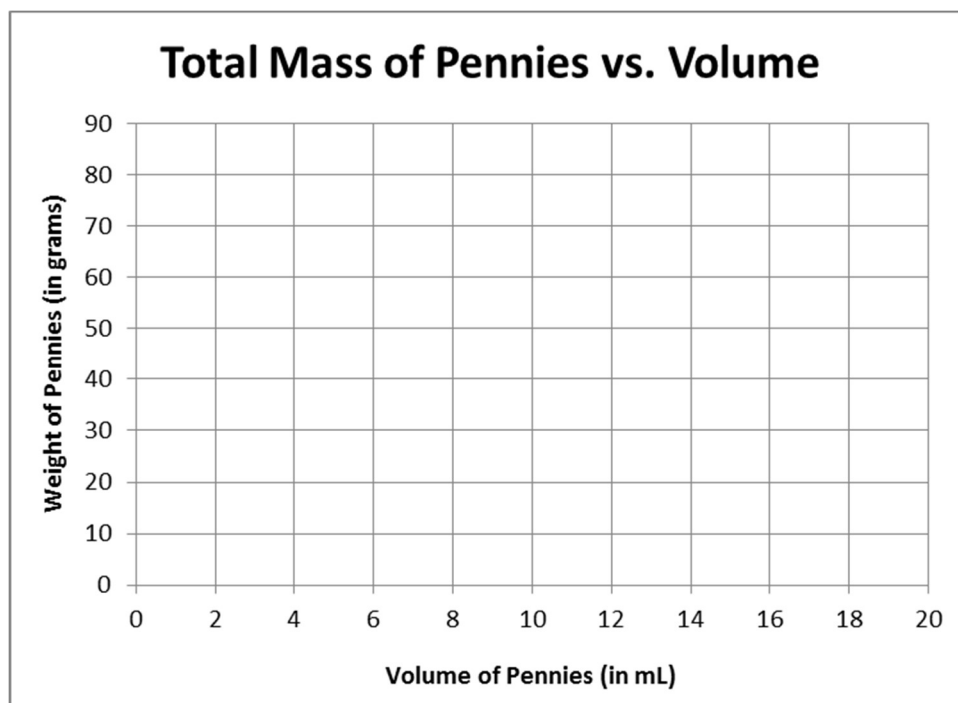


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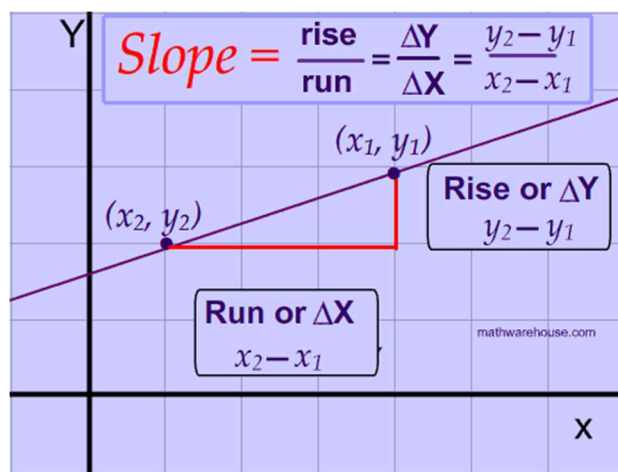
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3		15		
4		20		
5		25		

Data Table for Post-1982 Pennies				
Trial	Mass of 5 ¢ (g)	Total # ¢	Total Mass ¢ (g)	Total Volume Displaced (mL)
1		5		
2		10		
3		15		
4		20		
5		25		



C. Determining the Slope of These Plots to Get the Densities

- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
- Use the equation:



Slope of pre-1982
Pennies = g/mL

Slope of post-1982
Pennies = g/mL

c.

D. Further Discussion

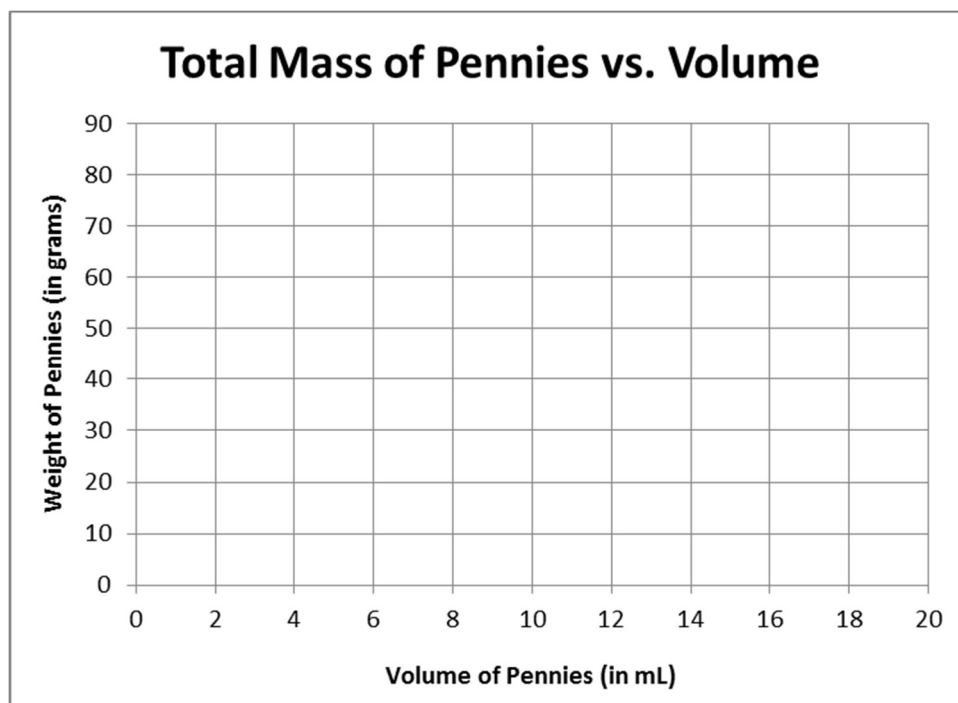
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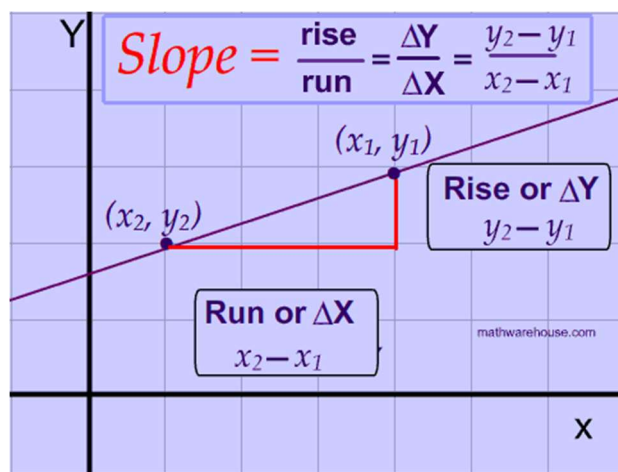
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Slope of post-1982
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c.

D. Further Discussion

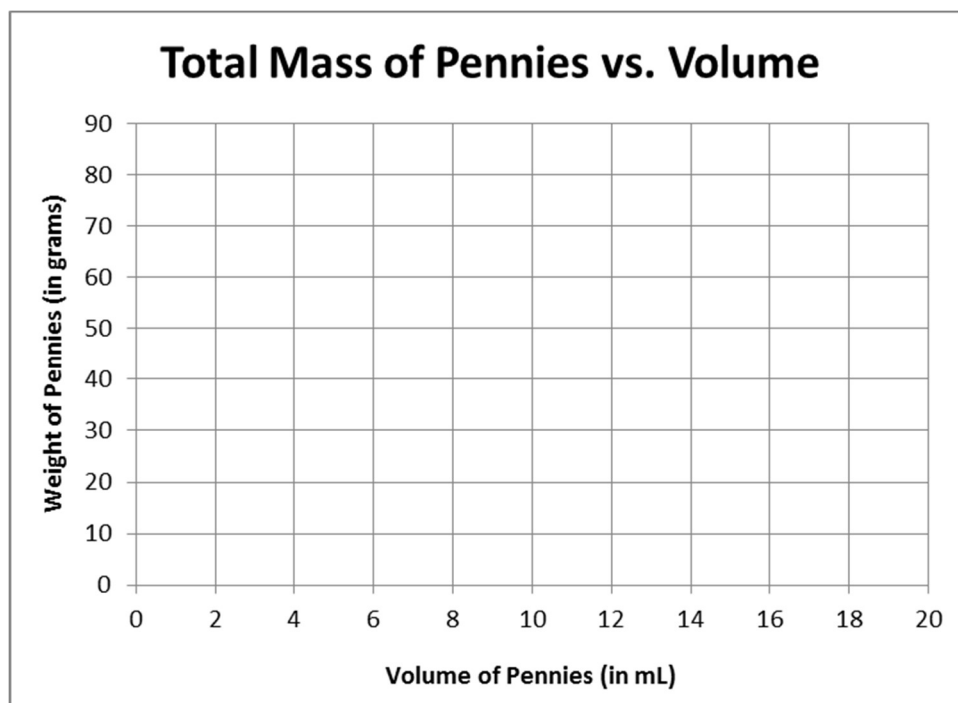
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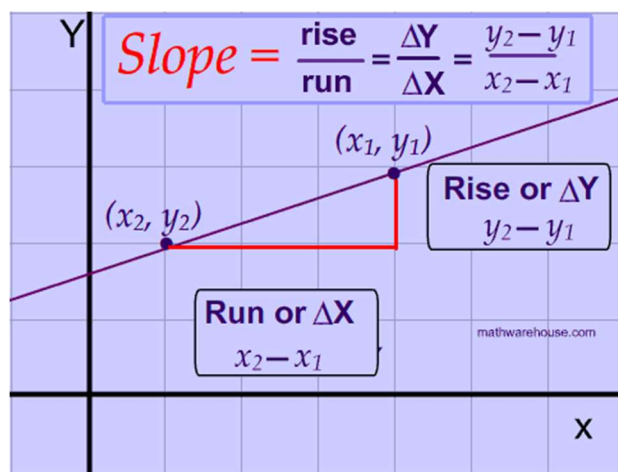
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c.

