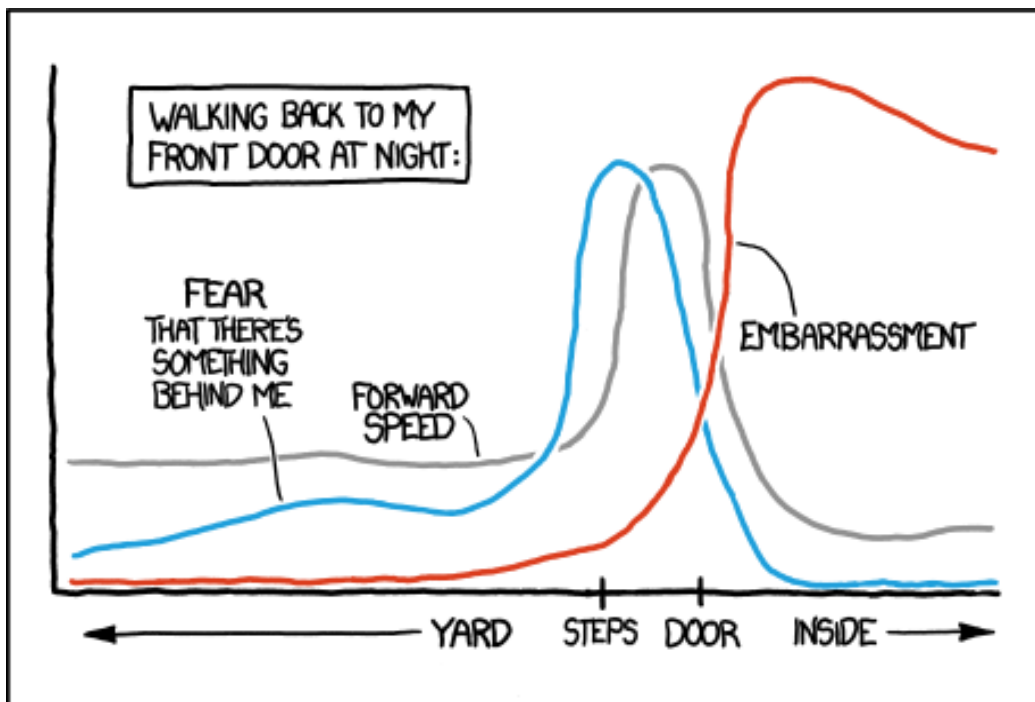# Graphs

- Always use a grid to draw a graph
- Needs a title, X & Y axis, all units
- X-axis is the independent variable Time (s)
- Y-axis is the dependent variable
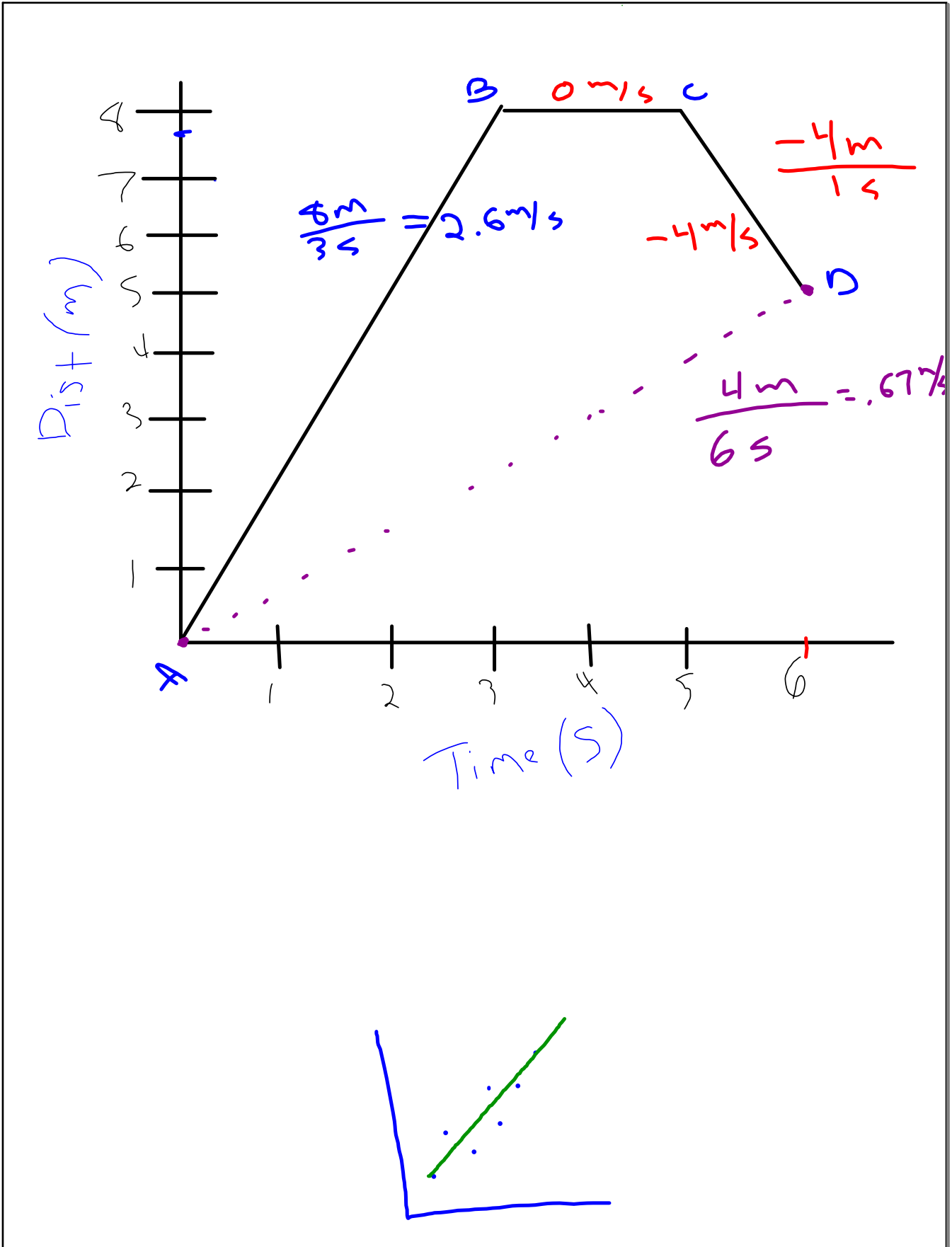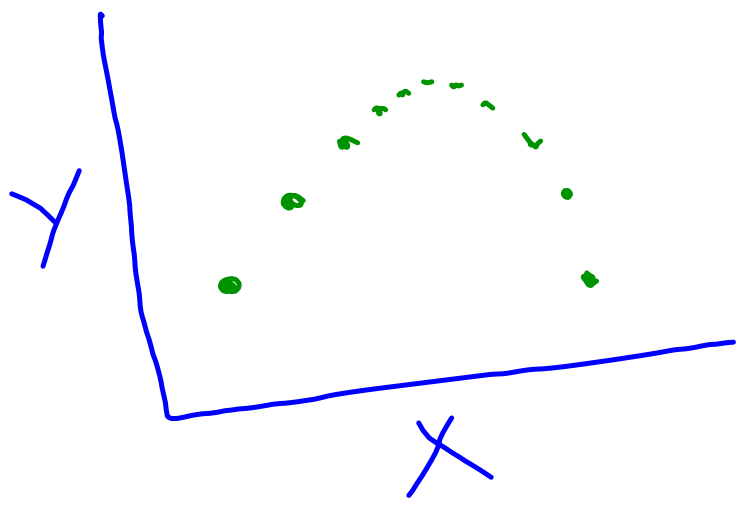
Types of Graphs
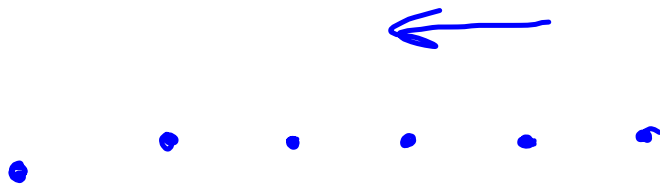
Line: Shows changes between two related variables

Slope= Rise/Run

Distance vs. Time graph with points A, B, C, D showing:
- $\frac{8m}{3s} = 2.6 m/s$ (slope from A to B, blue)
- $0 m/s$ (from B to C, red)
- $-4m/s$, $\frac{-4m}{1s}$ (from C to D, red)
- $\frac{4m}{6s} = .67 \%$ (dashed purple line A to D)
- Y-axis: Dist (m), X-axis: Time (s)
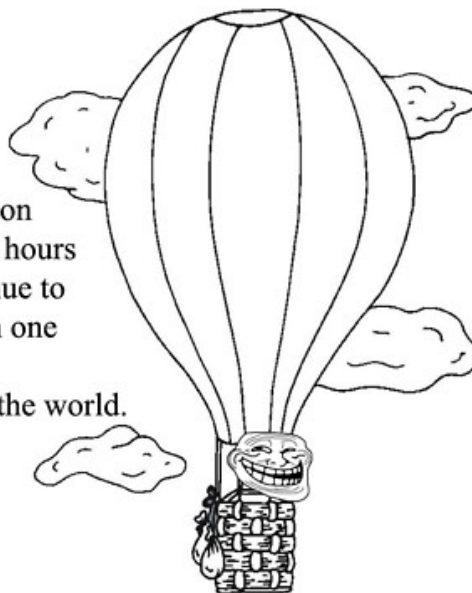
Dot Graphs for motion
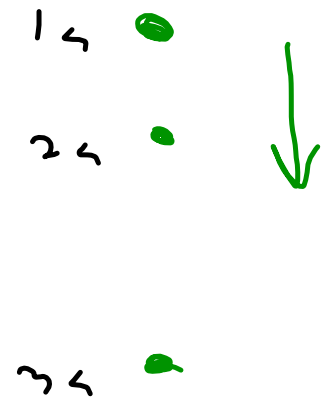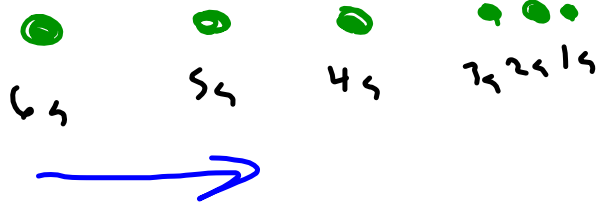
SI Units, Conversions, Scientific Notation, Significant Digits

