AP PHYSICS 1 SUMMER ASSIGNMENT

Dear Future AP Physics 1 Student,

Here is your much-anticipated summer assignment. The purpose of this assignment is not to punish you for signing up for the course, but to help refresh your memory of some basic mathematical principles and get a jump-start on our upcoming challenge. Before you begin this summer assignment there are a few important points that must be addressed.

First, I am committed to helping you be successful in my class; however, it is important to point out that the course is called AP Physics. This is a true college level course, **not** an Honors Course. You must be able to handle material at a college pace and learn on your own from resources provided. The key to success in a college physics course is the desire to challenge oneself and the ability to persevere in a stressful, fast-paced academic environment.

Second, this course is intended for students who have completed both Honors Chemistry and Honors Algebra II / Trig. Of course, you can still be successful if you have not completed these courses, but be prepared to work hard! **(If you are in Geometry you absolutely cannot take this class!)**

Third, this summer assignment is a review of basic mathematical principles as well as an introduction to Chapter 1 of our course. For this summer assignment you are asked to do the following:

1) Print this entire packet.

2) Purchase and setup your physics notebook. You will need it for your summer assignment. You can use any notebook you like but I strongly recommend a binder with lined paper. You will receive many handouts this year that need to be organized.

3) Using your new notebook and the sheets provided, watch the following 5 videos. For videos 1-4 you must slowly watch the video, pausing it frequently to take notes in your notebook. Your notes must be hand written. The notes are provided for video 5. Everything written on the screen must be neatly copied into your new physics notebook. I will be grading your notes so be thorough! Please do this assignment as close to the school year as possible. Do not do this in July or early August because you will forget the material!

In addition to taking notes, I have provided supplemental worksheets with each video that include answers. It is your responsibility to know and understand this material before coming to the first day of school. We will briefly go over these concepts in class and then you will have your first quiz at the end of the first week of school.

To access the videos, use the YouTube playlist. The first 4 videos are titled in order. Video 5 is from Flipping Physics.

https://www.youtube.com/playlist?list=PLQHEuNxDPw8THGZbZCWrRJSk5ZV2bkWlc

You should find this assignment to be relatively easy. It is supposed to be a review of concepts you already know! If you have an issues please contact me promptly at msneider@csh.k12.ny.us

I am looking forward to working with you this fall. Physics is a fun course, and I have a great year planned for us. Have a relaxing summer! **Please Note: The summer assignment is due in class on the first day of school.**

Sincerely, Mr. Sneider

If you struggle with the summer assignment above I strongly suggest you download the additional notes packet below and watch the additional videos linked below. Perseverance and persistence are your friend in AP Physics!

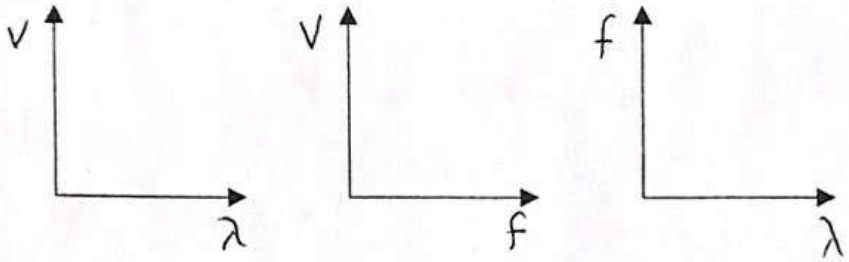
https://www.flippingphysics.com/uploads/2/1/1/0/21103672/01_lecture_notes_compilation_-_introductory_concepts.pdf

https://youtube.com/playlist?list=PLPyapQSxH6maR-JEosZJ9rxW2cw3ACczG

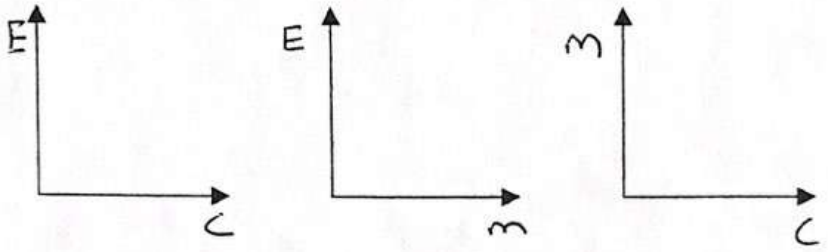
PHYSICS PRACTICE SHEET
GRAPHING RELATIONSHIPS

Directions: For each of the following problems, indicate the relationship between the two variables labeled on the axes (given the equation above), and sketch the trend in the space provided.