D. Further Discussion

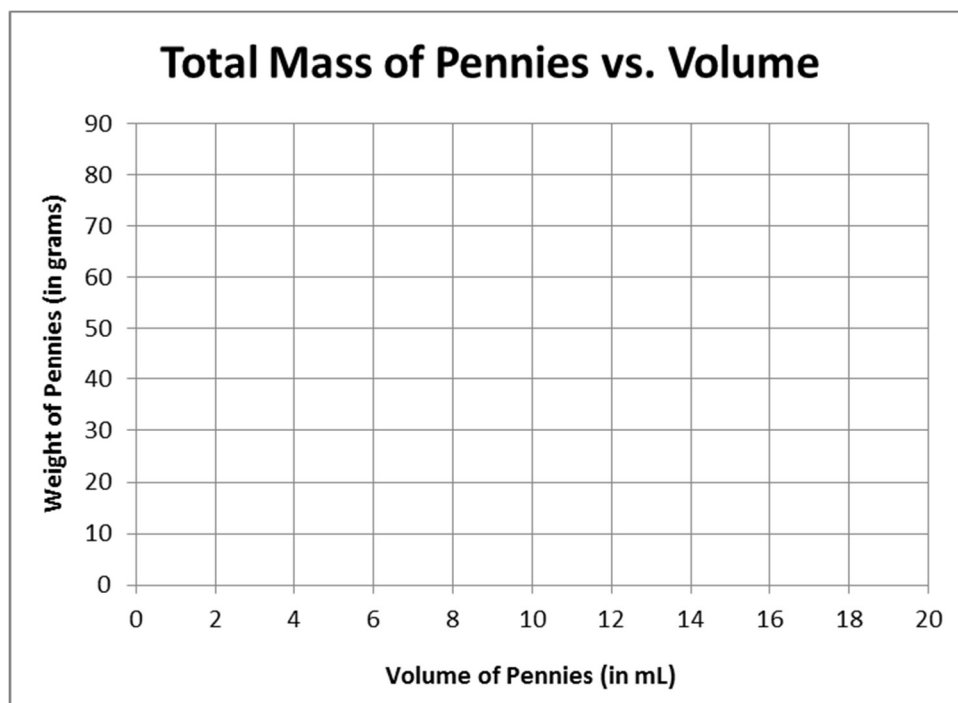
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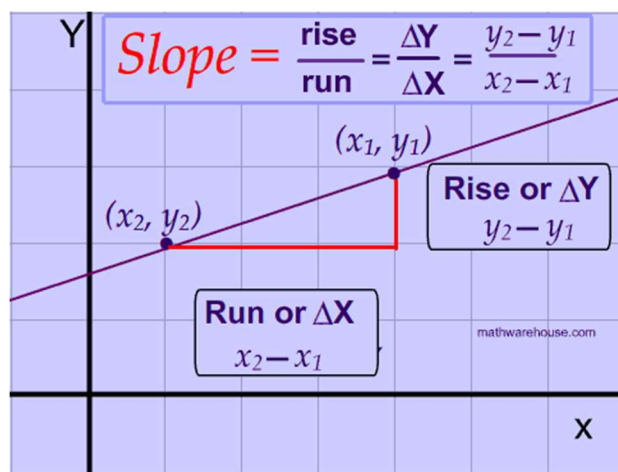
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- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
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D. Further Discussion

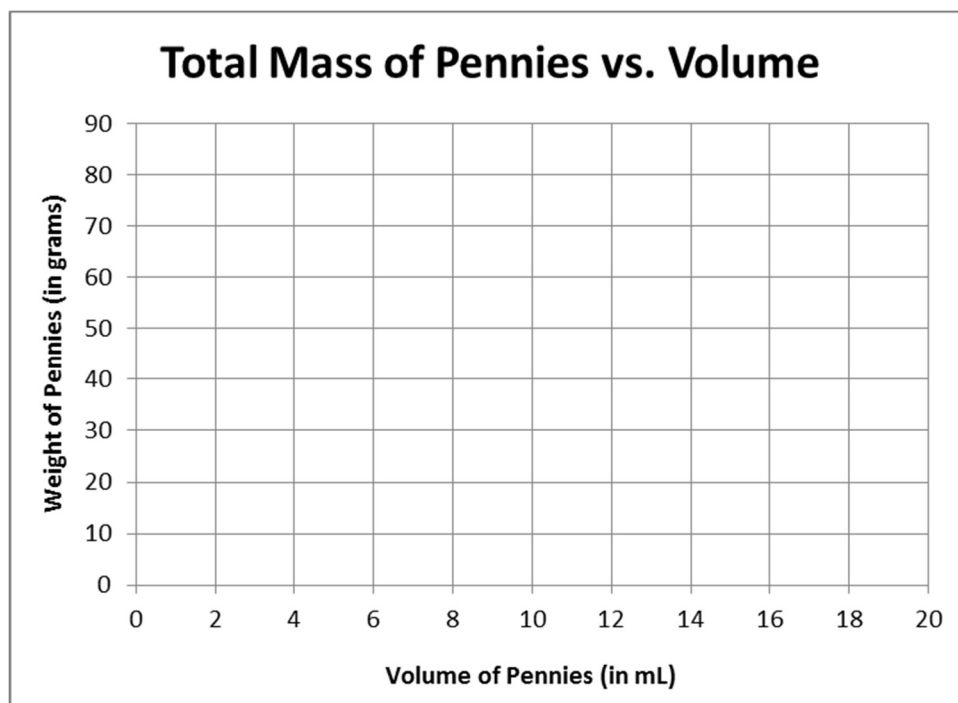
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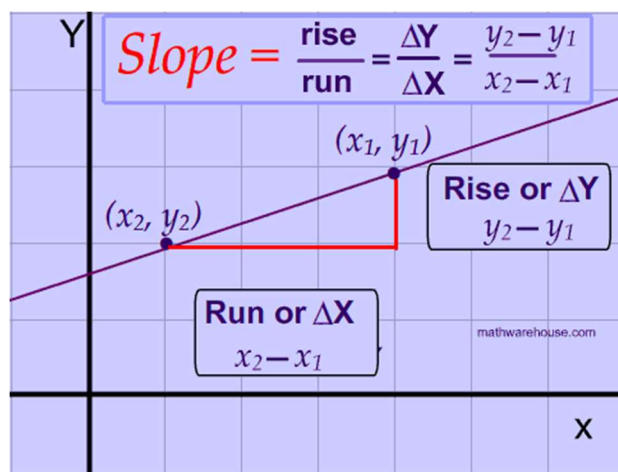
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c.

