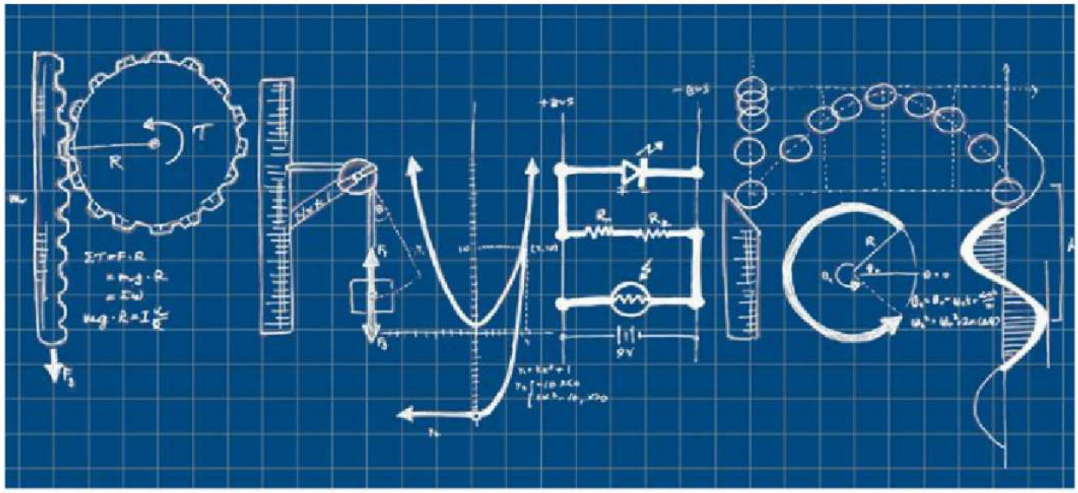
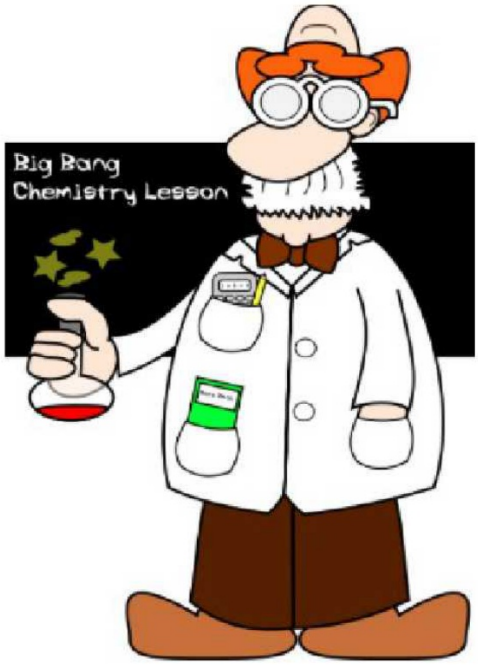
Hello!

- Find a seat.
- Take out your notebook, a pencil, and a calculator.
- Please put cell phones in a place where they can not be seen.



Welcome!



Greet the Creature

Syllibus

Procedures

Interest Survey

- Please fill out the survey to the best of your ability.
- You will be sharing an item or two with your new lab partner during class.
- You will not have to show your lab partner your survey, though I will collect it to get to know you better.

Interest Survey

- Interview your lab partner. Find out two items from their survey that they want you to know about them.
- You will introduce your partner to the class along with one thing about them that they would like the class to know.

What is science?

On the back of the interest survey, write what you think science is.

1) What it means formally
2) What it means in your own words
3) How it applies to your life

What is Physics?

- Making sense of our physical environment.
- Describing how matter, energy and motion interact.
- The behavior of the universe.

Organized problem solving.

What happening?

How's your balance?


0:01 / 5:27
5 Fun Physics Phenomena

Math Pre-test

- You will need a calculator, a pencil, and a calculator. In degrees.
- You will have the rest of the period to complete the quiz. Finish overnight if you need to.
- I will be collecting it.
- There is no benefit to sharing answers.

Do Now

- Take out your math pretest.
- Take out a pen or pencil and your notebook.

Tonight:

Dimensional Analysis Worksheet

Access it on School Wires

Read and Take Notes:
physicsclassroom.com
1-D kinematics: Lessons 1-3

Position – Time Graphs

In Case of Fire Drill

- Close all windows and doors.
- Leave belongings in class.
- Out the door, make a right.
- Down the stairs, turn around and out the door.
- First tree on the right.

Math Pre-test Review

- I will ask for volunteers to help me answer questions.

1st Block 7:25 to 8:08

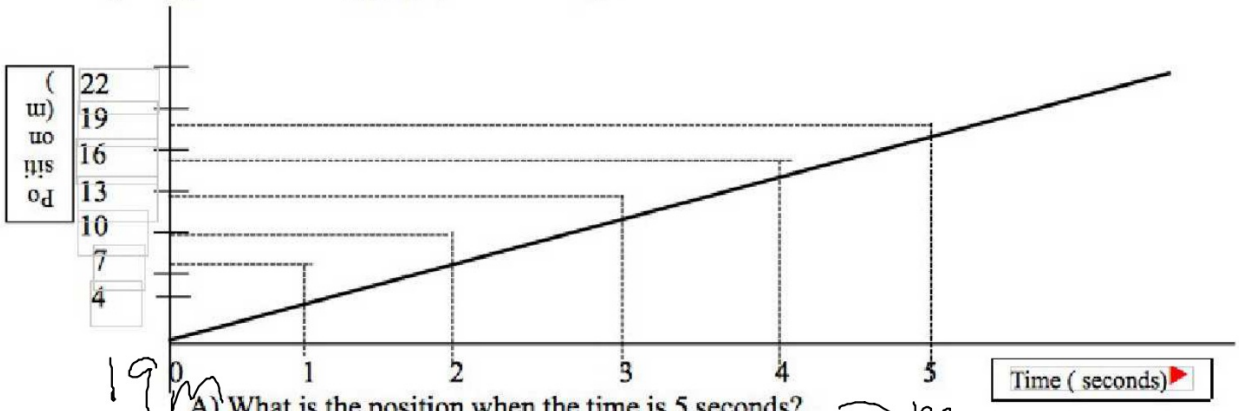
2nd Block 8:14 to 9:04

3rd Block 9:10 to 9:52

4th Block 9:58 To 10:40

Honors Physics Math Pre-Test

1) Using the following graph, answer the questions that follow:



19m

A) What is the position when the time is 5 seconds?

1 S

B) When is the object at position 7 meters?

C) What is the value of the slope? 3m/s

4m

D) What is the y (position) intercept?

