GRAPHING DENSITY FUNDAMENTALS:
MASS vs. VOLUME GRAPHS

On these graphs, the axes represent the following:

Y axis – represents **MASS** on **MASS VS. VOLUME GRAPHS**

X axis- represents **VOLUME** on **MASS VS. VOLUME GRAPHS**

Slope of a line: refers to the "steepness" of a line (similar to the "steepness" of a hill/mountain)

Slope of a line – **shows rate of change** – how much MASS changes as VOLUME changes

Calculated by dividing RISE by RUN (change in Y AXIS divided by change in X AXIS):

Y ÷ X

***ON MASS/VOLUME GRAPHS. SLOPE REPRESENTS THE DENSITY OF THE SUBSTANCE!**

***WHY? BECAUSE SLOPE IS Y÷X; ON A MASS/VOLUME GRAPH, Y = MASS, X = VOLUME, SO Y÷X = MASS/VOLUME, WHICH = DENSITY!**

CALCULATING SLOPE / DENSITY OF A LINE ON A MASS vs. VOLUME GRAPH

GOOD NEWS!!! Calculating slope can be easy!

IF A LINE:

A. Is **perfectly straight (no curves/angles)**
AND
B. **passes through the origin** (0, 0)

Then its **slope** is calculated by picking **ANY POINT** and **dividing** its **Y** value **by** its **X** value.

EXAMPLE: What is the slope of the line for substance 1?

Step 1: pick a point: let's choose this point:
X (volume) = 2 mL,
Y (mass) = 20 grams

Step 2: divide the Y value by the X value: 20 grams ÷ 2 mL = 10 grams/mL

So, the slope, and DENSITY, of substance 1 = 10 grams/mL

ANALYZING GRAPHS

1. STEEP SLOPES are lines that are NEARLY VERTICAL (straight up and down):

– these show HIGH RATES OF CHANGE:
- **on mass/volume graphs, they represent HIGH DENSITIES**

2. GENTLE SLOPES are lines that are NEARLY HORIZONTAL (side to side):

– these show LOW RATES OF CHANGE:
- **on mass/volume graphs, they represent LOW DENSITIES**

3. "ANGLES" IN THE LINE are CHANGING SLOPES - these show CHANGES IN THE *RATE* OF CHANGE

- the more the line "bends", the greater the # of changes

- MASS/VOLUME GRAPHS SHOULD NOT HAVE ANGLES. WHY?_____

ANALYSIS QUESTIONS: Use the graph provided to answer the following.

1a.Which SUBSTANCE has a greater density?

1b. what type of slope did you look for to determine your answer?

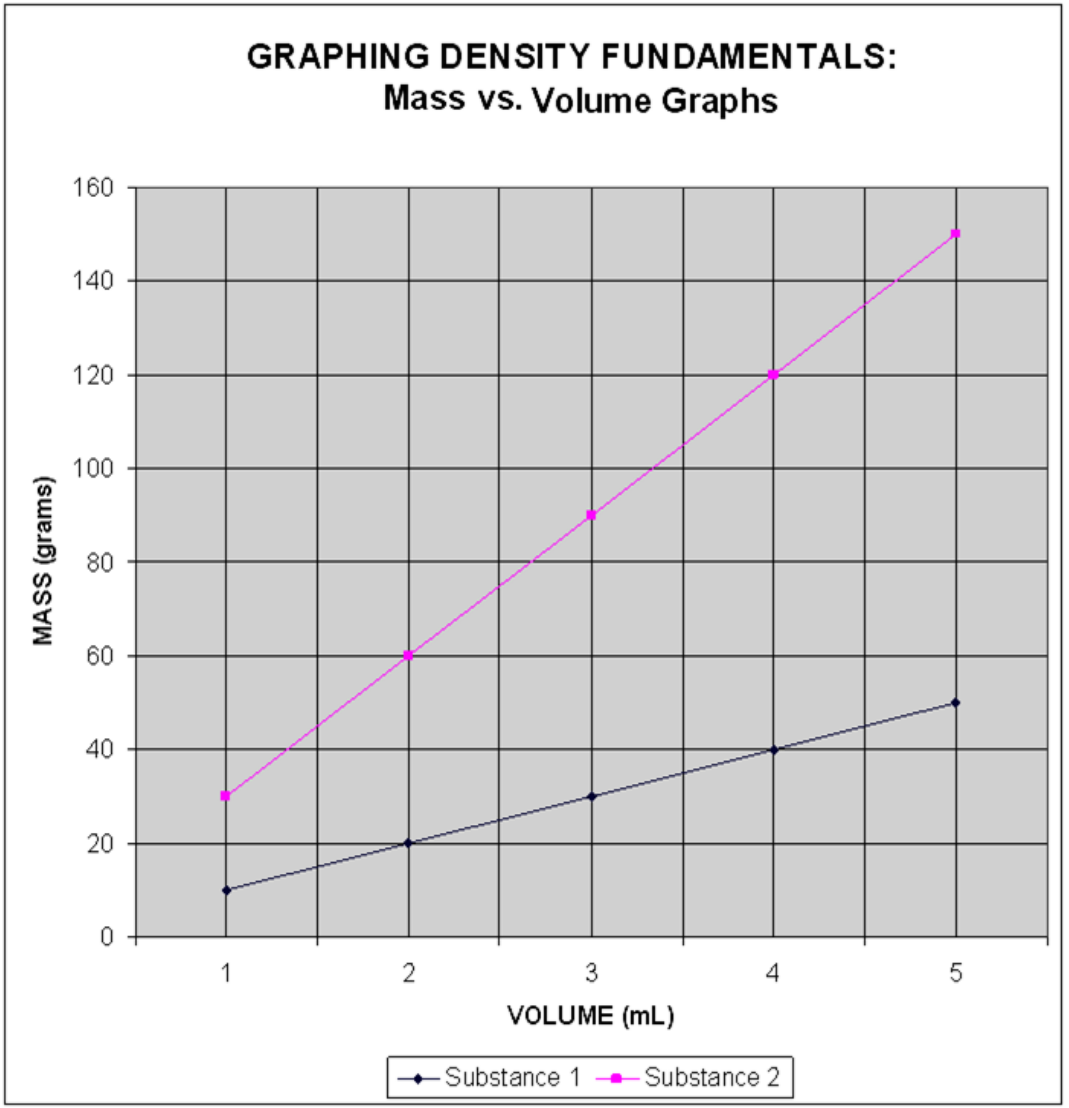
1c. using the fact that Density = slope = y ÷ x (for a straight line), calculate the density of this substance:

2a.Which SUBSTANCE has the lower density?

2b. what type of slope did you look for to determine your answer?

_____

2c. using the fact that Density = slope = y ÷ x (for a straight line), calculate the density of this substance:



INTERPOLATING DATA
USE THE LINES FOR EACH SUBSTANCE AND THE INFORMATION PROVIDED TO ANSWER THE FOLLOWING QUESTIONS:

3. ___ is the mass of 5 mL of substance 1

4. _____ is the volume of 60 grams of substance 2

5. _____ is the mass of 4 mL of substance 2

6. _____ is the volume of 40 grams of substance 1