Name_____ **Period**_____

Unit 1: Introduction to Chemistry, Measurement and Scientific Method

Skills:

1) Create testable questions
2) Make CER-based conclusions
3) Utilize and convert Sci. Not.
4) Use the Metric System

Unit 1: Vocabulary:

Complete throughout unit. Due on quiz day!

	Definition
Metric System	
Scientific Notation	
Claim	
Evidence	
Reasoning	
Kelvin	
Meter	
Testable	
Independent Variable	
Dependent Variable	

Unit 1 Resources:

Skill 1: Asking Scientific Questions

Phenomena: A fact or situation that is _____to exist or happen, especially one whose cause or explanation is in _____.

Describe what you see occurring:

Ask Questions:

Make them testable!

What is a "Testable Question?": A testable question is one that can be answered by designing and conducting an experiment.

Testable questions are always about changing one thing to see what the effect is on another thing.

Make one of your questions testable!

Phenomena Stations:

At each station, describe the phenomena and ask at least one TESTABLE question!

Observe: **Questions:**	**Observe:** **Questions:**
Observe: **Questions:**	**Observe:** **Questions:**
Observe: **Questions:**	**Observe:** **Questions:**

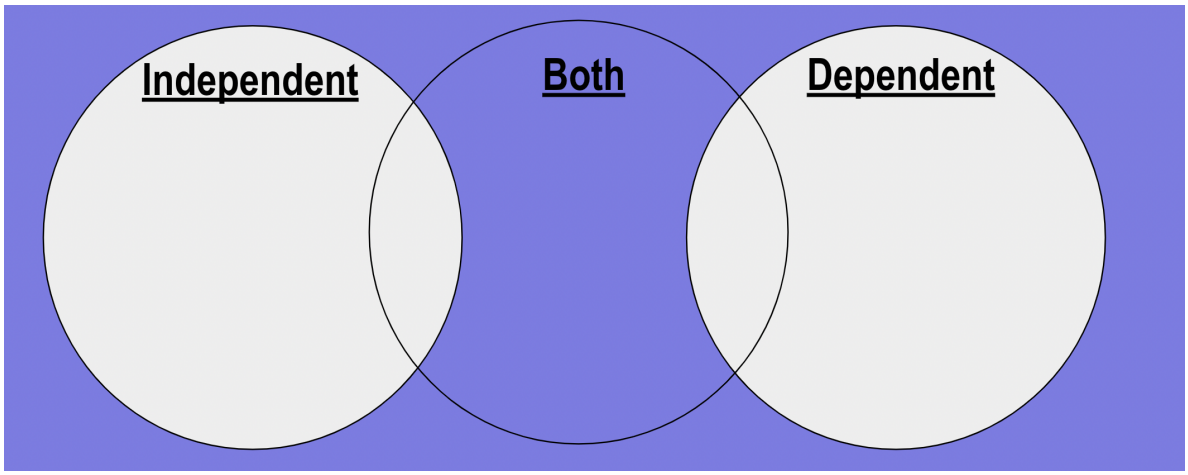
Skill 2: Make CER-Based Conclusions

Learning how to construct responses to explain phenomena is a process. Using the CER format can help organize thoughts and think critically about structuring understanding. There are key concepts that need to be defined in this process:

Claim: A statement about the _____ of an investigation

Characteristics of a well written claim:

- A one-sentence answer to the guiding question you investigated
- It answers, _____?
- It should not start with **yes** or **no**
- It should describe the relationship between **dependent** and **independent** variables
    - _____**:** a number or quantity that represents different values in different situations.



Evidence: Scientific _____ that supports the claim

Evidence must be:

- **Sufficient** - use enough evidence to support the claim
- **Appropriate** - use data that supports your claim. Leave out information that does not support the claim
- _____ (using the senses) or _____ (numerical) or a combination of both

Reasoning: Ties together the _____ and the _____

Characteristics of a well written reasoning:

- Shows **how** or **why** the data counts as evidence to support the claim
- Provides the justification for why **this** evidence is important to **this** claim
- Includes one or more _____ that are important to the claim and evidence

Model 1 - Non-science Scenario: My Dad is a Space Alien!

Given the scenario from the video, determine whether the little girl's CER statements below are appropriate or not appropriate using the characteristics above.

Claim: My dad is a space alien

Evidence: He speaks a weird language
He drinks green stuff
He is from Albuquerque
He drives a spaceship

Reasoning: Just look at him, the evidence doesn't lie, my dad is an alien.