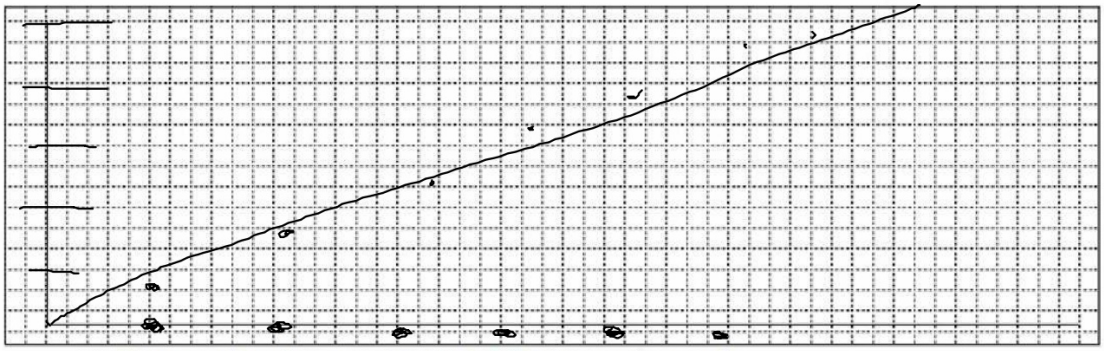
E) Write a specific equation that describes the line shown on the graph. Use the symbol x for position and t for time.

$y = 3x + 4$

2)

A) Plot the points and label the graph for a baseball player who does not use human growth hormone:

x (number of years experience)	y (cumulative number of homeruns)
1	35
2	72
3	112
4	137
5	175
6	210



B) Using a ruler, draw a LINE OF BEST FIT on the graph.

_____C) Using the line of best fit, predict the cumulative number of homeruns that will be hit by season 7.

A) $v = v_0 + at$, where $v_0 = 5$, $a = 7$, $t = 3$, $v = ?$

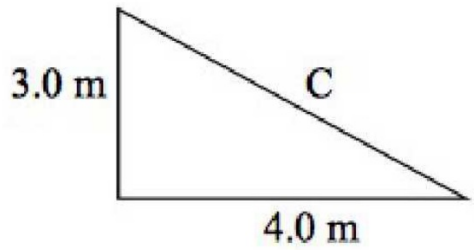
B) $v^2 = v_0^2 + 2a\Delta x$, where $v = 7$, $a = 4$, $\Delta x = 3$, $v_0 = ?$

$\Delta x = v_0 t + 0.5at^2$, where $\Delta x = 72$, $a = 7$, $t = 4$, $v_0 = ?$

A) $v = v_0 + at$, solve for a.

B) $v^2 = v_0^2 + 2a\Delta x$, solve for a.

C) $a = F/m$, solve for m.



a) Determine the size of side **C**.

b) Determine the size of the angle in the lower right (in degrees).

http://www.ted.com/talks/michael_specter_the_danger_of_science_denial

You Can Be Logical

Answer the Following

- What is science?
- Why are there many people that do not trust the scientific method?
- Why is science important to our society?

6) Given the equation: $90 = 5 + 2\mathbf{t} + 3\mathbf{t}^2$,find all solutions for **t.**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$3t^2 + 2t - 85 = 0$

$a = 3, \quad b = 2, \quad c = -85$

$x = 5$ or $-5.\overline{6}$

6) Given the equation: $90 = 5 + 2\mathbf{t} + 3\mathbf{t}^2$,find all solutions for **t.**

Factoring

$(3t+17)(t-5)=0$

$\frac{-17}{3}$ $\quad 5$

7) Given the equations: $X = 10 + 2t^2$ and $X = 100 + 3t - 4t^2$ find all solutions for **x** and **t**.

$10 + 2t^2 = 100 + 3t - 4t^2$

$-3t + 4t^2 \quad -100 \quad -3t + 4t^2$

-100

$6t^2 - 3t - 90 = 0$

$t = 4.13 \text{ & } -3.63$

$X = 44.1 \text{ & } 36.4$

Jump to 42

Le Systeme International d'Unites

- SI Units: the standard for measurement (metric).
- Length: meter [m]
- Mass: kilogram [kg]
- Time: second [s]

SI vs British Engineering

• meter	• foot
• kilogram	• pound
• second	• second
• newton Force	• foot-pound
• Celsius	• Fahrenheit

Unit Prefixes

- Kilo [k] 10^3
- Mega [M] 10^6
- Giga [G] 10^9
- Tera [T] 10^12

- Centi [c] 10^-2
- Milli [m] 10^-3
- Micro [μ] 10^-6
- Nano [n] 10^-9
- Pico [p] 10^-12

Convert into Scientific Notation

- 301,000
- 0.000074
- 4,000
- 0.0200

Dimensional Analysis

- The role of units in problem solving.
- Dimensional analysis allows us to properly convert units by "canceling" out conversion factors.
- This is a good way to check your work. If you use DA properly, you should arrive at the proper units.

How many inches are in a meter?

$1 in = 2.54 cm$

K: 1m

U: ? in

$1m = 100cm$

Eqn: $1 in = 2.54 cm$

$$\frac{1m}{1} \times \frac{100cm}{1m} \times \frac{1 in}{2.54cm} = 39.4 in$$

Many meters are in a mile?

1 mile = 5,280 ft. 1 in = 2.54 cm.

$$\frac{1\ mi}{1} \times \frac{5280\ ft}{1\ mi} \times \frac{12\ in}{1\ ft} \times \frac{2.54\ cm}{1\ in}$$

$$\times \frac{1\ m}{100\ cm} = \qquad m$$

How many cubic inches in a cubic yard?

K: $1\ yd^3$

U: $\#in^3$

Eqn: $1yd = 36\ in$

How many cubic centimeters in a cubic meter?

A car is traveling at 65 mi/hr. How fast is it traveling in m/s?

Tonight:

Dimensional Analysis Worksheet

Access it on School Wires

Read and Take Notes:
physicsclassroom.com
1-D kinematics: Lessons 1-3

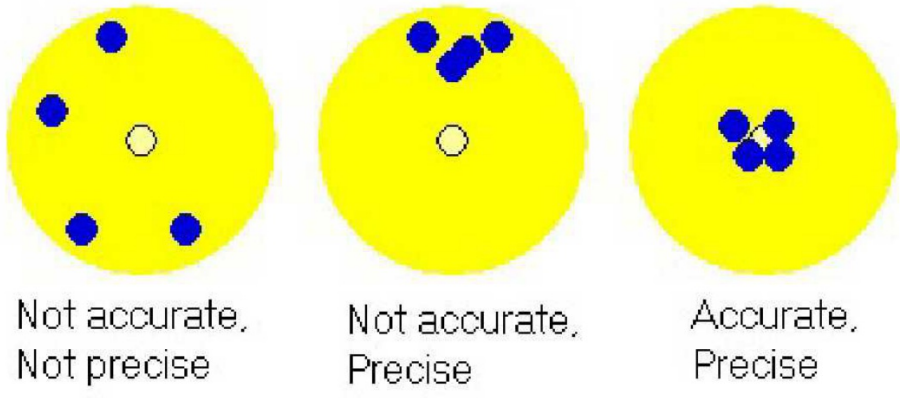
0.0000273135

2.73×10^{-5}

Accuracy and Precision

- Accuracy: How close a measurement is to the true value.
- Precision: How close measured values are to each other.