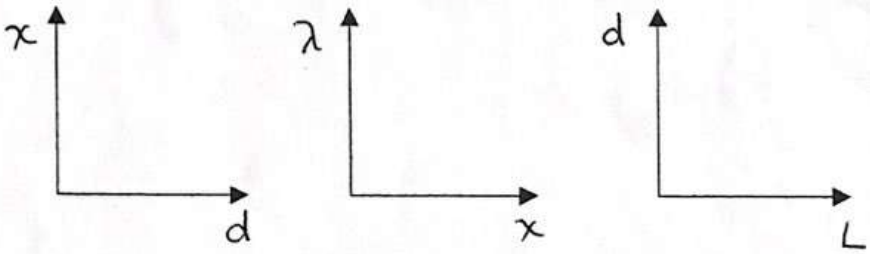
1. $V = f\lambda$



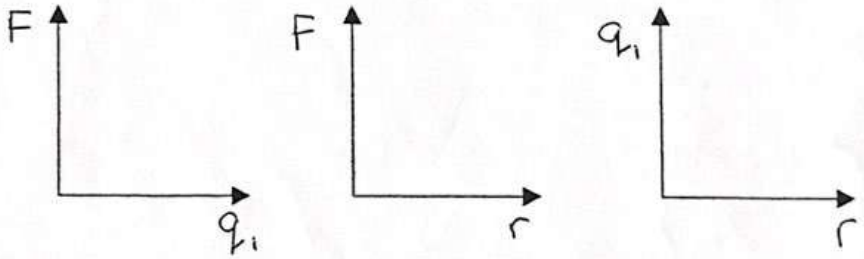
2. $E = mc^2$



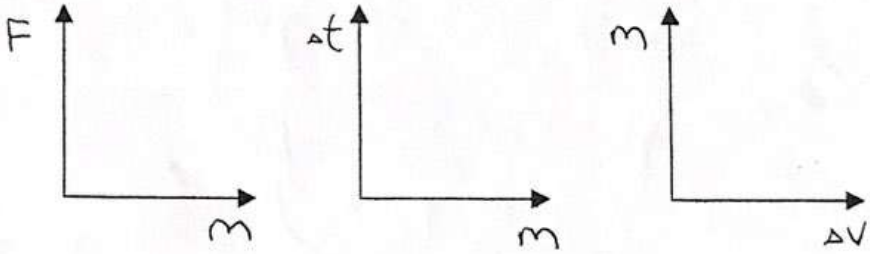
3. $\frac{\lambda}{d} = \frac{x}{L}$



4. $F = \frac{kq_1q_2}{r^2}$



5. $F(\Delta t) = m(\Delta v)$



PHYSICS PRACTICE SHEET
GRAPHING RELATIONSHIPS

Directions: For each of the following problems, indicate the relationship between the two variables labeled on the axes (given the equation above), and sketch the trend in the space provided.

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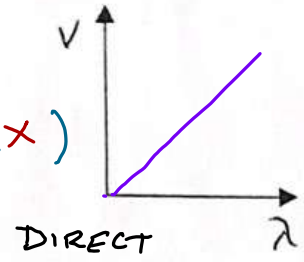
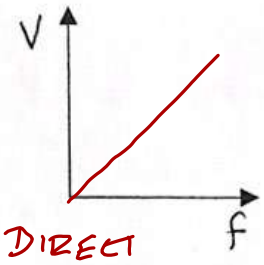


