

Name: \_\_\_\_\_

Period: \_\_\_\_\_

### Unit 1 Chemical Math – Guided Notes

**Scientific Method** List the steps to the scientific method

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

**Types of Observations**

- Qualitative:
- Quantitative:

**Significant Figures**

- \_\_\_\_\_ is a common type of measurement. The measurement is \_\_\_\_\_ and can be expressed \_\_\_\_\_.
- In science, measurements should only have \_\_\_\_\_ degree of uncertainty (or \_\_\_\_\_ estimated digit).
- Significant figures:
  - Exactness is also called \_\_\_\_\_.
  - 5 Rules for Significant Figures:
    - 1.
    - 2.
    - 3.
    - 4.
    - 5.
  - “Cheat Sheet”/ Atlantic-Pacific Method:
  - Learning Check:
    - 1) Which answers contain 3 significant figures?  
a. 0.4760      b. 0.00476      c. 4760
    - 2) All the zeros are significant in  
a. 0.00307      b. 25.300      c.  $2.050 \times 10^3$
    - 3) 534,675 rounded to 3 significant figures is \_\_\_\_\_

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- 4) In which set(s) do both numbers contain the *same* number of significant figures?
- a. 22.0 and 22.00
  - b. 400.0 and 40
  - c. 0.000015 and 150,000

State the number of significant figures in each of the following:

- 5) 0.030 m
- 6) 4.050 L
- 7) 0.0008 g
- 8) 3.00 m
- 9) 2,080,000 bees

Calculations with Sig Figs
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- A calculated answer cannot be.....
- Adding and Subtracting:
  - Rule:
  - Example:
$$\begin{array}{r} 25.2 \\ + 1.34 \\ \hline \end{array}$$
  - Learning Check: In each calculation, round the answer to the correct number of significant figures.
    - 1)  $235.05 + 19.6 + 2.1 =$
    - 2)  $58.925 - 18.2 =$
- Multiplying and Dividing:
  - Rule:
  - Example:  $15.7 \times 0.63 =$
  - Learning Check:
    - 1)  $2.19 \times 4.2 =$
    - 2)  $4.311 \div 0.07 =$
    - 3)  $\frac{2.54 \times 0.0028}{0.105} =$

Scientific Notation
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- What is Scientific Notation?
- What numbers are best for scientific notation?
- Scientific Notation consists of two parts:  $N \times 10^x$
- When you divide by a number that is in scientific notation, use \_\_\_\_\_.
- Standard Form to Scientific Notation
  - Place the decimal point so that there is one non-zero digit to the left of the decimal point.
  - Count the number of decimal places the decimal point has “moved” from the original number. This will be the exponent on the 10.
  - If the original number was less than 1, then the exponent is negative. If the original number was greater than 1, then the exponent is positive.
  - Examples:
    - 289,800,000
    - 0.000567
- Scientific Notation to Standard Form
  - Simply move the decimal point to the right for positive exponent 10.
  - Move the decimal point to the left for negative exponent 10. (Use zeros to fill in places.)
  - Examples:
    - $5.093 \times 10^6$
    - $1.976 \times 10^{-4}$
- Learning Check: Express these numbers in Scientific Notation:
  - 1) 405789
  - 2) 0.003872
  - 3) 3000000000
  - 4) 2
  - 5) 0.478260

Measurements
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- In every measurement there is a \_\_\_\_\_ followed by a \_\_\_\_\_ from a measuring device
- The number should also be as \_\_\_\_\_ as the measurement.
- Use the SI units- based on the metric system
  - Length
  - Mass
  - Volume
  - Time
  - Temperature

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- Which tool(s) would you use to measure:
  - Temperature
  - Volume
  - Time
  - weight
- Learning Check: Indicate what is being measured: Length, Mass, or Volume
  - 1) A bag of tomatoes is 4.6 kg. \_\_\_\_\_
  - 2) A person is 2.0 m tall. \_\_\_\_\_
  - 3) A medication contains 0.50 g Aspirin. \_\_\_\_\_
  - 4) A bottle contains 1.5 L of water. \_\_\_\_\_
- What are some U.S. units that are used to measure each of the following?
  - length
  - volume
  - weight
  - temperature
- Can you hit the bull's eye?

Three targets with three arrows each to shoot.



How do they compare?

Both accurate and precise

Precise but not accurate

Neither accurate nor precise

- Can you define accuracy and precision?
  - Accuracy:
  - Precision:
- Reading a Meter stick:

. |<sup>2</sup> . . . | . . . |<sup>3</sup> . . . | . . . |<sup>4</sup> . . cm

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- Answer: \_\_\_\_\_
- In you answer, underline the certain digits and circle the uncertain digit
- Learning Check: What is the length of the line?

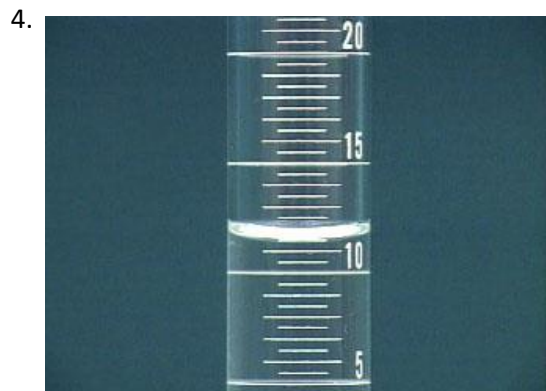
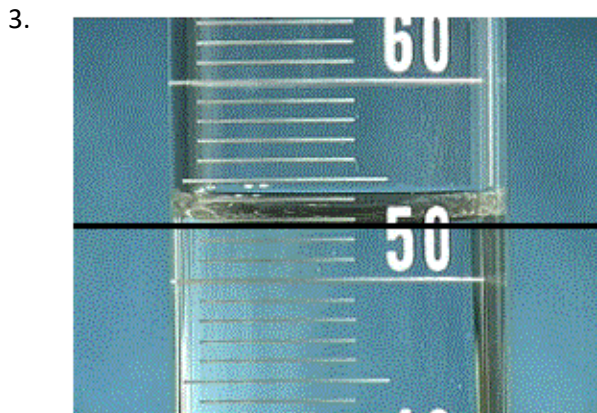
. |<sup>8</sup> . . . | . . . |<sup>9</sup> . . . | . . . |<sup>10</sup> . . cm

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- How does your answer compare with your neighbor's answer? Explain any differences.

2.  $3 \dots | \dots | 4 \dots | \dots | 5 \dots$  cm

How much water is in the graduated cylinders?



Metrics

- Learning check: Select the unit you would use to measure the following:
  1. Your height: a) millimeters      b) meters      c) kilometers
  2. Your mass: a) milligrams      b) grams      c) kilograms
  3. The distance between two cities: a) millimeters      b) meters      c) kilometers
  4. The width of an artery: a) millimeters      b) meters      c) kilometers
- Metric Prefixes: You MUST know these


- Metric Conversions: Convert 3.400 kiloliters to Decaliters
  - To convert using metrics:
    1. Determine which prefix you are starting with
    2. Determine which prefix you are converting to
    3. Count how many spaces you move when you go from step 1 to step 2
    4. Move the decimal over that many spaces in the same direction
- Learning Check:
  - 1) 1000 m = \_\_\_ mm
  - 2) 0.001 g = \_\_\_ kg
  - 3) 0.1 L = \_\_\_ cL
  - 4) 0.01 m = \_\_\_ dm



