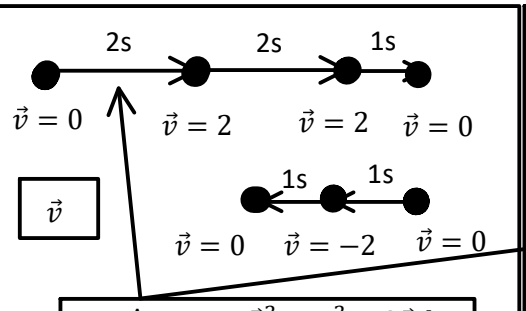
P11 - 1.0 - $\vec{v}$ vs t Notes

$\vec{v} = velocity\ (\frac{m}{s})$

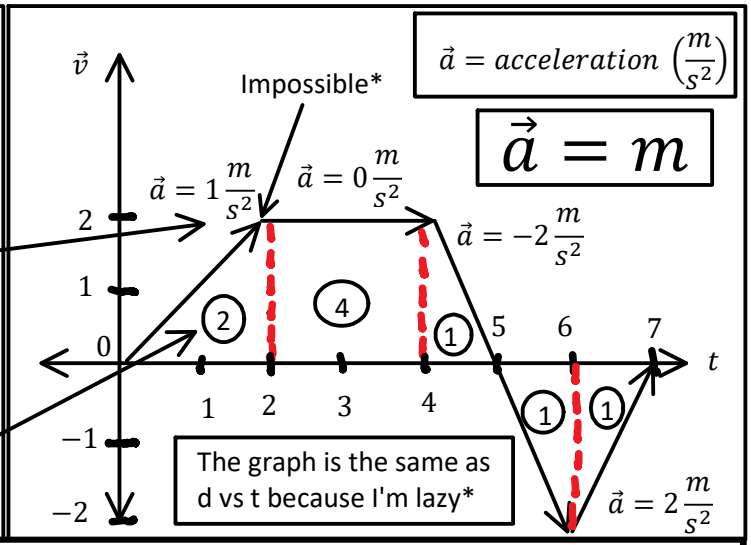
You start from rest and accelerate East at 1 m/s^2 for 2s then run for 2s at constant speed then slow down at 2 m/s^2 to a stop and run backwards speeding up at 2 m/s^2 for 1s then slow down to a stop in 1s.



$$\vec{a} = \frac{\Delta v}{\Delta t} \qquad \vec{v}_f^2 = \cancel{v_i^2} + 2\vec{a}d$$

$$\vec{a} = \frac{2}{2} = 1\frac{m}{s^2} \qquad d = \frac{\vec{v}_f^2}{2\vec{a}}$$

$$d = \frac{2^2}{2(1)} = 2m$$

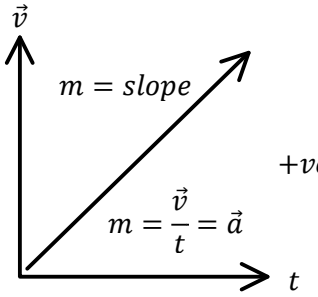


$\vec{a} = acceleration\ (\frac{m}{s^2})$

$\vec{a} = m$

t	$\vec{v}$
0	0
1	1
2	2
3	2
4	2
5	0
6	−2
7	0

$$m = \frac{\vec{v}_2 - \vec{v}_1}{t_2 - t_1}$$



Velocity vs Time

$$\vec{a}_{(0,2)} = \frac{2-0}{2-0} \qquad \vec{a}_{(2,4)} = \frac{2-2}{4-2}$$

$$\vec{a}_{(0,2)} = 1\frac{m}{s^2}\ [E] \qquad \vec{a}_{(2,4)} = 0\frac{m}{s^2}\ [E]$$

$+ve\ , -ve^*$

$$\vec{a}_{(4,6)} = -2\frac{m}{s^2}\ or\ 2\frac{m}{s^2}\ [W]$$

$displacement = area$

$$a = \frac{bh}{2} \qquad a = \frac{(2)(2)}{2} \qquad a = 2 \qquad d = 2m$$

$$a = lw \qquad a = (2)(2) \qquad a = 4 \qquad d = 4m$$

$$a = \frac{bh}{2} \qquad a = \frac{(1)(2)}{2} \qquad a = 1 \qquad d = 1m$$

Constant Velocity : Horizontal Line
Zero Velocity : $x - int$
Positive Velocity : Above $x - axis$
Negative Velocity : Below $x - axis$
Acceleration : Slope
Speeding Up : $\vec{a}$ & $\vec{v}$ *same sign*
Slowing Down : $\vec{a}$ & $\vec{v}$ *opposite sign*
Displacement : Area*

Find the total Distance Travelled and Displacement.

$$Distance = 2 + 4 + 1 + 1 + 1$$

$$Distance = 9\ m$$

$$Displacement = 2 + 4 + 1 - 1 - 1$$

$$Displacement = 5\ m$$

$slope = \vec{a}$

$$m = \frac{\vec{v}_2 - \vec{v}_1}{t_2 - t_1} = \frac{\Delta\vec{v}}{\Delta t} = \boxed{\vec{a}}$$

$\Delta = change\ in$

$$\vec{a} = \frac{d}{dt}\vec{v}(t)$$

Leibniz Notation

Derivatives Calc 12