DIRECT



DIRECT

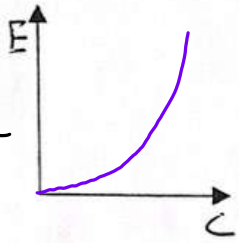
Inverse

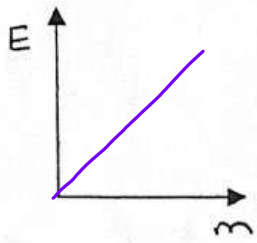
$1 = YX$

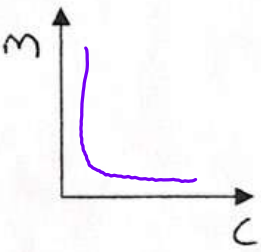
$y = \frac{1}{x}$

2. $E = mc^2$

$(\ ) = (\ )(\ )^2$





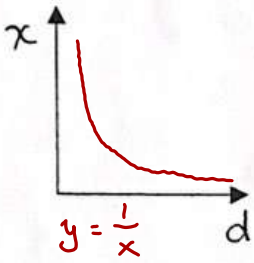


$1 = YX^2$

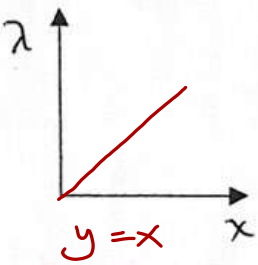
$y = \frac{1}{x^2}$

3. $\frac{\lambda}{d} = \frac{x}{L}$

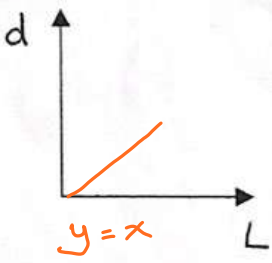
$\frac{(\ )}{(\ )} = \frac{(\ )}{(\ )}$



$y = \frac{1}{x}$



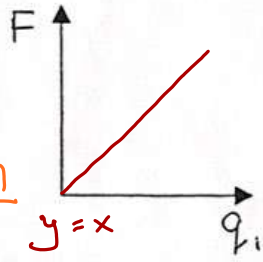
$y = x$



$y = x$

4. $F = \frac{kq_1q_2}{r^2}$

$(\ ) = \frac{(\ )(\ )(\ )}{(\ )^2}$



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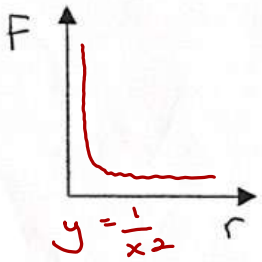
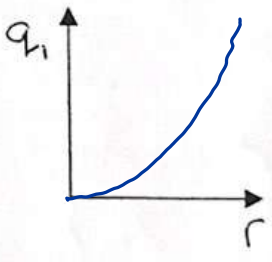


$y = \frac{1}{x^2}$

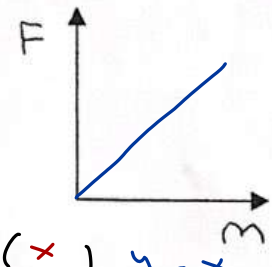


$1 = \frac{Y}{x^2}$

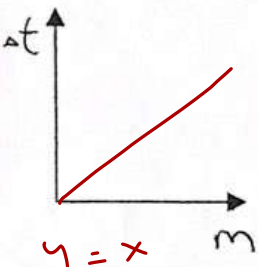
$y = x^2$

5. $F(\Delta t) = m(\Delta v)$

$(\ )(\ ) = (\ )(\ )$



$y = x$



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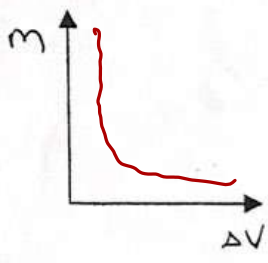


$1 = YX$

$y = \frac{1}{x}$

MEASUREMENT CONVERSION FACTORS:

Length:

1 centi meter	=	10 millimeter (mm)
1 meter	=	100 centimeters (cm)
1 meter	=	1000 millimeters
1 kilometer	=	1000 meters (m)
1 foot	=	12 inches (in)
1 yard	=	36 inches
1 mile	=	5280 feet (ft)
1 mile	=	1760 yards (yd)
1 mile	=	1.61 km
1 inch	=	2.54 cm
1 meter	=	39.37 in

Mass / weight:

1 kilogram (kg)	=	1000 gram (g)
1 kilogram	=	2.2 pounds (lb.)
1 pound (lb.)	=	454 grams
1 ton	=	2000 lb.

Volume:

1 liter (l)	=	1000 milliliters (ml)
1 liter	=	1.06 quarts (qt)
1 gallon (gal)	=	4 quarts
1 qt	=	2 pints (pt)
1 pt	=	16 fluid ounces (fl oz)

Time:

1 year	=	365 days
1 day	=	24 hours (hr)
1 hr	=	60 minutes (min.)
1 min.	=	60 seconds (sec)
1 decade	=	10 years
1 century	=	100 years

WEIGHTS AND MEASURES

CUBIC MEASURE

1,728 cubic inches .....1 cubic foot
27 cubic feet .....1 cubic yard
128 cubic feet .....1 cord (wood)
2,150.42 cubic inches .1 standard bu.
231 cubic inches..1 U.S. standard gal.