D. Further Discussion

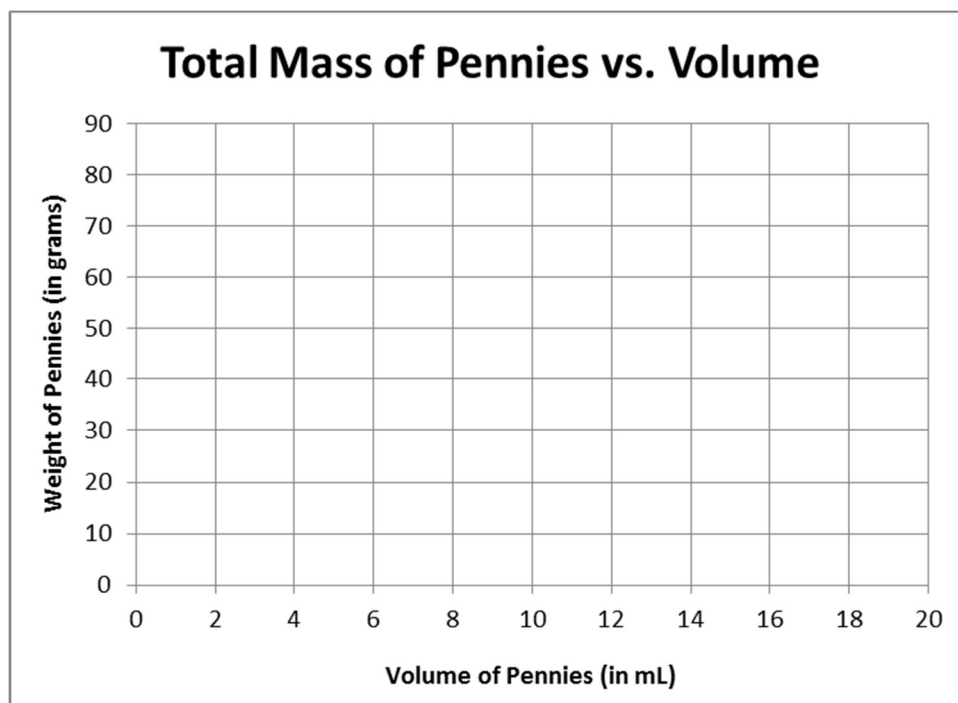
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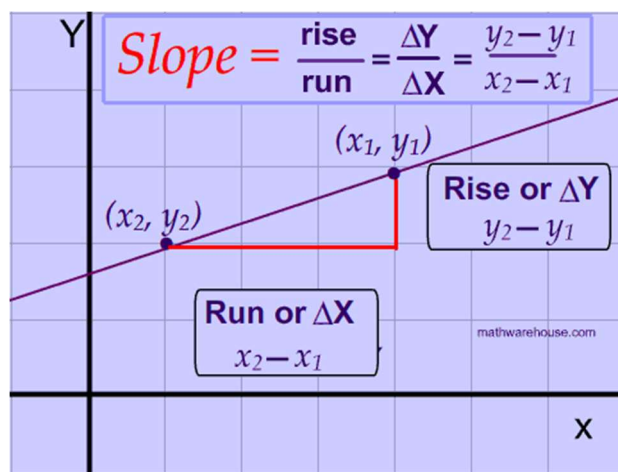
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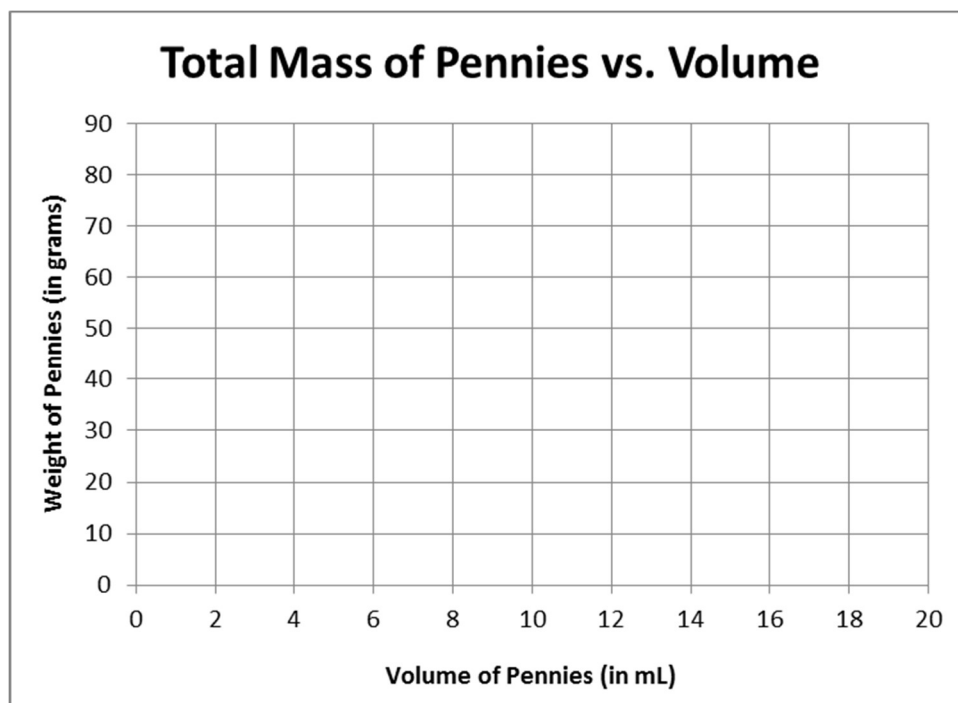
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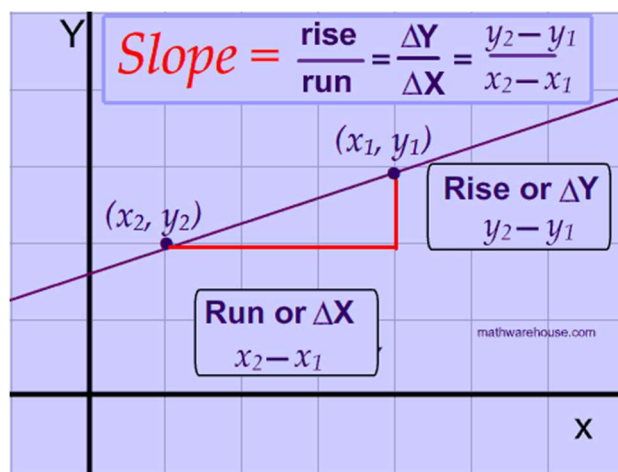
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c.

