Warm up:

In a bottle rocket, a 2L soda bottle can be pressurized to 100 psi (pounds per square inch) safely. If 1 atmosphere = 14.7 psi, how many atm of pressure can the bottle take?

$$\frac{100\ psi}{1} \times \frac{1\ atm}{14.7\ psi} = 6.80\ atm$$

Objective: SWBAT determine the position and velocity of an object moving at constant velocity or constant acceleration

Agenda:

- Warm Up
- Lab: Constant Velocity
- Notes
- Practice
- Reflection

Lab: Constant Velocity Motion

A: $x = 61.4t + 61.5$ (cm)

- x: displacement (or final position)
- 61.4: speed
- 61.5: starting (initial) position

Materials:

- bouncy ball
- ramp
- meterstick
- timer

Question: At a constant speed, how does the time elapsed affect the distance the ball rolls?

Record your procedure and data (remember repetition), and present your model after ~20 minutes.

Notes: Quantities for Describing Motion

A **time interval** $\Delta t = t_2 - t_1$ is the difference between two times as read from a clock/timer.

- SI unit: seconds (s)

The **position** of an object is where it is on some coordinate system. An object's **displacement** is the distance between its initial and final position. The **path length** is how far the object traveled between its initial and final position.

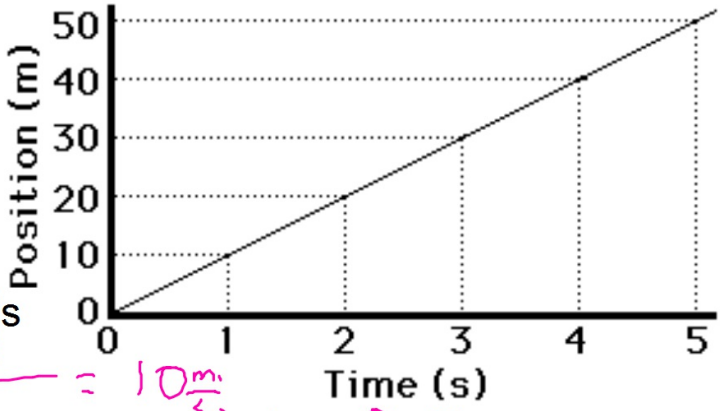
- SI unit: meters (m)

Reading Position vs. Time Graphs

notation:

- x -- instantaneous position (position at a particular instant)
- x_i -- initial position
- x_f -- final position

- displacement $\Delta x = x_f - x_i$
- time interval $\Delta t = t_f - t_i$



We can find an equation for this line.

$m = \frac{20-10}{2-1} = 10\frac{m}{s}$ $b = 0m$

$x(t) = 10t$

Notes: Quantities for Describing Motion

An object's **speed** is how far it goes in a certain amount of time. Its **velocity** is both the speed and direction the object is moving.

- SI unit: meter per second (m/s)

Acceleration is the change in speed (or velocity) in a certain amount of time. Like velocity, it can be a vector.

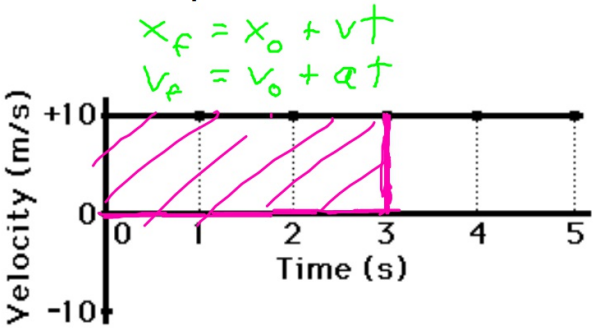
- SI unit: meter per second per second (m/s^2)

Reading Velocity vs. Time Graphs

How can we get acceleration from these graphs?

$a = m = \frac{0\ m/s}{1\ s}$

$= 0\ m/s^2$



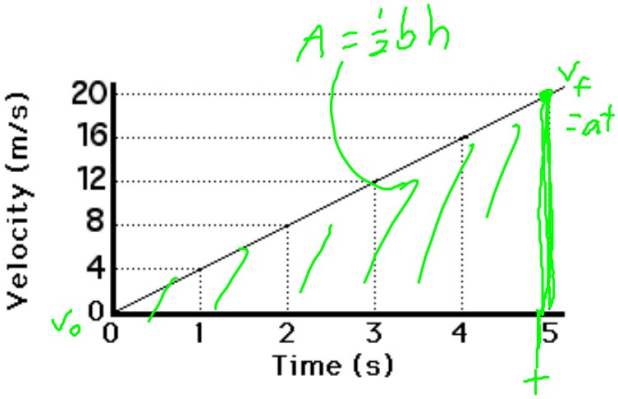
$a = \frac{+4\ m/s}{1\ s} = 4\ m/s^2$

How can we get displacement?

$\Delta x = 10\ m/s \cdot 3\ s = 30\ m$

$\Delta x = \frac{1}{2} b h = \frac{1}{2}(t)(at)$

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



Practice

pg. 52: 1-25

(you don't have to do them all)
(some are for homework)

Reflection

What is the difference between displacement and distance traveled?