DRY MEASURE

2 pints .....1 quart
8 quarts.....1 peck
4 pecks.....1 bushel

LIQUID MEASURE

4 gills .....1 pint
2 pints .....1 quart
4 quarts .....1 gallon
31½ gallons.....1 barrel

IMPERIAL LIQUID MEASURE

1 U.S. gallon....0.833 Imperial gallon
1 U.S. gallon .....3.785 liters
1 Imperial gallon...1.201 U.S. gallons
1 Imperial gallon.....4.546 liters
1 liter .....0.264 U.S. gallon

LONG MEASURE

12 inches.....1 foot
3 feet .....1 yard
5½ yards.....1 rod
40 rods .....1 furlong
8 furlongs.....1 statute mile
3 land miles.....1 league

MARINERS' MEASURE

6 feet.....1 fathom
120 fathoms.....1 cable length
5,280 feet.....1 statute mile
6,076.11 feet .....1 nautical mile

SQUARE MEASURE

144 sq. inches.....1 sq. foot
9 sq. feet.....1 sq. yard
30¼ sq. yards.....1 sq. rod
640 acres .....1 sq. mile

METRIC EQUIVALENTS

Linear Measure

1 centimeter.....0.3937 inch
1 inch.....2.54 centimeters
1 foot.....0.3048 meter
1 meter...39.37 inches ..1.0936 yards
1 yard.....0.9144 meter
1 rod .....5.029 meters
1 kilometer.....0.621 mile
1 mile .....1.609 kilometers

Square Measure

1 sq. centimeter.....0.1550 sq. inch
1 sq. inch.....6.452 sq. centimeters
1 sq. foot .....0.0929 sq. meter
1 sq. meter.....1.196 sq. yards
1 sq. yard.....0.8361 sq. meter
1 hectare.....2.47 acres
1 acre .....0.4047 hectare
1 sq. kilomerer.....0.386 sq. mile
1 sq. mile.....2.59 sq. kilometers

Weights

1 gram.....0.03527 ounce
1 ounce .....28.35 grams
1 kilogram.....2.2046 pounds
1 pound .....0.4536 kilogram
1 metric ton .....0.98421 English ton
1 English ton.....1.016 metric tons

Measure of Volume

1 cubic centimerer ....0.061 cubic inch
1 cubic inch ...16.39 cubic centimeters
1 cubic foot.....0.0283 cubic meter
1 cubic meter .....1.308 cubic yards
1 cubic yard .....0.7646 cubic meter
1 liter .....1.0567 quarts liquid
1 quart dry .....1.101 liters
1 quart liquid .....0.9463 liter
1 liter .....1.0567 quarts
1 gallon.....3.78541 liters
1 peck.....8.810 liters
1 hectoliter .....2.8375 bushels

TEMPERATURE CONVERSIONS

A Fahrenheit degree is smaller than a Celsius (Centigrade) degree, one Fahrenheit degree being $^5/_9$ of a Celsius degree.

To convert Fahrenheit degrees into Celsius, subtract 32, multiply by 5, and divide by 9.

To convert Celsius into Fahrenheit, multiply by 9, divide by 5, and add 32.

The freezing point of water is 32°F., 0°C. The boiling point is 212°F., 100°C.

Conversion Factor Method

Use Conversion Factor Method to perform the following unit conversions. Show all Work on a separate Page! Use the Conversion Factors provided on the previous page.

1) Convert 6.20×10^3 feet to meters

2) Convert 21 $^{meters}/_{second}$ to feet per hour

3) Convert 5.25 tons to grams

4) Jim spent $71.25 on ice cream. Each pint cost $4.79. How many grams of ice cream were purchased?

5) Convert 3.35 km^2 to meters squared.

6) Convert 75 miles per hour to meters per second.

Conversion Factor Method

Use Conversion Factor Method to perform the following unit conversions. Show all Work on a separate Page! Use the Conversion Factors provided on the previous page.