D. Further Discussion

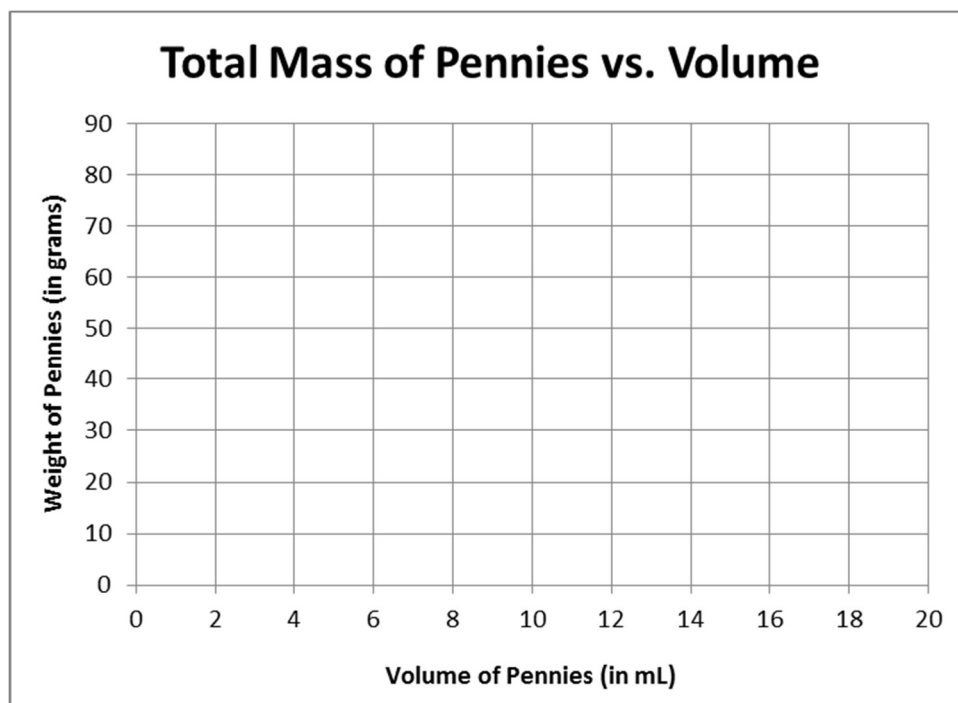
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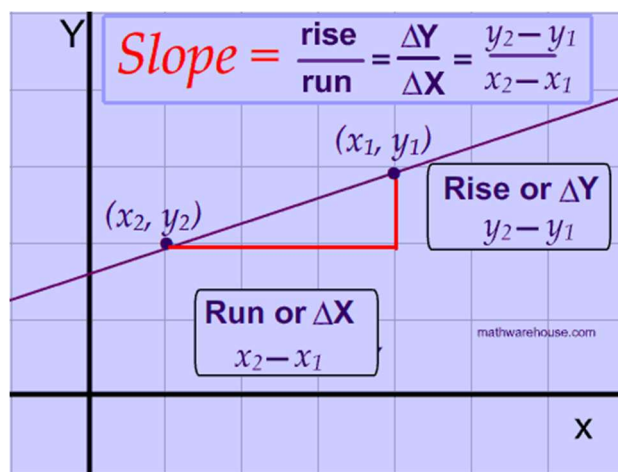
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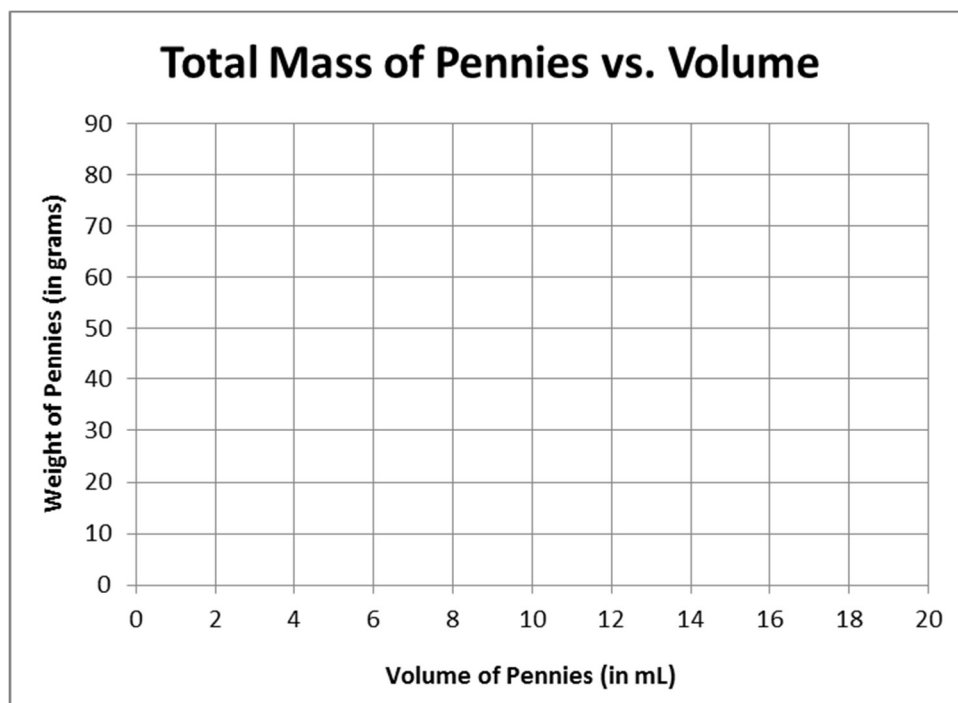
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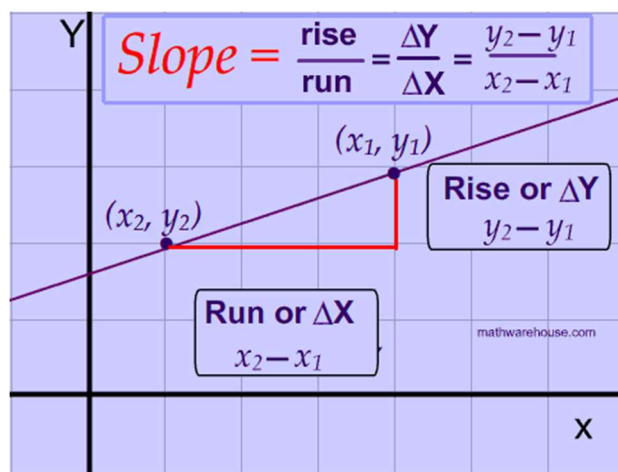
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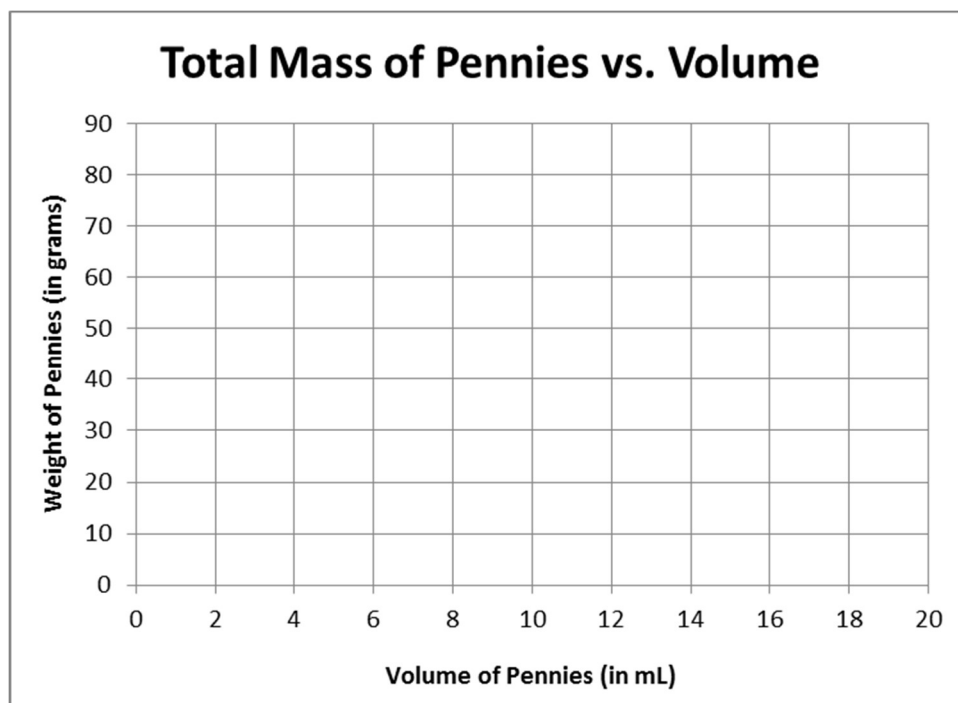
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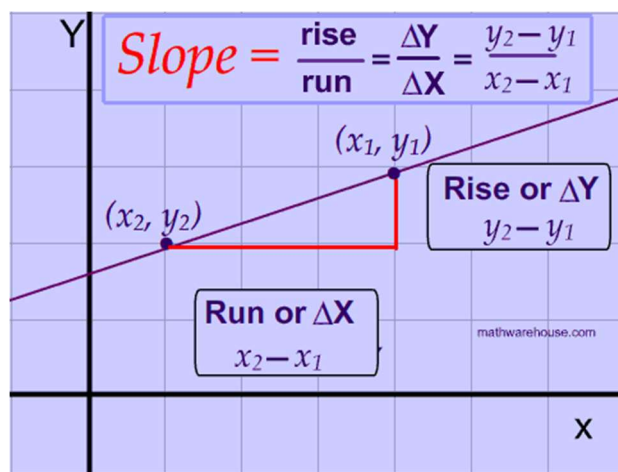
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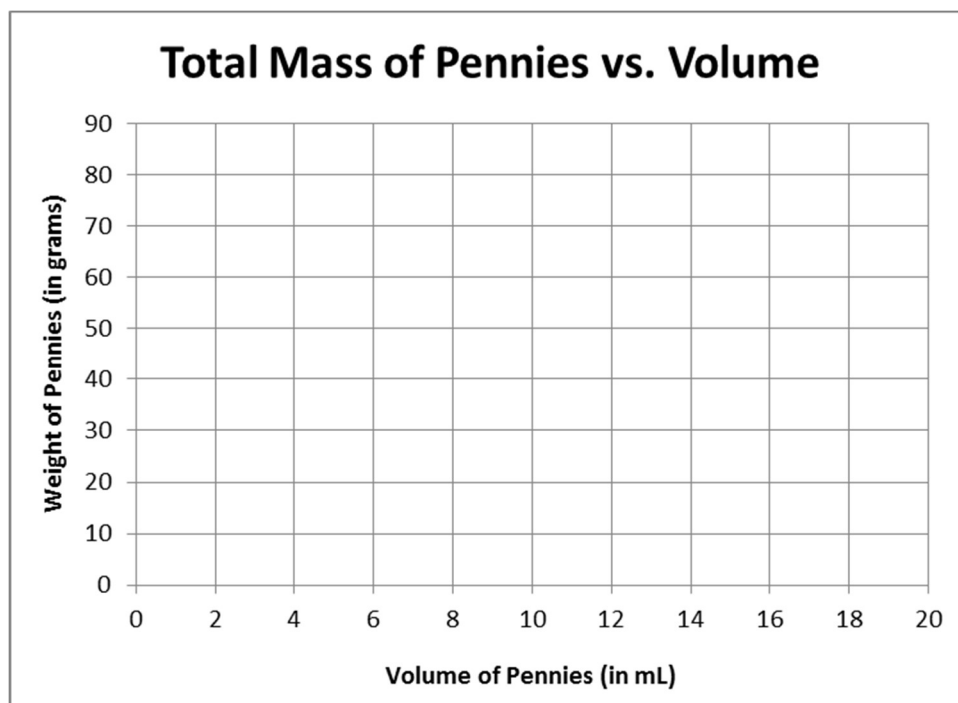
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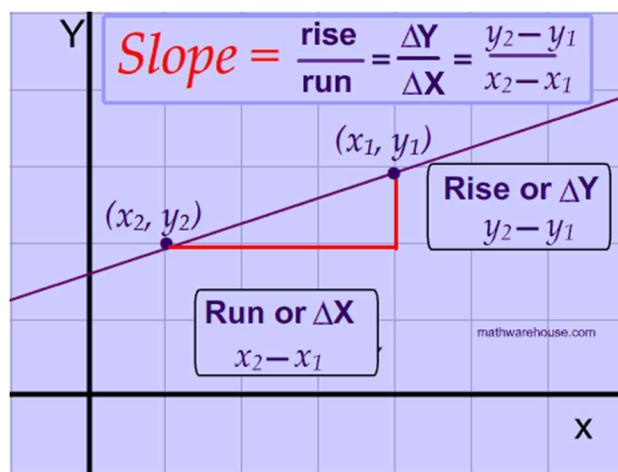
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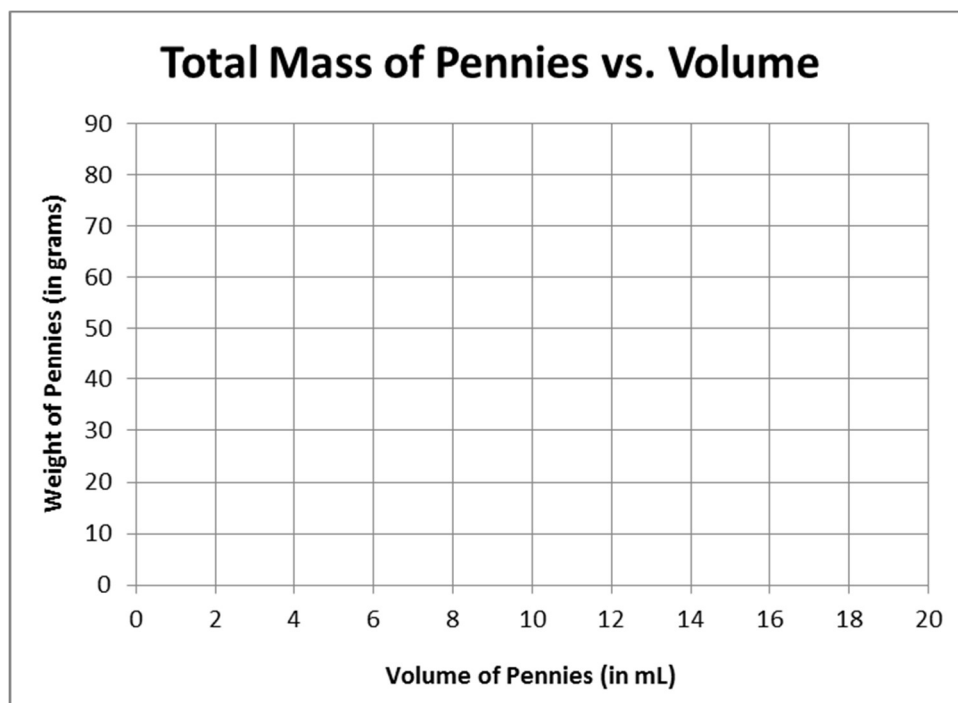
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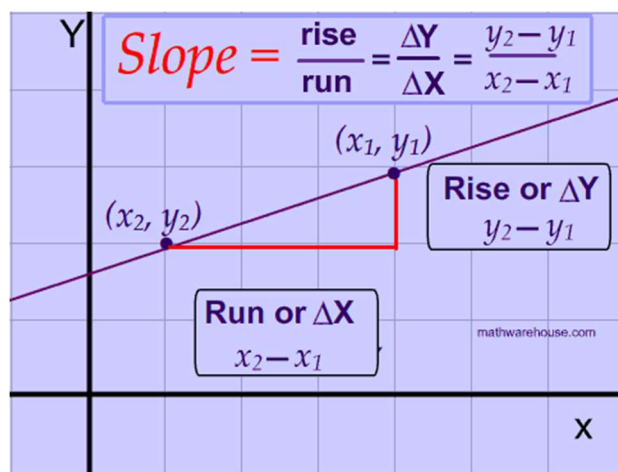
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2		10		
3		15		
4		20		
5		25		