Ch 1

http://amazingrust.com/Experiments/background_knowledge/Measurement.html

1. Acquire hot air balloon
2. Hover around for 24 hours
3. The earth will continue to rotate while you stay in one place.
4. Enjoy going around the world.

Jan 16-10:32 AM

SI Units

Area: m^2

Volume: L, m^3

Density: $\dfrac{mass}{volume} \rightarrow \dfrac{Kg}{m^3} \rightarrow \dfrac{Kg}{L}$

Distance: m

Mass: g, Kg

Time: S

Temperature: $K, {}^\circ C$

Common Prefixes:

Tera= 1,000,000,000,000 m $1 Tm$
Giga= 1,000,000,000 $m \rightarrow 1 Gm$
Mega= 1,000,000 $m \rightarrow 1 Mm$
Kilo= 1,000 $m \rightarrow 1 Km$
base= 1 m
centi= .01 $m \rightarrow 1 cm$
milli= .001 $m \rightarrow 1 mm$
micro=.000001 $m \rightarrow 1 \mu m$
nano=.000000001 $m \rightarrow 1 nm$
pico= .000000000001 $m \rightarrow 1 pm$

When converting use the picket fence method!

$$\frac{(3876 \text{ g})(1000) \text{ mg}}{1 \text{ g}} = 3{,}876{,}000 \text{ mg}$$

Conversion factors: 3,876g to mg

Common conversions:
1 in = 2.54 cm
1 mile= 1609 m
1 kg = 2.2 lbs
1 m = 3.28 ft
°F = 5/9 (°F-32) gives T in °C
°C = 9/5 °C + 32 gives T in °F

Height of a volunteer from ft to m, then lbs to kg

6 ft 2 in ⟶ m

$$\frac{74 \text{ in}}{} \frac{2.54 \text{ cm}}{1 \text{ in}} \frac{1 \text{ m}}{100 \text{ cm}} = \boxed{1.88 \text{ m}}$$

175 lbs ⟶ Kg

$$\frac{175 \text{ lbs}}{} \frac{1 \text{ Kg}}{2.2 \text{ lbs}} = 79.5 \text{ Kg}$$

m/s

$$\frac{75 \text{ miles}}{\text{hr}} \frac{1609 \text{ m}}{1 \text{ mile}} \frac{1 \text{ hr}}{3600 \text{ s}} = \boxed{33.5 \text{ m/s}}$$

Jan 16-10:03 AM
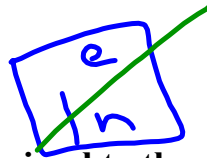
Scientific Notation

used to express very large or small numbers.

$1 \text{ E}^3 = 1000$

$25 \text{ EE}^4 \quad 25 \times 10^4$

To convert large numbers move the decimal point to the left until it is located to the right of the first nonzero number

E   EE

3459987355 -->

EXP

To convert small numbers move the decimal to the right of the first non zero number.

.0000000567 -->

$5 \text{ EE}^4 = 50000$

For numbers larger than one the exponent is positive
For numbers smaller than one the exponent is negative

$3.2 \times 10^3 + 5.1 \times 10^2 =$

$5.0 \times 10^9 / 2.5 \times 10^6 =$

$(3.0 \times 10^6 \text{ m/s}) (5.0 \times 10^2 \text{ s}) =$

Significant Digits/Figures

For most cases, the correct number of significant digits to use is the least in one number of the problem

$25.\overset{4}{3}4 + 15\overset{3}{2} + 4.\overset{4}{0}09 =$ $178.453 \approx 178$ 1.78×10^2

200

$20.345 * 100.9 =$ 1.78×10^2

You can combine Sig Figs and Scientific Notation!

$4500.$

Using this equation D=VT write the answer in Sig Figs.
A space shuttle leaves Earth and Flies to Jupiter covering a distance of 389,763,156,976,654 m. It took the space shuttle 8.5 years to get there. What Was its velocity?

$.0500$

Jan 16-10:08 AM

SOH CAH TOA

$5 m/s = V_y$

$10 m/s$

$30°$

$V_x = 8.66 m/s$ $\cos 30 = \dfrac{V_x}{10}$

$30°$ $150°$

$300°$

$60°$

$30°$