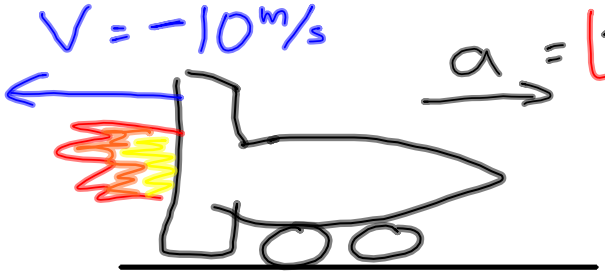
Acceleration and Velocity as Arrows



acceleration tells us how much to change the velocity each second

therefore, the velocity will change by 2 m/s each second.

−10 m/s +2 m/s = −8 m/s

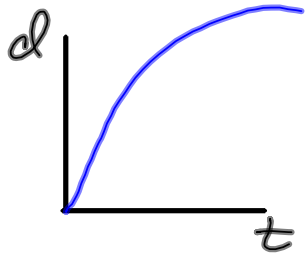
Time	acceleration	acceleration arrow	Velocity arrow	Velocity
0	2 m/s/s	→	←	−10 m/s
1	2 m/s/s	→	←	−8 m/s
2	2 m/s/s	→	←	−6 m/s
3	2 m/s/s	→	←	−4 m/s
4	2 m/s/s	→	←	−2 m/s
5	2 m/s/s	→		0 m/s
6	2 m/s/s	→	→	2 m/s
7	2 m/s/s	→	→	4 m/s
8	2 m/s/s	→	→	6 m/s

The slope of a Velocity vs. Time graph is the Acceleration

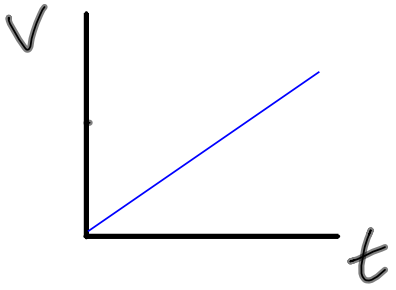
The slope of a Distance vs. Time graph is the velocity.

A lacrosse player is sprinting at 6m/s. She scores a goal and then slows down to high five her team mates

1. What would her distance vs. time graph look like?



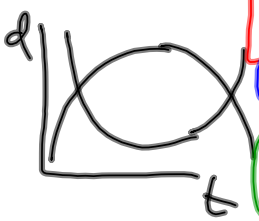
2. Draw a velocity time graph for this motion



10. Distance VS time: Slope = velocity

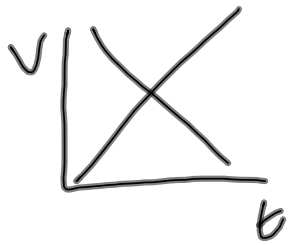
Velocity vs. time graph: slope= acceleration

11.



if there is a constant acceleration that means that the velocity has to be changing. Velocity is the slope of a distance time graph, so if the velocity is changing, the slope of a d vs t graph must also be changing.

12.

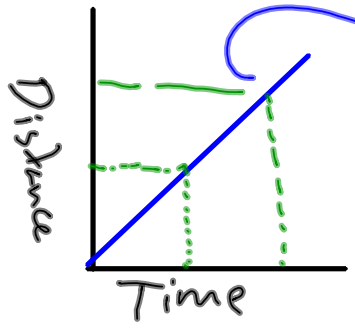


acceleration is the slope of a velocity time graph. we have a constant acceleration then there should be a constant slope to a V vs T graph.

Motion Lab 1:

Distance vs. Time graphs with a constant velocity:

Relationship: Linear



Slope = the velocity

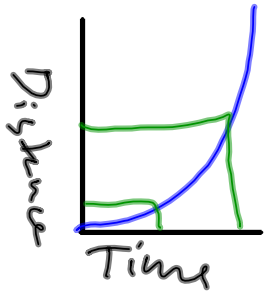
$$d = V \cdot t$$

When you double the time, the distance doubles as well.

Motion Lab 2:

Distance vs. Time graph with a Constant Acceleration

Relationship: Quadratic



distance ~ acceleration · time²

$$d = \frac{1}{2} a t^2$$

When the time is doubled the distance is quadrupled.

Acceleration: A change in velocity over time.

$$a = \frac{V_f - V_i}{t}$$ (V_f ~ final velocity, V_i ~ initial velocity, t ~ time)

$$a = \frac{\Delta V}{\Delta t}$$

↳ Δ = delta = change in

Units: $\frac{m/s}{s} = m/s/s = m/s^2$

$$\frac{\frac{m}{s} \cdot \frac{1}{s}}{\frac{s}{1} \cdot \frac{1}{s}} = \frac{m}{s} \cdot \frac{1}{s} = \frac{m}{s \cdot s} = \frac{m}{s^2}$$

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