C. Determining the Slope of These Plots to Get the Densities

- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
- Use the equation:



Slope of pre-1982
Pennies = g/mL

Slope of post-1982
Pennies = g/mL

c.

D. Further Discussion

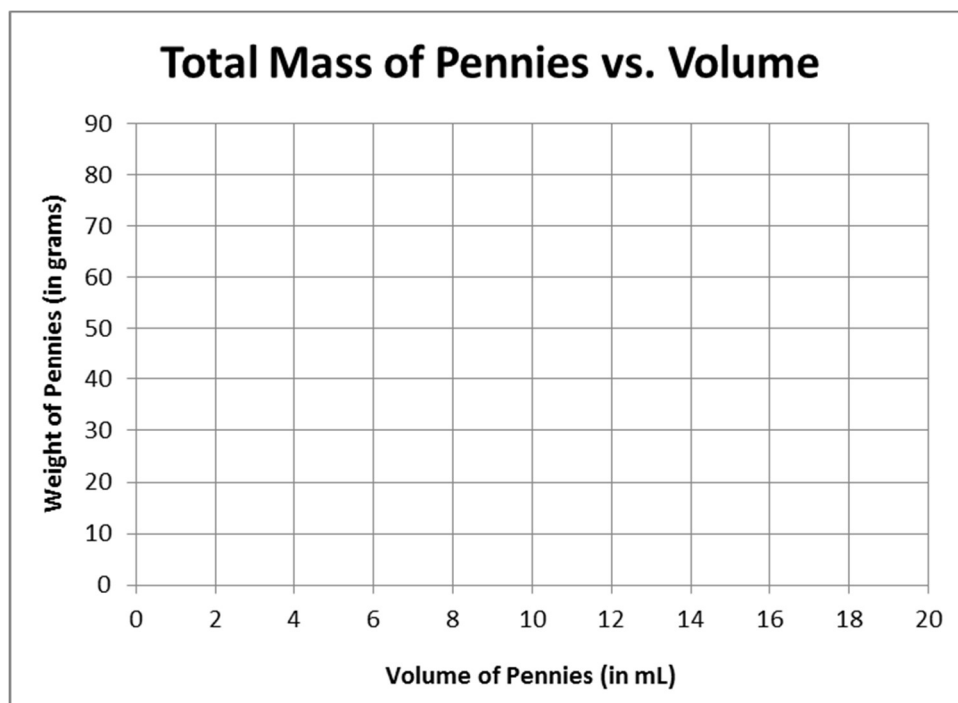
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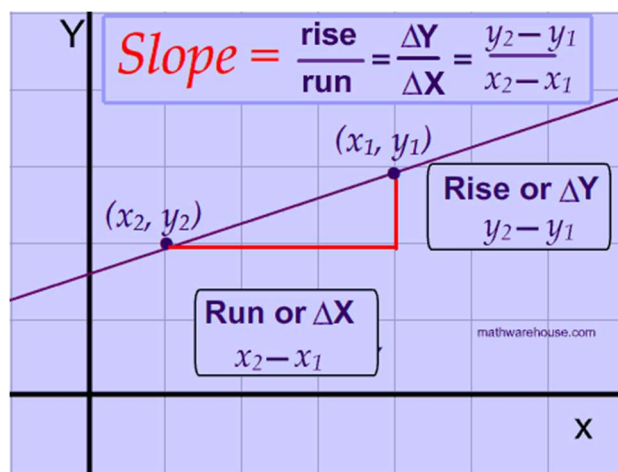
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Trial	Mass of 5 ¢ (g)	Total # ¢	Total Mass ¢ (g)	Total Volume Displaced (mL)
1		5		
2		10		
3		15		
4		20		
5		25		



C. Determining the Slope of These Plots to Get the Densities

- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
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Slope of post-1982
Pennies = g/mL

c.

D. Further Discussion

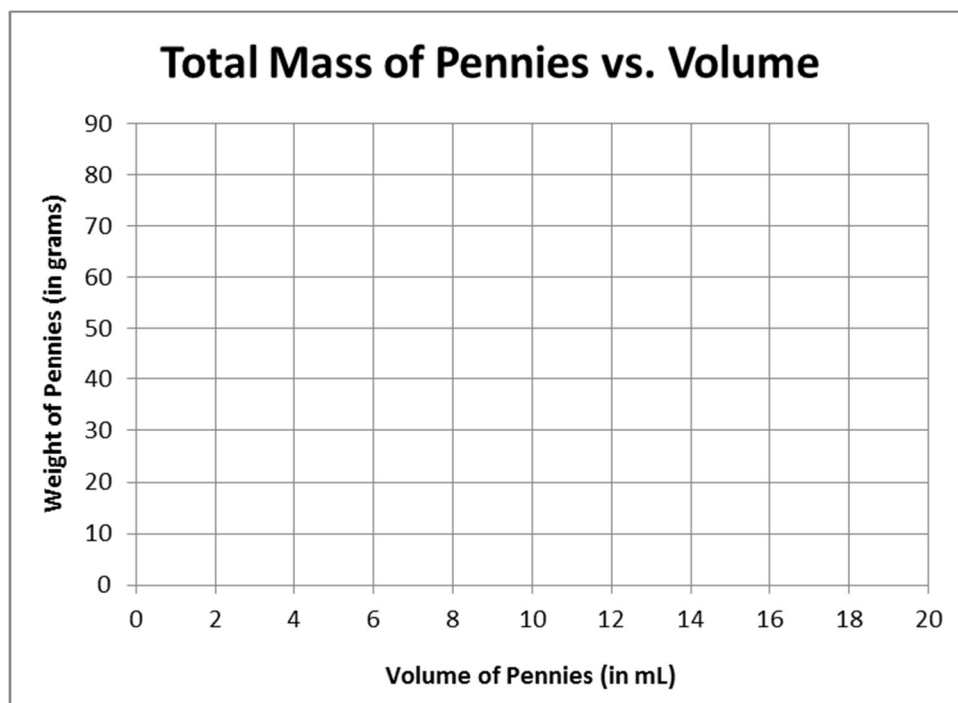
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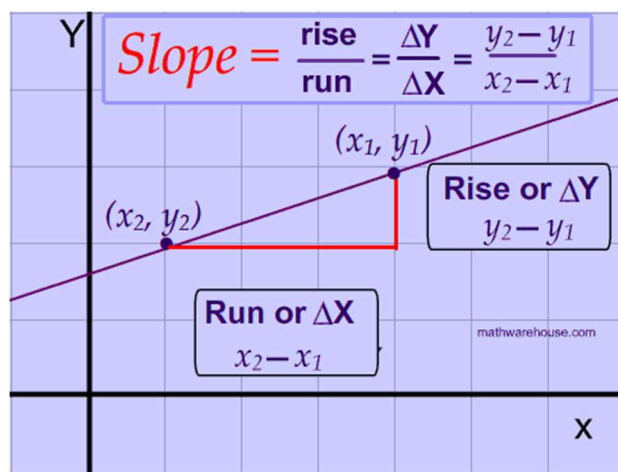
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C. Determining the Slope of These Plots to Get the Densities

- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
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Slope of post-1982
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c.