  How specific the measurement is.



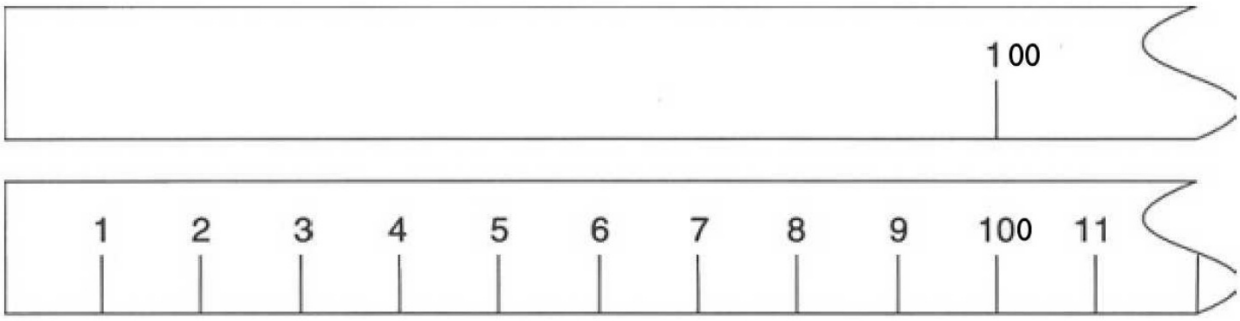
Precision vs Accuracy

Accurate, Precise or Both?

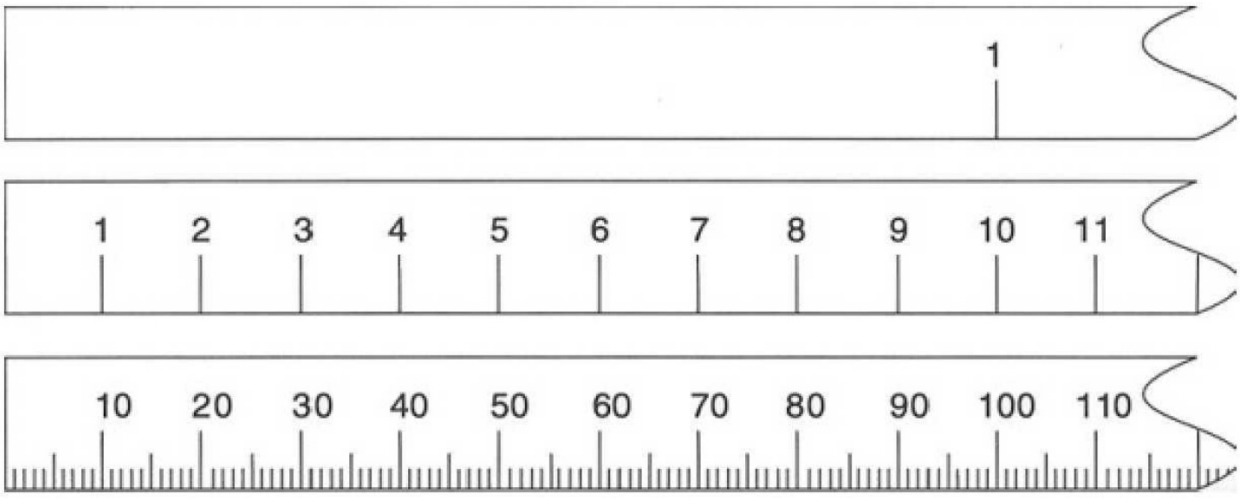
- Pi = 22/7
- Pi = 3.14159
- We are in Doylestown
- The text book has a mass of 2kg
- Three darts 1cm apart on the edge of the dart board.

