PHYSICS 2204 **UNIT 1: KINEMATICS**

WORKSHEET #1: UNITS AND MEASUREMENT

Physics is the study of motion, matter, energy, and force.

Qualitative Descriptions: are descriptions made by observing with the 5 senses, such as the smell of a flower or the colour of someone's eyes. They include observations which cannot be measured.

Quantitative Descriptions : are descriptions that are based on measurements or counting (i.e. they are numerical), such as the number of petals a flower has or how tall a person is. They deal with quantities.

Le Système International d'Unités (SI) refers to a single measurement system (metric system) that has been agreed upon by scientist all over the world. SI has seven base units. Most other units are derived from these seven units

Base unit: refers to units that are defined.

Table 1. SI base units

Base quantity	Name	Symbol
	SI base unit	
length	meter	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K
amount of substance	mole	mol
luminous intensity	candela	cd

Note:

meter is defined as the distance light travels in a small fraction of a second.

kilogram is the current "base unit" for mass. A kilogram is defined as the mass of a certain lump of platinum and iridium that is kept in Paris under glass to protect it from chemical changes that could alter its mass.

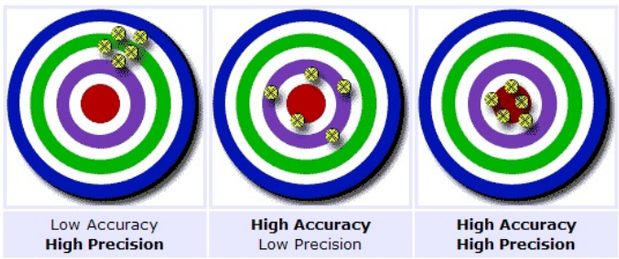
Derived units are ones that we "figure out" by using base units.

Table 2. Examples of SI derived units

Derived quantity	Name	Symbol
	SI derived unit	
area	square meter	m^2
volume	cubic meter	m^3
speed, velocity	meter per second	m/s
acceleration	meter per second squared	m/s^2

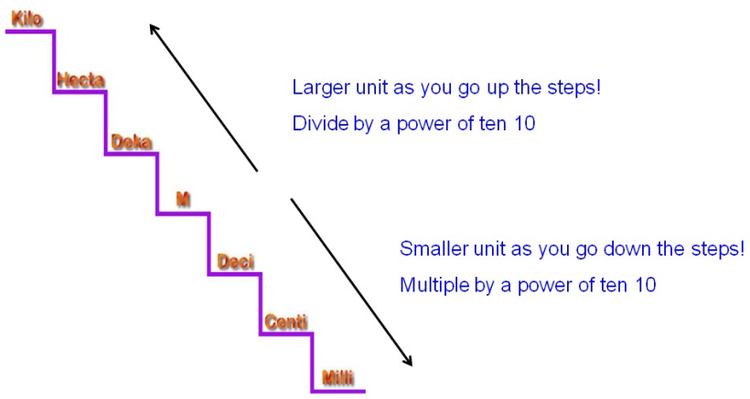
Accuracy refers to the closeness of measurements to is how close a measured value is to the actual (true) value.

Precision is how close the measured values are to each other.



Converting measurements is a skill that will be tested in high school math and science classes, as well as in some college classes

Method #1: The Step Stair



METHOD #2: CONVERSION FACTOR

To convert units, we need to multiply the quantity we want to convert by its conversion factor. The conversion factor basically tells us how to convert one unit into another

Example 1:

How many seconds are in seven years?

$$7a \times \frac{365day}{1a} \times \frac{24hours}{1day} x \frac{60\,\text{min}}{1hr} \times \frac{60}{1\,\text{min}} = 2.2075x10^{8}\,s$$

Example 2:

Convert 30 km/hr to m/s:

$$30\frac{km}{1hr} \times \frac{1hr}{60\,\text{min}} \times \frac{1\,\text{min}}{60\,\text{sec}} \times \frac{1000m}{1km} = 8.3m/s$$

General Rule:

To change from km/hr = m/s ÷ 3.6

To change from m/s to km/hr x 3.6

PART A: MULTIPLE CHOICE

1. Which of the following involves the study of motion, matter, energy, and force?

   (A) Biology
   (B) Chemistry
   (C) Meterology
   (D) Physics

2. Which of the following is a great physicist?

   (A) Albert Einstein
   (B) Galileo Galilei
   (C) Isaac Newton
   (D) All are correct

3. Which of the following is used to make a qualitative description?

   (A) Your bath scales
   (B) Your Eyes
   (C) A measuring Tape
   (D) A rain gauge

4. Which of the following is a quantitative description?

   (A) The glass is half full
   (B) It is warm in the physics lab
   (C) The lemon tastes sour
   (D) The mass the cat is 2.0 kg

5. Which organization is responsible for creating a system of base units to be followed by the scientific community?

   (A) International Union of Pure and Applied Chemisrty (IUPAC)
   (B) Le Système International d'Unités (SI)
   (C) French Academy of Sciences (FAS)
   (D) International Space Agency (ISA)

6. What is the bass unit for measuring time?

   (A) kilograms
   (B) meter
   (C) second
   (D) meter/second

7. What is the bass unit for measuring mass?

   (A) kilogram
   (B) meter
   (C) second
   (D) meter/second

8. Which of the following is a derived unit?

   (A) kilograms
   (B) meter
   (C) second
   (D) meter/second

9. Use the picture below to describe accuracy and precision:

	Accuracy	Precision
(A)	Low	Low
(B)	Low	High
(C)	High	Low
(D)	High	High

10. How many seconds are there in 1.5 hours?

(A) 90 s
(B) 1500 s
(C) 5400 s
(D) 8600 s

11. Convert 1.56 kilograms into grams

(A) 1560 g
(B) 156 g
(C) 1.56 g
(D) 0.00156 g

12. What is the measurement 455 km, converted to meters?

(A) 0.000455 m
(B) 0.455 m
(C) 45 500 m
(D) 455 000 m

13. What is 198 km/h equal to?

(A) 0.0198 m/s
(B) 55.0 m/s
(C) 198 m/s
(D) 7128 m/s

14. What is 120. km/h equal to?

(A) 0.120 m/s
(B) 33.3 m/s
(C) 432 m/s
(D) 1.20×10^3 m/s

1. Complete the chart below. [11]

Step 1. Tell if each of the following is a quantitative or qualitative description.

Step 2. If it is a quantitative description, tell if the unit is a derived unit or a base(standard) unit.

Measurement	Quantitative/ Qualitative	Derived Unit/ Base Unit
a speed of 25 m/s		
a foul odour		
mass is 75.1 kg		
a long trip		
salty taste		
a time of 200.0 seconds		
a density of 200 g/m^3		

2. Write the correct abbreviation for each metric unit. [9]

A) Kilogram _____ B) Milliliter _____ C) Kilometer _____

D) Meter _____ E) Millimeter _____ F) Centimeter _____

G) Gram _____ H) Liter _____ L) Milligram _____

3. Convert the following. [16]

A) 2000 mg = _____ g B) 5 L = _____ mL

C) 16 cm = _____ mm D) 104 km = _____ m

E) 198 g = _____ kg F) 2500 m = _____ km

G) 480 cm = _____ m H) 75 mL = _____ L

I) 65 g = _____ mg J) 5.6 kg = _____ g

K) 50 cm = _____ m L) 6.3 cm = _____ mm

M) 8.8 mm = _____ cm N) 5.6 m = _____ cm

0) 120 mg = _____ g P) 2000 ml = _____ L

4. Convert the following

A) 30.0s = _____ min B) 602 min = _____ h

C) 4.7 h= _____ min D) 23.6 h = _____ s

E) 5024 s = _____ min F) 6.2 h = _____ min

G) 25.40 min = _____ h H) 45 km/h= _____ m/s

I) 2.67 m/s = _____ km/h J) 100 km/h = _____ m/s

K) 15 m/s = _____ km/h L) 363 m/s = _____ km/h

M) 25 km/h = _____ m/s N) 2.0 m/s = _____ km/h