D. Further Discussion

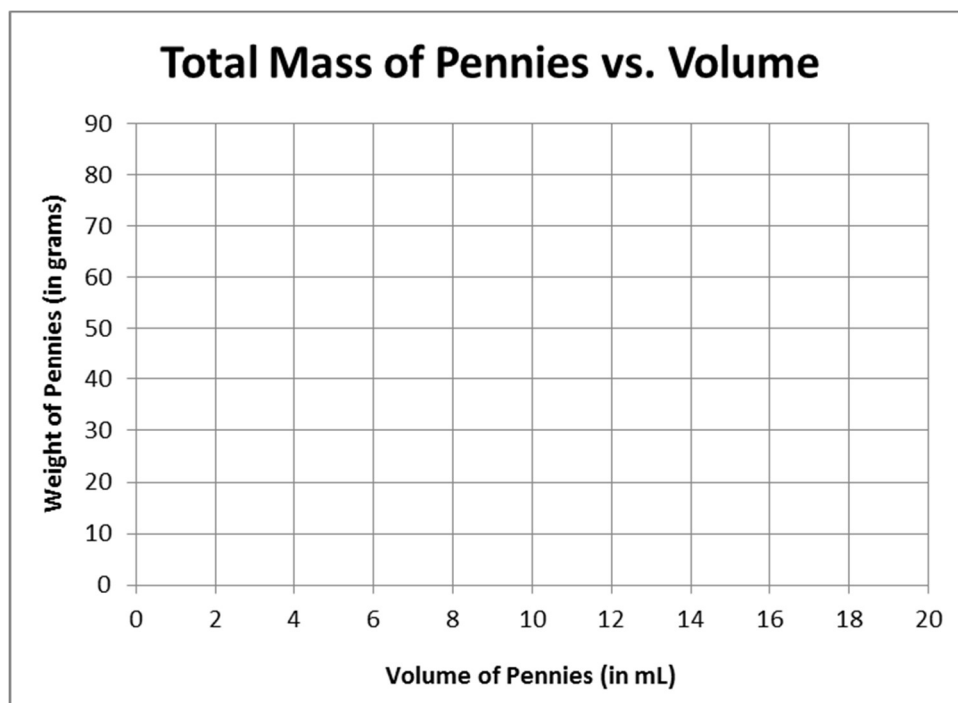
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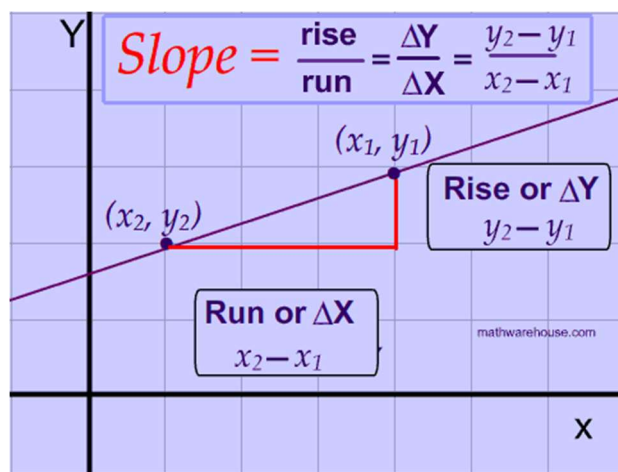
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C. Determining the Slope of These Plots to Get the Densities

- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
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Slope of post-1982
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c.

D. Further Discussion

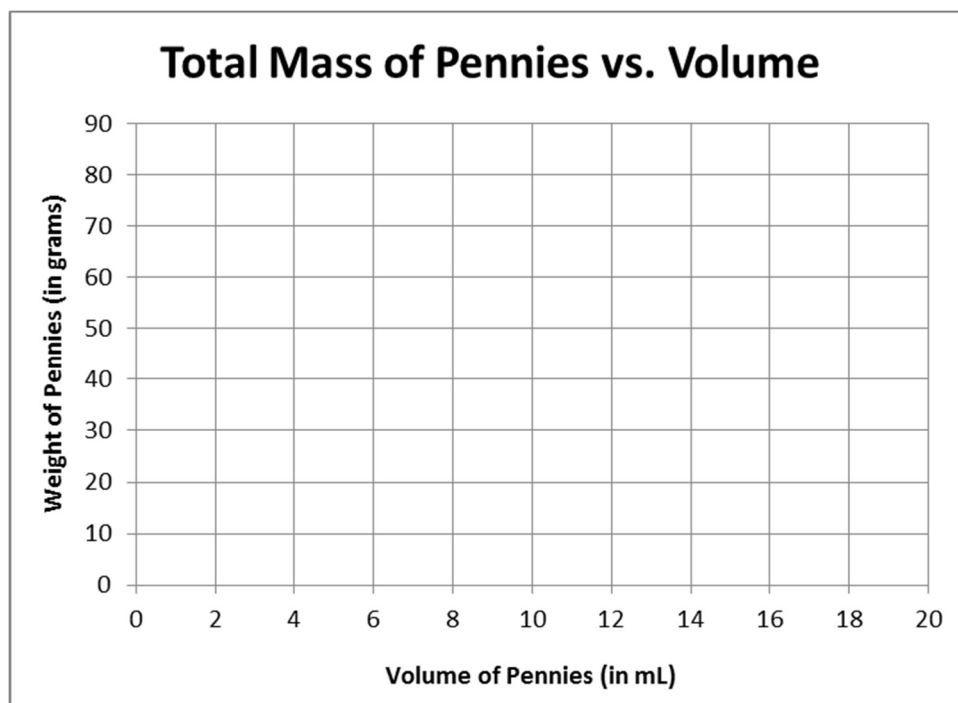
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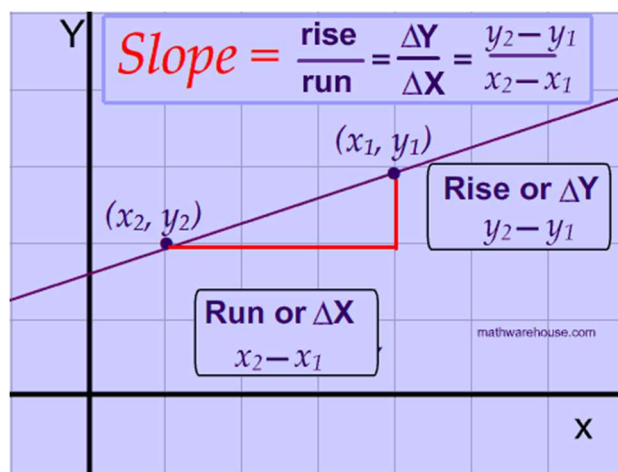
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D. Further Discussion

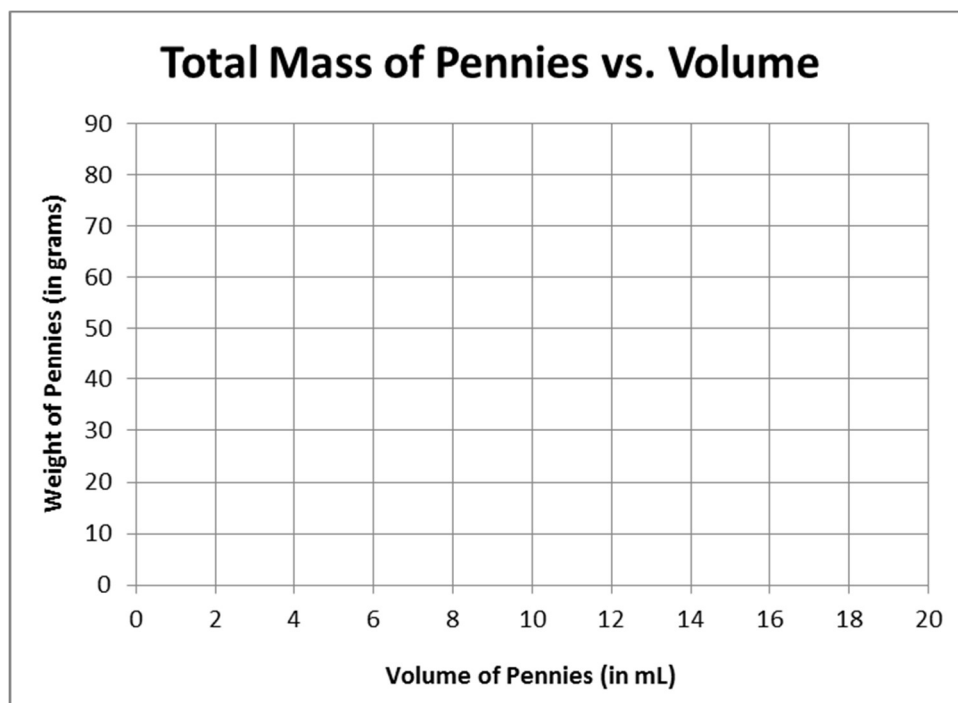
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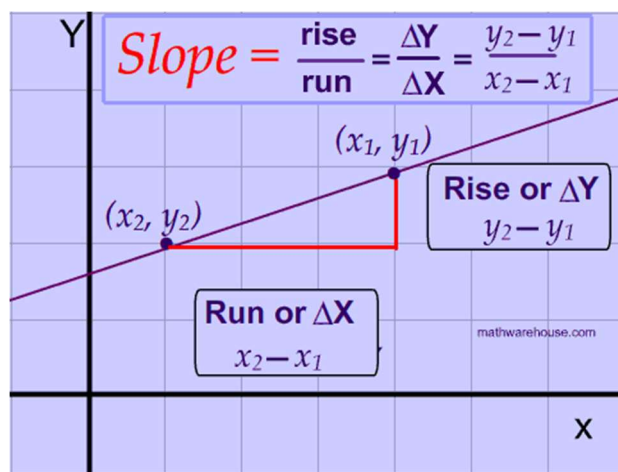
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C. Determining the Slope of These Plots to Get the Densities

- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
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Slope of post-1982
Pennies = g/mL

c.