1) Convert 6.20×10^3 feet to meters

$$\frac{6.20\times10^3\ \text{ft}}{1}\left(\frac{.3048\text{m}}{1\ \text{ft}}\right) = 1889.76 = \boxed{1890\text{m}}$$

2) Convert 21 $^{\text{meters}}/_{\text{second}}$ to feet per hour

$$\frac{21\text{m}}{\text{s}}\left(\frac{3600\text{s}}{1\text{hr}}\right)\left(\frac{1\text{ft}}{.3048\text{m}}\right) = 248031.4961$$

$$\boxed{2.5\times10^5\ \frac{\text{feet}}{\text{hr}}}$$

3) Convert 5.25 tons to grams

$$\frac{5.25\ \text{tons}}{1}\left(\frac{2000\text{lb}}{1\ \text{ton}}\right)\left(\frac{454\text{g}}{1\text{lb}}\right) = 4767000 \quad \boxed{4.77\times10^6\text{g}}$$

4) Jim spent \$71.25 on ice cream. Each pint cost \$4.79. How many grams of ice cream were purchased?

$$\frac{\$71.25}{1}\left(\frac{1\ \text{pint}}{\$4.79}\right)\left(\frac{16\ \text{oz}}{1\ \text{pint}}\right)\left(\frac{28.35\text{g}}{1\text{oz}}\right) = 6747.18$$

$$\boxed{6747\text{g}}$$

5) Convert 3.35 km^2 to meters squared.

$$\frac{3.35\ \text{km}^2}{1}\left(\frac{1000\text{m}}{1\text{km}}\right)\left(\frac{1000\text{m}}{1\text{km}}\right) = \boxed{3.35\times10^6\ \text{m}^2}$$

6) Convert 75 miles per hour to meters per second.

$$\frac{75\text{mi}}{1\text{hr}}\left(\frac{1\text{hr}}{3600\text{s}}\right)\left(\frac{1609\text{m}}{1\text{mi}}\right) = 33.5208$$

$$\boxed{34\ \frac{\text{m}}{\text{s}}}$$

Physics
Trigonometry Practice Sheet I

Name: _____

Instructions: Draw a simple, labeled diagram and show the mathematical solution for each problem.

1) A flag pole is 15.2 meters high and you can see the top at an angle of 60.1^0 above the ground, at ground level. How far are you from the pole?

2) A rope is stretched from the top of a post to ground level and makes an angle of 25.9^0 with the ground. How long is the rope if the post is 13.6 meters high?

3) You can see the FUJI blimp hovering 525 meters over the National Tennis Center at an angle of 15.0^0 above the horizon. How far are you from the NTC?

4) A buzzard is circling over its prey and you measure its angle from the horizon to be 70.2^0. If the buzzard (in the air) is 345 meters from you (on the ground), how far are you from the buzzard's prey?

5) A LILCO lineman notices that a 32.2 meter wire makes a 50.5^0 angle with the ground when stretched from the pole top to the ground. How far is the lower end of the wire from the pole's base?

6) Four year old Katie slides down a banister which is 4.32 meters long and makes of 30.8^0 below the horizontal. If the bottom of the banister is 1.00 meters above the floor, how high is the top of the banister above the same floor?

Physics
Trigonometry Practice Sheet I

Name: _____

Instructions: Draw a simple, labeled diagram and show the mathematical solution for each problem.

1) A flag pole is 15.2 meters high and you can see the top at an angle of 60.1^0 above the ground, at ground level. How far are you from the pole?

8.74m

2) A rope is stretched from the top of a post to ground level and makes an angle of 25.9^0 with the ground. How long is the rope if the post is 13.6 meters high?

31.1m

3) You can see the FUJI blimp hovering 525 meters over the National Tennis Center at an angle of 15.0^0 above the horizon. How far are you from the NTC?

1960m

4) A buzzard is circling over its prey and you measure its angle from the horizon to be 70.2^0. If the buzzard (in the air) is 345 meters from you (on the ground), how far are you from the buzzard's prey?

117m

5) A LILCO lineman notices that a 32.2 meter wire makes a 50.5^0 angle with the ground when stretched from the pole top to the ground. How far is the lower end of the wire from the pole's base?

20.5m

6) Four year old Katie slides down a banister which is 4.32 meters long and makes of 30.8^0 below the horizontal. If the bottom of the banister is 1.00 meters above the floor, how high is the top of the banister above the same floor?