I weigh 475.025kg

Measure Your Arm

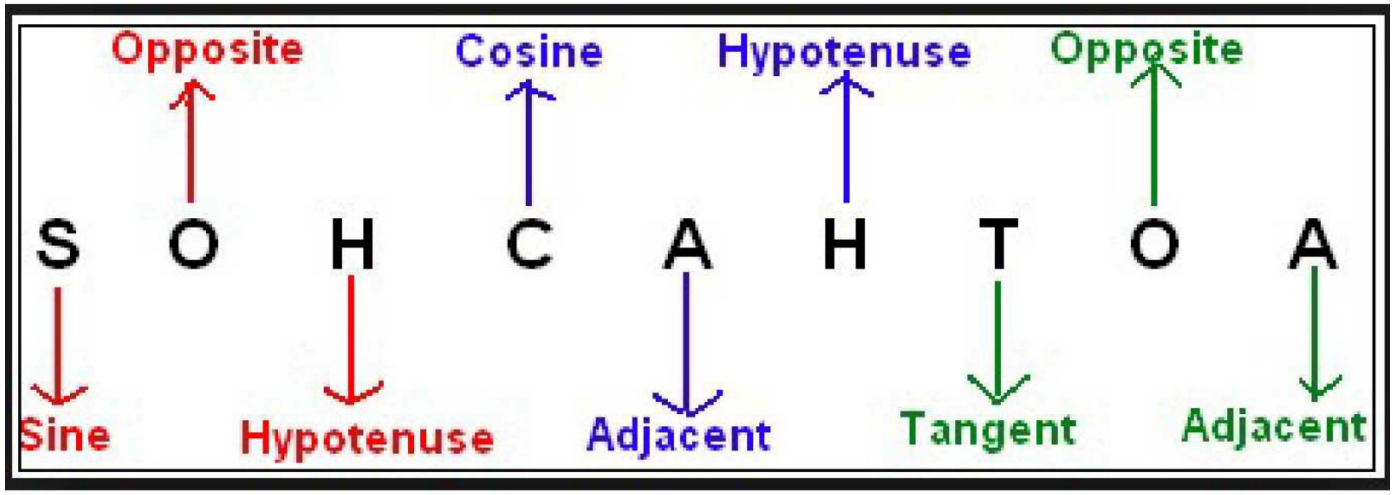


Measure Your Arm



Measure Your Arm

Jump to 59



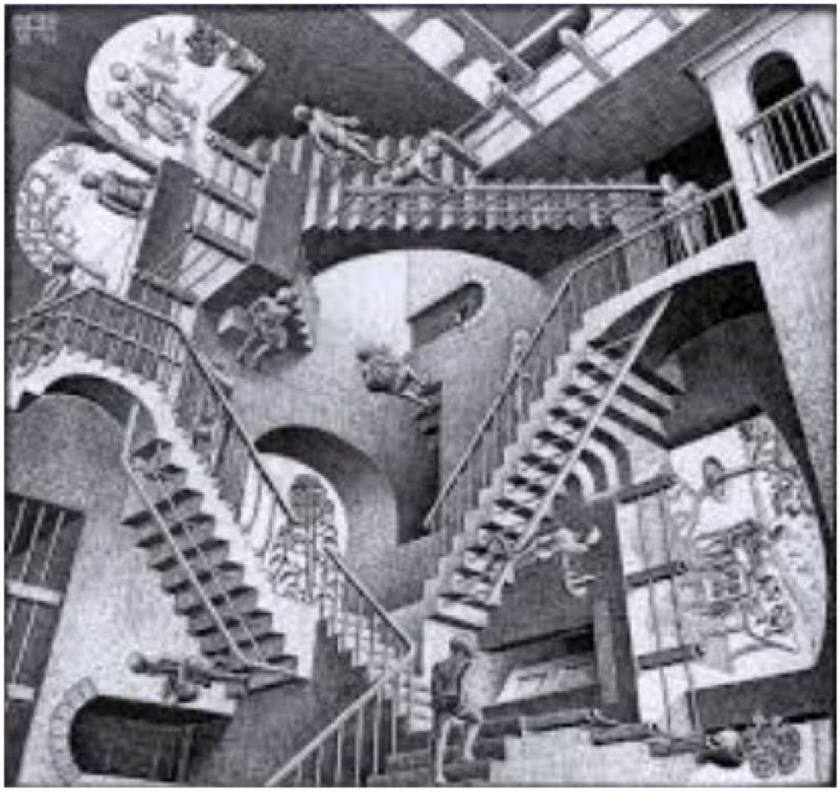
Trigonometry

$$\sin\Theta = \frac{\text{Opposite}}{\text{Hypotenuse}} \qquad \csc\Theta = \frac{1}{\sin\Theta}$$

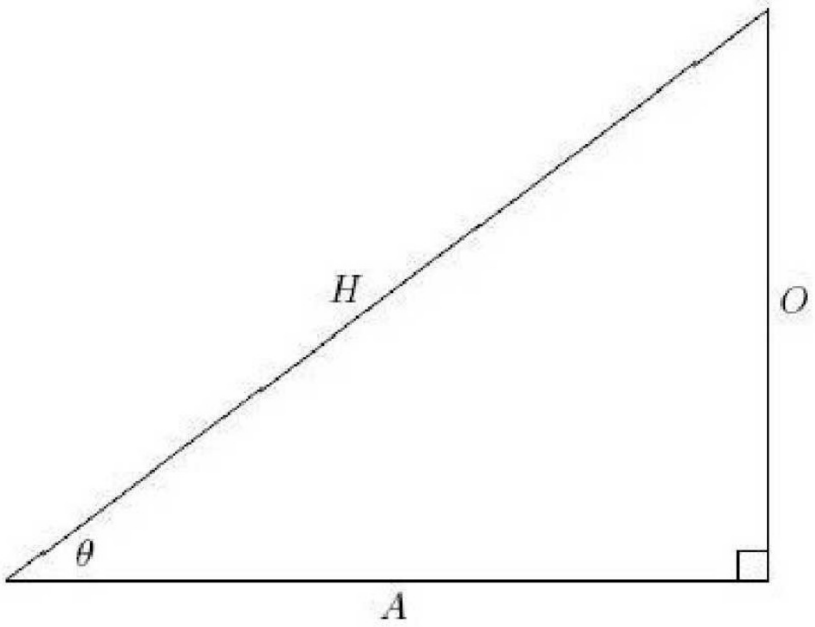
$$\cos\Theta = \frac{\text{Adjacent}}{\text{Hypotenuse}} \qquad \sec\Theta = \frac{1}{\cos\Theta}$$

$$\tan\Theta = \frac{\text{Opposite}}{\text{Adjacent}} \qquad \cot\Theta = \frac{1}{\tan\Theta}$$

Fraction Resolution



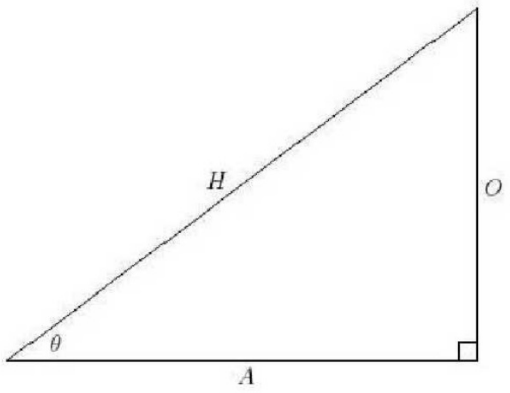
Downstairs, Downstairs = Upstairs, Upstairs