D. Further Discussion

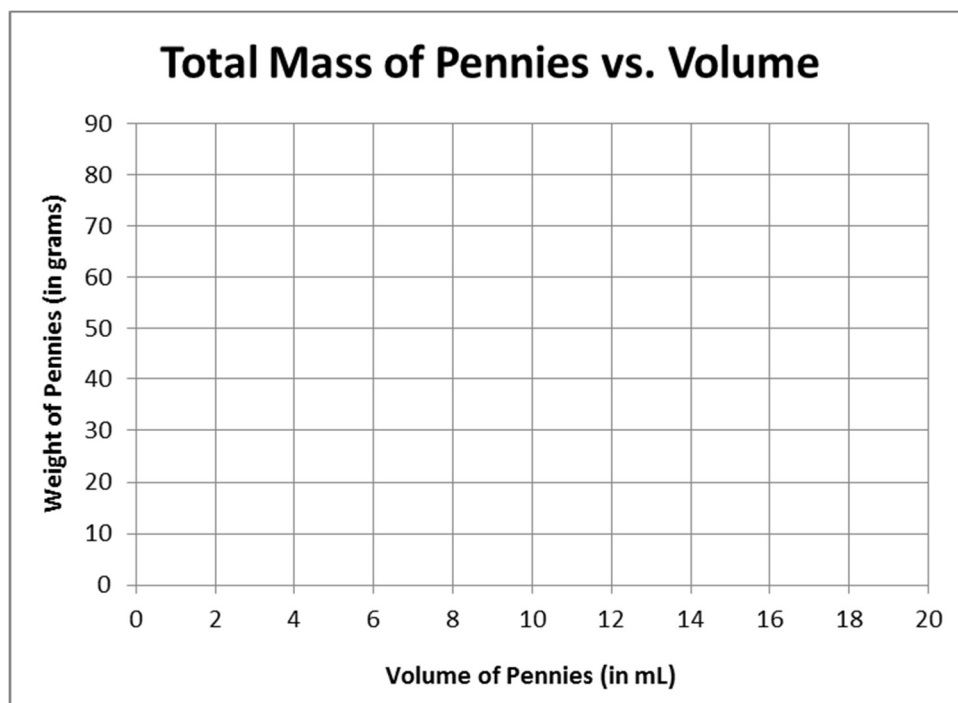
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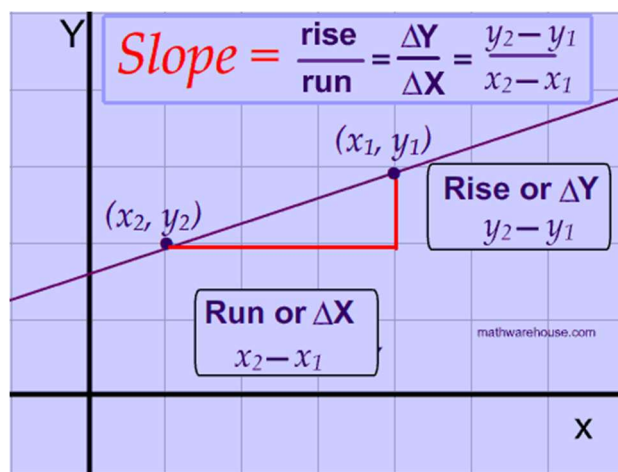
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C. Determining the Slope of These Plots to Get the Densities

- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
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Slope of post-1982
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c.

D. Further Discussion

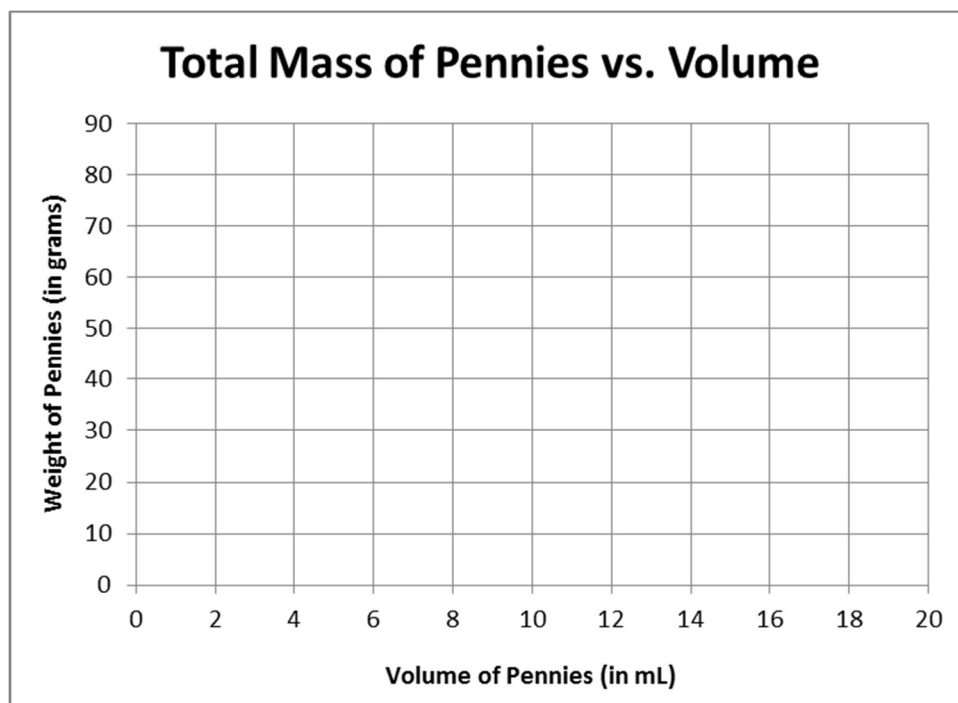
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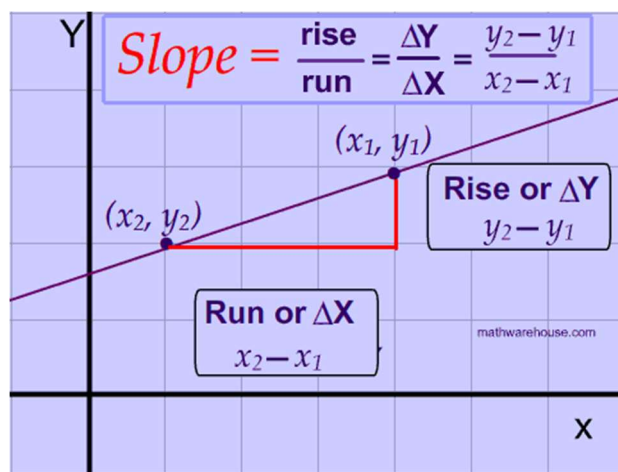
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c.