3.21m

Name:_____ Solving Equations

Solve the following:

1) Solve $a = \frac{v_f - v_i}{t}$ for v_i

2) Solve $v_f^2 = v_i^2 + 2ad$ for a

3) Solve $K = \frac{1}{2}mv^2$ for v

4) Solve $T = 2\pi\sqrt{\frac{L}{g}}$ for L

5) Solve $d = v_i + \frac{1}{2}at^2$ for t provided $v_i = 0$

Name:_____ Solving Equations

Solve the following:

1) Solve $a = \frac{v_f - v_i}{t}$ for v_i

$at = v_f - v_i$

$at + v_i = v_f$

$v_i = v_f - at$

2) Solve $v_f^2 = v_i^2 + 2ad$ for a

$v_f^2 - v_i^2 = 2ad$

$\frac{v_f^2 - v_i^2}{2d} = a$

3) Solve $K = \frac{1}{2}mv^2$ for v

$2K = mv^2$

$\frac{2K}{m} = v^2$

$v = \sqrt{\frac{2K}{m}}$

4) Solve $T = 2\pi\sqrt{\frac{L}{g}}$ for L

$T^2 = (2\pi)^2 \frac{L}{g}$

$T^2 = \frac{4\pi^2 L}{g}$

$T^2 g = 4\pi^2 L$

$\frac{T^2 g}{4\pi^2} = L$

5) Solve $d = v_i + \frac{1}{2}at^2$ for t provided $v_i = 0$

$d = 0 + \frac{1}{2}at^2$

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

$\sqrt{\frac{2d}{a}} = t$

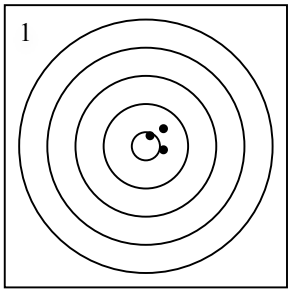
Flipping Physics Lecture Notes: Introduction to Accuracy and Precision

Accuracy is how close your observed (or measured) values are to the accepted value.

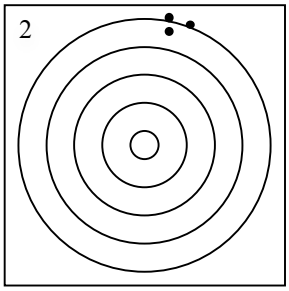
Precision is how close your observed (or measured) values are to one another. (Repeatability)

Precision is also the degree of exactness of a measurement, or how many significant digits it has. However, when comparing Accuracy to Precision, this is not the definition we use.

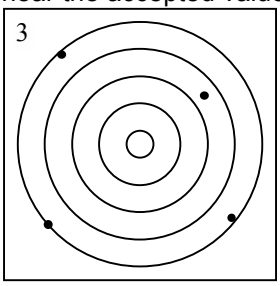
Example Problems question:
Which of the following is true about the Accuracy and Precision represented by this target?
1) High Accuracy & High Precision 2) Low Accuracy & High Precision
3) Low Accuracy & Low Precision 4) High Accuracy & Low Precision
5) Can't determine Accuracy or Precision
6) Can't determine Precision 7) Can't determine Accuracy



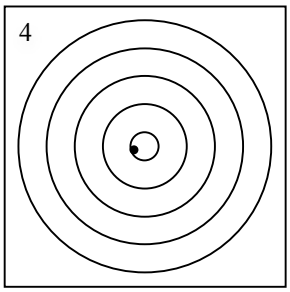
1st Example: All the arrows are near the bull's eye, so all the measurements would be near the Accepted Value, so it's High Accuracy. All the arrows are near one another, so your measurements are highly repeatable, so High Precision as well. So the answer is #1.



2nd Example: Just like in the previous example all the arrows are close to one another so it is still highly accurate. However, now the measurements aren't near the accepted value, so it is low accuracy. So the answer is #2.



3rd Example: All the arrows are far from one another, so the precision is low. If you take the average of all of the arrows or measurements, then you actually get an average measurement that is close to the accepted value. So the answer is #4, High Accuracy and Low Precision.



4th Example: There is high accuracy because the arrow or measurement is near the bull's eye or accepted value. There is only one measurement so we can't compare it to any of the other measurements so we can't determine Precision. The correct answer is #6.

$$E_r = \frac{O - A}{A} \times 100$$

E_r = Relative Error; O = Observed Value; A = Accepted Value.

Relative Error is a measurement of Accuracy.

Because the Observed Value and the Accepted Value have the same dimensions, the dimensions cancel out and Relative Error is a percentage.

Enjoy the outtakes. It took a really long time to get these 11 shots to stick to the board and to hit where I needed them.