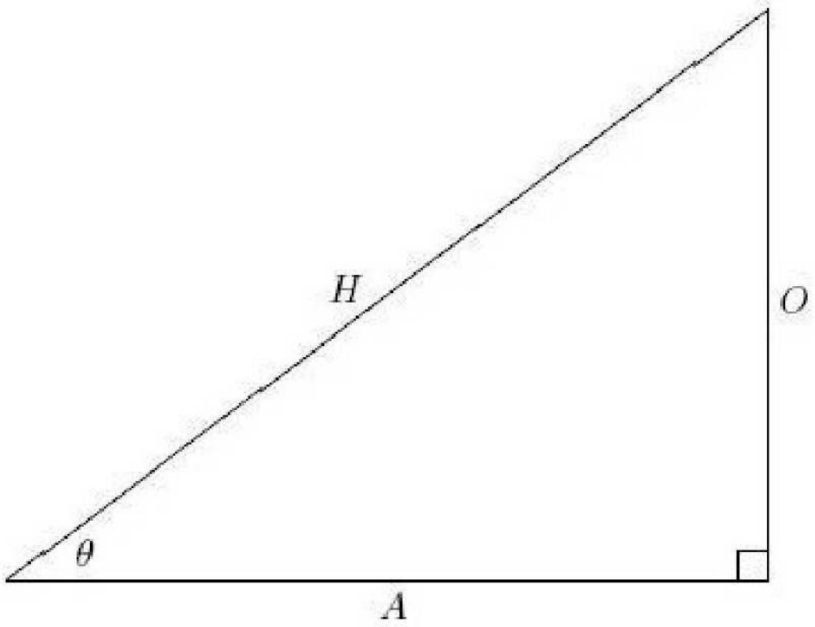


Choose the Function

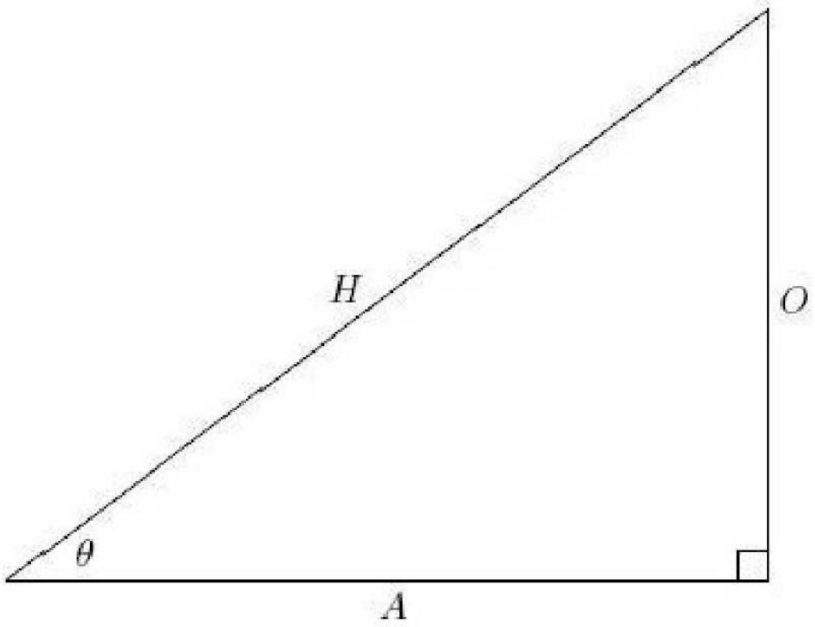
Solve the Following

- Find H if A=3m and θ=25°.
- Find θ if A=2.4m and H=7.3m.
- Find O if θ=73° and H=6.2m.

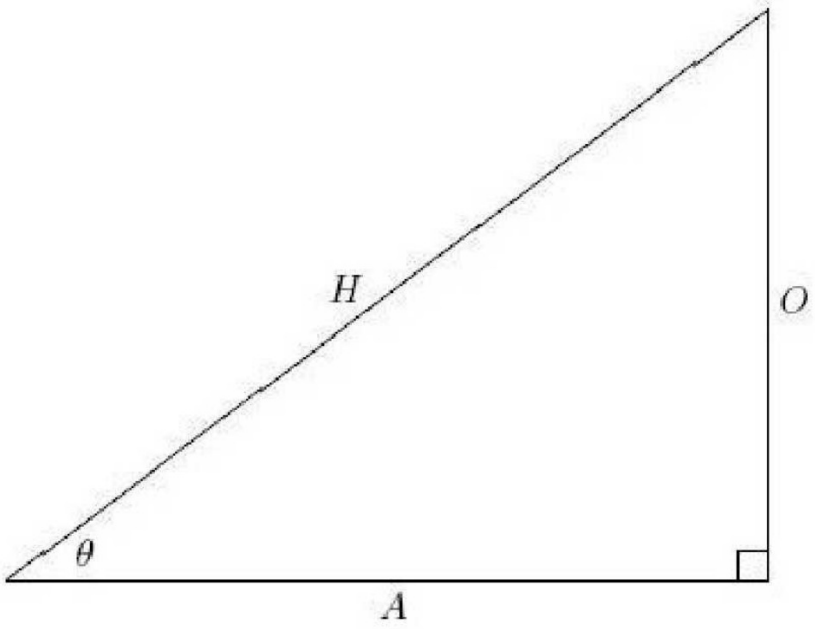




- Find H if A=3m and θ=25°



- Find θ if A=2.4m and H=7.3m.



- Find O if θ=73° and H=6.2m.

Do Now:

Take out your homework. Solutions are on the left side of the room.

I am handing back the math pretest. Set up #6 in your notes.

Today:

Math Pretest Review

Scalers and vectors.

Position-time graphs (time permitting).

Tonight: Speed and velocity worksheet.

Jump to 28

Scalers and Vectors

- Scalar: A numerical value for measurement. Ex: 2 km.
- Vector: A numerical value **along** with a direction of measurement. Ex: 2 km northeast.

Scalar or Vector

V

- The temperature increased by 5°C.

S

- It's 70°C outside.

S

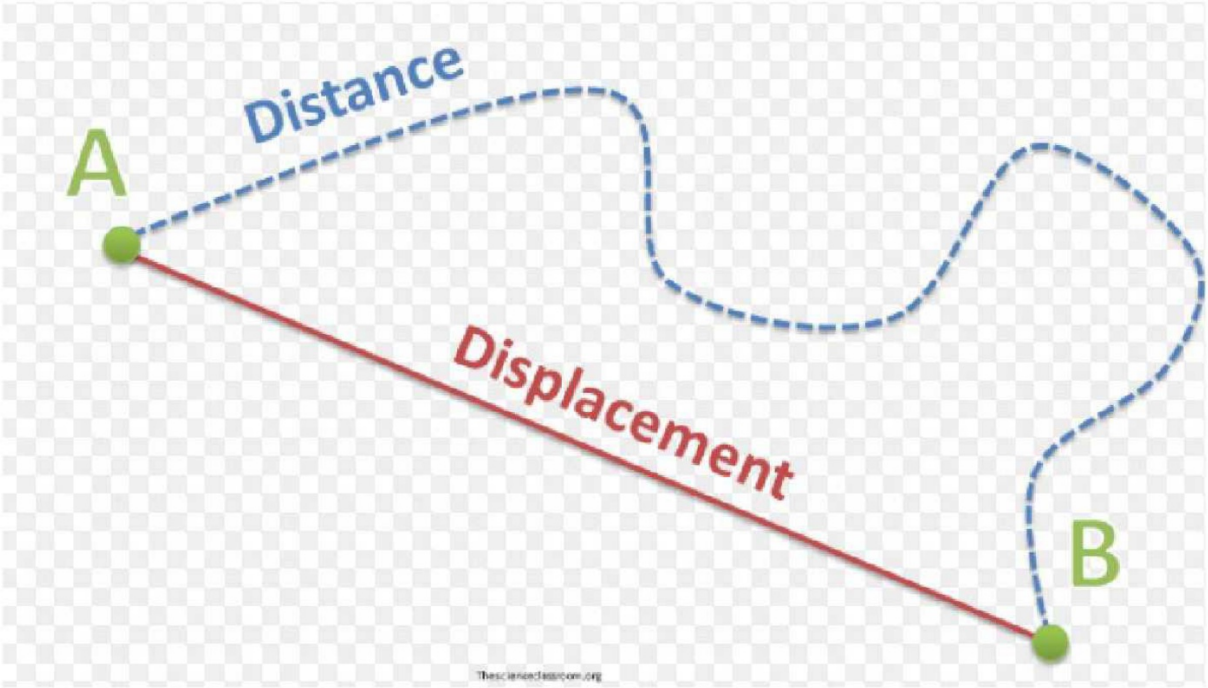
- I rode my bike 25 miles.