1) Describe how her claim follows the guidelines for a Claim.

2) Explain whether her claim describes the relationship between dependent and independent variable.

3) Describe how her evidence is considered qualitative and not quantitative.

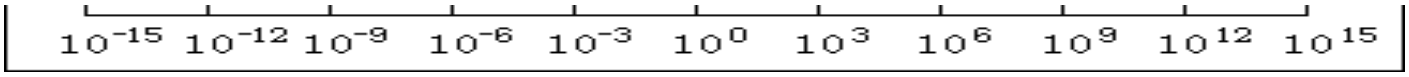
4) Why is her data not classified as "sufficient and appropriate evidence" to support her claim?

5) Does she use a scientific principle to tie the evidence to the claim in the reasoning given?

6) Do you agree with the girl's CER process or would you refute the claim that her dad is an alien? Justify your answer.

Skill 3: Utilize and Convert Scientific Notation

Throughout the year we will encounter VERY small and big numbers. We use scientific notation to represent these numbers in powers of tens.



- Remember:
  - Keep all non zero numbers,
  - Count your loops, loops place decimal
  - Move right = negative exponent
  - Move left = positive exponent

- 5,300,000 m can be written as _____

- 0.00000375 g can be written as _____

Examples: Write the following in scientific notation

1) 34500000 kg = _____

2) 7561000 m = _____

3) 0.000301 cm = _____

4) 0.000000002091 mg = _____

Examples: Convert the following from scientific notation to standard

1) 4.51×10^{3} g = _____

2) 8.91×10^{-4} km = _____

3) 5.12×10^{-6} kg = _____

4) 5.234×10^{7} cm= _____

Convert the following numbers into scientific notation:

1) 3,400 _____

2) 0.000023 _____

3) 101,000 _____

4) 0.010 _____

5) 45.01 _____

6) 1,000,000 _____

Convert the following numbers into standard notation:

7) 2.30×10^{4} _____

8) 1.76×10^{-3} _____

9) 1.901×10^{-7} _____

10) 8.65×10^{-1} _____

11) 9.11×10^{3} _____

Skill 4: Use the Metric System

- ☐ In chemistry (and all sciences) the International System of Units (SI) is used. It is a universal set of units that allows scientists from around the world to be consistent with each other.
- ☐ **What BASE UNIT describes the following measurements?**
  - a. Mass _____
  - b. Volume _____
  - c. Energy _____
  - d. Time: _____
  - e. Temperature: _____
  - f. Pressure: _____

- ☐ TABLE _____ is a list of _____
- ☐ The SI system is a decimal system, meaning prefixes are used to change SI units by a power of 10
- ☐ TABLE _____ is a list of

  _____
- ☐ In front of every base unit comes a _____ that indicates the "order of magnitude" or how large the number is.

Table C
Selected Prefixes

Factor	Prefix	Symbol
10^{3}	kilo-	k
10^{-1}	deci-	d
10^{-2}	centi-	c
10^{-3}	milli-	m
10^{-6}	micro-	μ
10^{-9}	nano-	n
10^{-12}	pico-	p

Converting Between Metric Units:

1) Identify starting and ending unit
2) Set up number line using scientific notation exponent!
3) Count loops in reference to the base unit!

Ex: 155 grams to milligrams:

Ex: 155 grams to kilograms:

If all else fails: King Henry Does Usually Desire Chocolate Milk

Practice:

1. If a substance weighs 2.00 grams and you need the mass in kilograms, will the number appear to become smaller or larger? Explain your answer.

2. Convert the following:

a. 900 km = _____ m

b. 200 kg = _____ g

c. 5.00 m = _____ km

d. 7000 J = _____ kJ

e. 800 cm = _____ m

f. 20 cg = _____ g

g. 2.0 L = _____ cL

h. 568 mm = _____ m

i. 52 mg = _____ g

j. 0.025 J = _____ mJ

k. 0.859 s = _____ ms

l. 0.0256 m = _____ um

m. **0.000589g = _____ ng

n. **0.00005987 m =_____ pm

Skill 5B: Temperature Conversion:

Equation (see reference tables):

Convert the following to Kelvin:

1) 0° C _____

2) -50° C _____

3) 90° C _____

4) -20° C _____

Convert the following to Celsius:

5) 100° K _____

6) 200° K _____

7) 273° K _____

8) 350° K ____