V

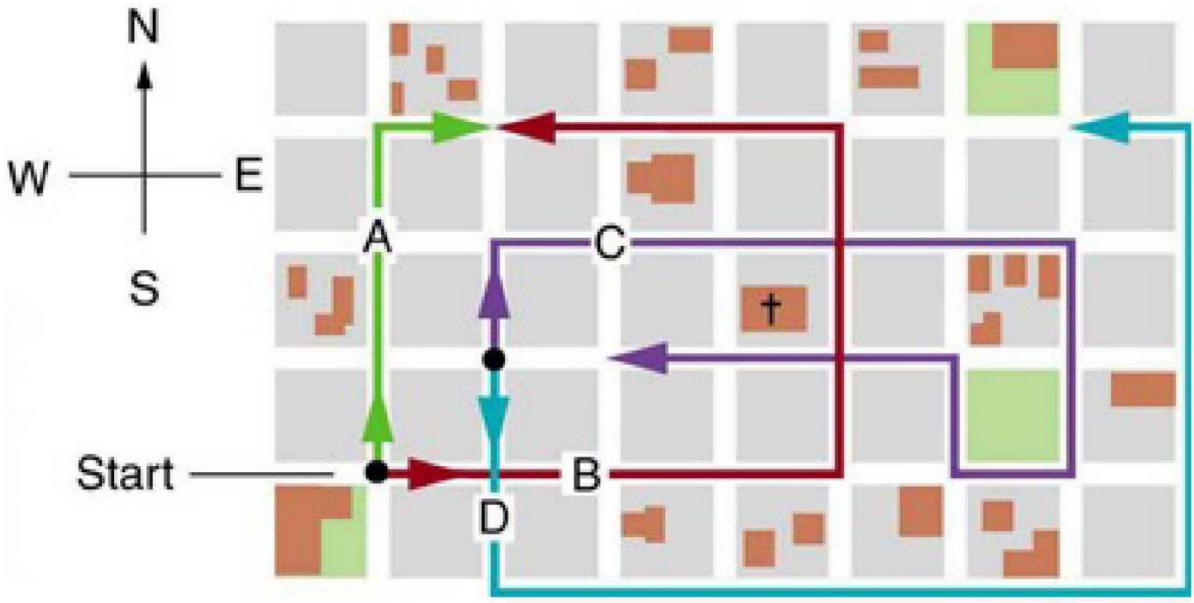
- Upper Dublin HIgh School is 15 miles southwest of Doylestown.

Distance & Displacement

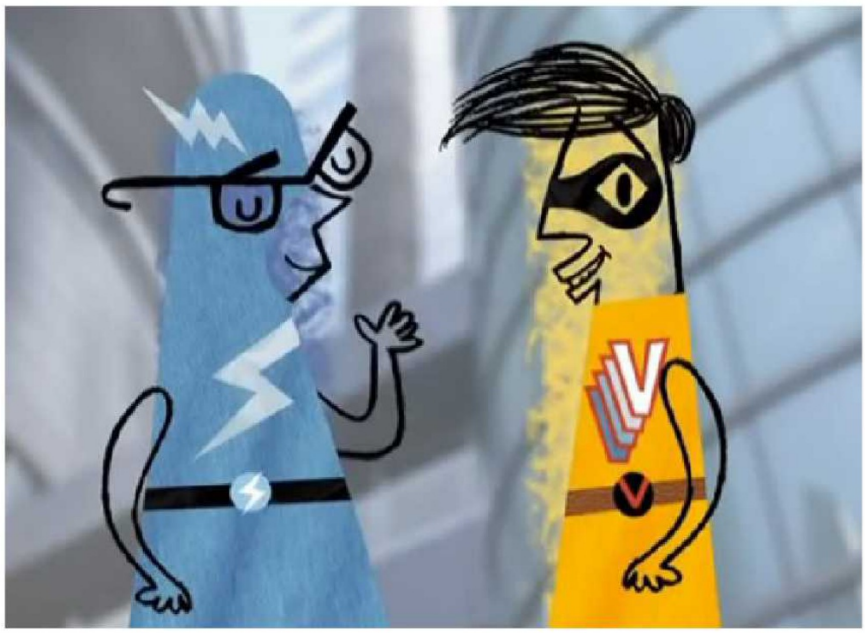
- Distance between the animals?
- How far does the cat have to travel to get to the bear?


Distance
A
Displacement
B

Stephen rides a skateboard 2 blocks north. He turns left and rides 7 blocks. He turns left again and rides 4 blocks. What was the total distance traveled? What was the magnitude and direction of Stephen's displacement?



Find the distance traveled and the displacement of each path.



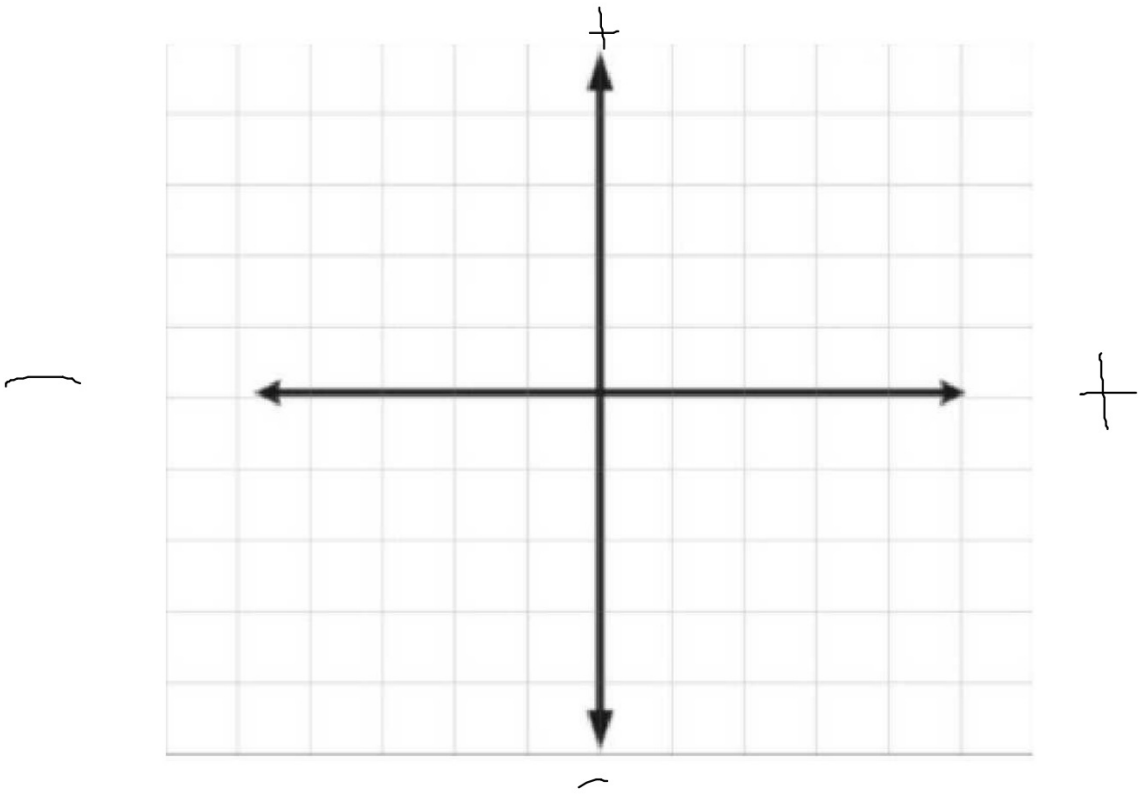
Speed vs Velocity

Average Speed

- The total distance traveled divided by the time needed to complete the journey.
- Distance/time we will generally speak of this in meters per second [m/s].

Average Velocity

- The displacement divided by the time needed to complete the journey.
- This is < or equal to average speed.
- The units are the same [m/s], but there is a direction given or implied.



Focus on the positive

Marcus walks 1.2km north over the course of 20 minutes. Find Marcus' average velocity over that time.

K: $\Delta x = 1.2\,km$, $t = 20\,min$

U: $V = ?$

Eqns: $V = \frac{\Delta x}{t}$

Plug in #: $\frac{1.2\,km}{20\,min} = 0.06\,\frac{km}{min}$

An iPhone slides across a frictionless table at a speed of 1.5m/s. How long does it take for the phone to go 7.2m?

K: $s = 1.5\,m/s$ & $d = 7.2m$

U: $t = ?$

Eqn: $\frac{t\,s}{s} = \frac{d}{s}$ th

$t = \frac{d}{s} = \frac{7.2m}{1.5\,m/s} = 4.8s$

Make a formula to relate velocity, time and displacement. Share it with your partner.

$S=d/t$

$V=\Delta x/t$

Average Speed vs Average Velocity

- Units are the same.
- For velocity, direction matters.
- If something moves back toward where it started, it has a negative velocity.
- Distance traveled is always positive.
- Displacement may be negative.

Do Now:

Get a whiteboard and a marker from the counter on the right side of the room.

Convert 63mi/hr to m/sec.

I will put up the homework in a moment. Please have it out so I can check it.

Convert 63mi/hr to m/sec

$$\frac{63\ mi}{1\ hr} \times \frac{1\ hr}{3600\ sec} \times \frac{52.80\ ft}{1\ mi} \times \frac{12\ in}{1\ ft}$$

$$\times \frac{2.54\ cm}{1\ in} \times \frac{1\ m}{100\ cm} = 28.2\ \frac{m}{sec}$$

Today:

Continue with constant velocity problems.

Position time graphs.

Tonight:

Position-Time Graph Worksheet
On School Wires

Multi-Part problems: make a table:

Column 1: leg of the journey. leg

Column 2: time for leg t

Column 3: displacement for leg. Δx

Column 4: velocity for the leg. v

Column 5: total distance traveled. d_{tot}

Column 6: total displacement. Δx_{tot}

Column 7: average speed. s

Column 8: average velocity. v

Average Speed

- Nathan in trying to catch Ari. Ari runs down the a hallway (120m) in 20 seconds. He then hides in the broom closet for 15 seconds to let Nathan pass him by. He runs back to where he first started in 25 seconds.
- What was Ari's average speed?

$\Delta = F - I$

What was Ari’s average speed after 35 seconds?

The Engine that Couldn't

- A train travels at 5m/s for 7 seconds.
- It then hits a steep hill and slows to 2 m/s for 3 seconds before blowing its engine.
- It then slides back down the hill at 2m/s for 2 seconds before applying its emergency breaks.
- What it the displacement of the train after each leg of the journey?

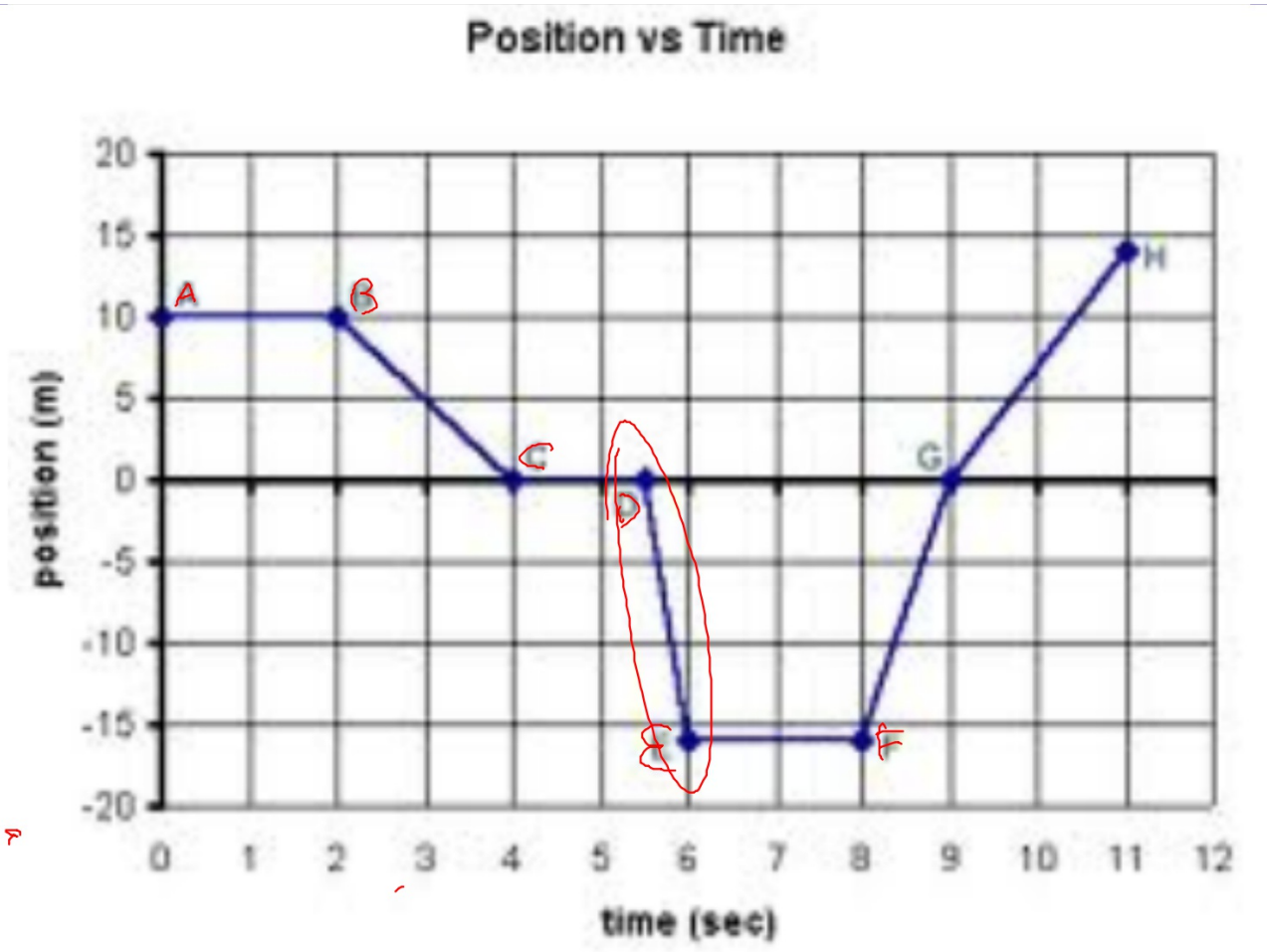
Position-time graphs:

Represent the motion of an object.

Slope of the graph is the velocity.

Take the information from the table that you created for the last problem and draw a position-time graph on your whiteboard.

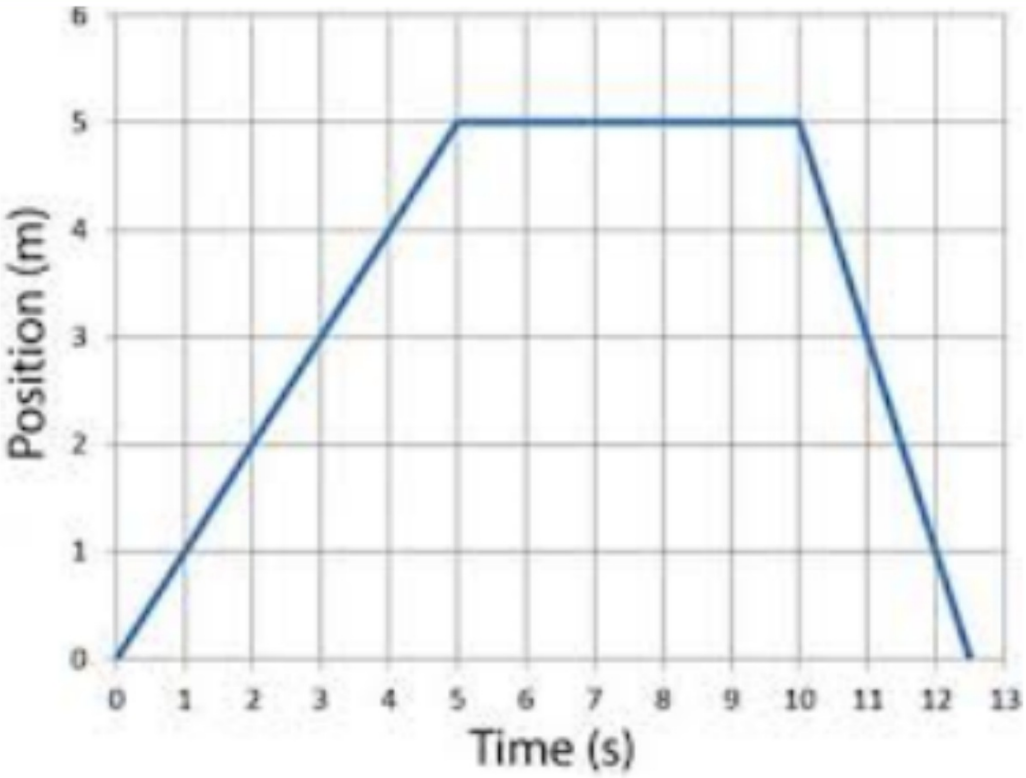
Time is on the X axis (always).



Create a chart from the graph.

Questions:
When is the magnitude of the velocity greatest?

When is the magnitude of the displacement greatest?



Walk this way

Finish Ted Talk:

Michael Spector: The Dangers of Science Denial

Think Pair Share:

Two field hockey players stand 105 meters apart. They start walking toward each other. Player A walks to the right with a velocity of 2m/s. Player B runs to the left with a velocity of 4.1m/s.
How far has player A walked when she reaches player B?

Come up with an approach to the problem and write it on your white board.
Hint: Draw a positon time graph.

Batman is out to get the Joker. Joker is 50m ahead of batman. They begin running in the same direction at the same time. If Batman runs at 7.2m/s and Joker runs at 6.3m/s, how long does it take for Batman to catch Joker?

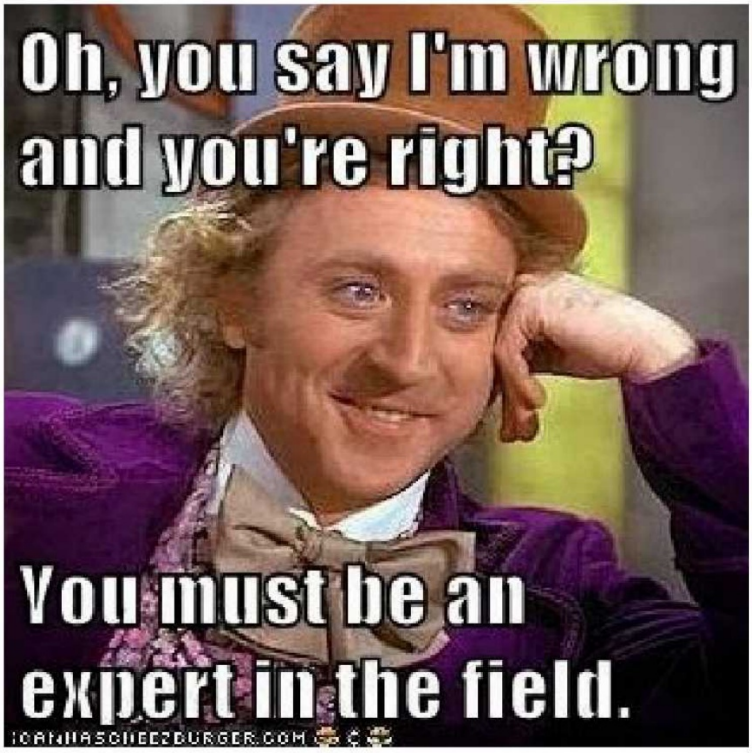
http://www.docstoc.com/docs/75394102/Acceleration

Acceleration

- The change in velocity. What's velocity again?
- This could be a change in the "speed."
- Acceleration can also be a change in direction, even if speed remains constant.

What happens to the passenger when a car...

- rapidly increases in speed.
- turns left.
- decreases in speed.
- turns right.



http://theconversation.com/no-youre-not-entitled-to-your-opinion-9978