D. Further Discussion

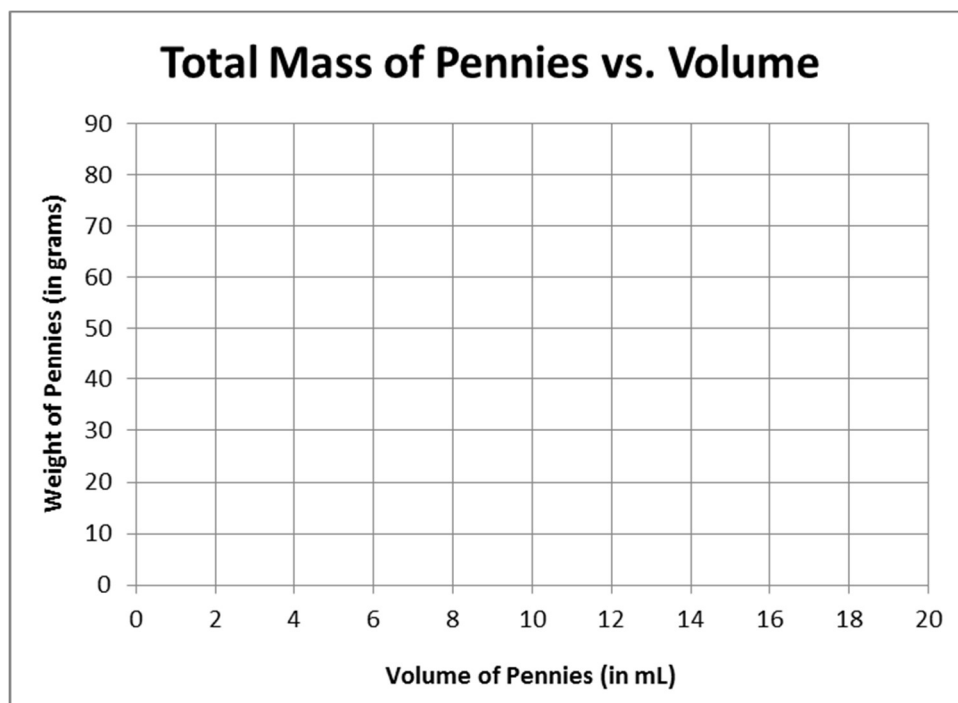
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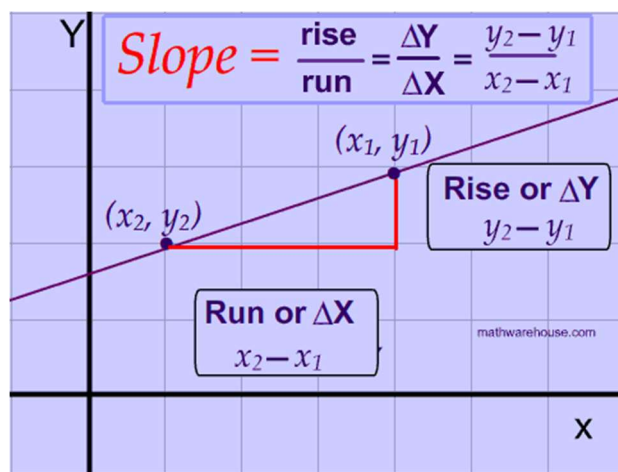
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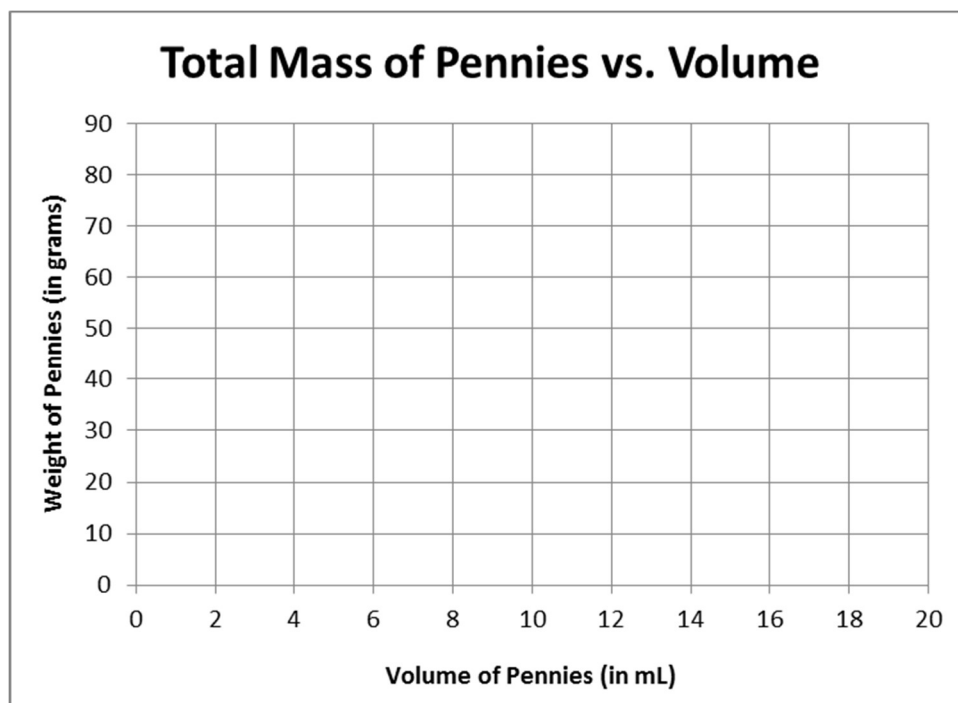
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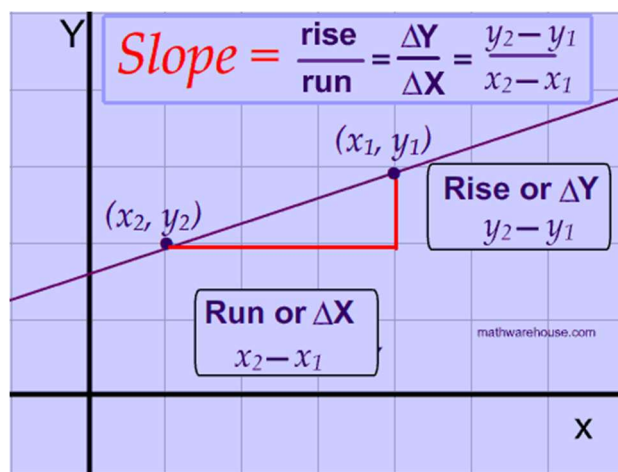
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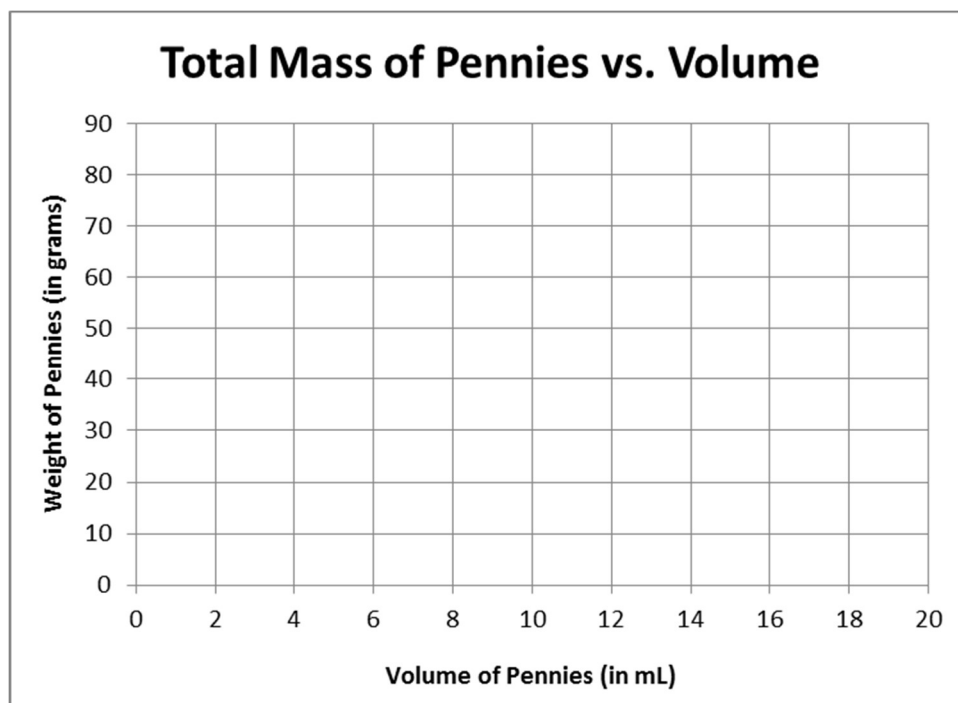
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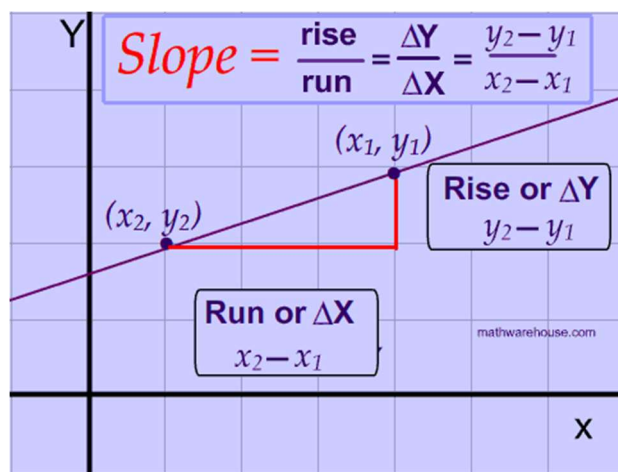
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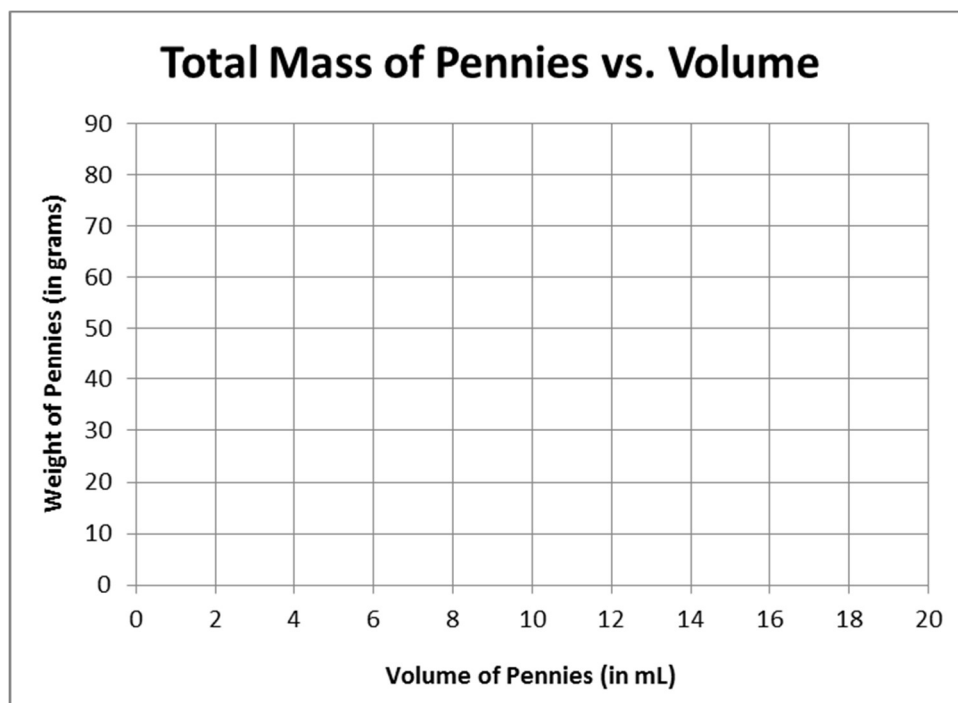
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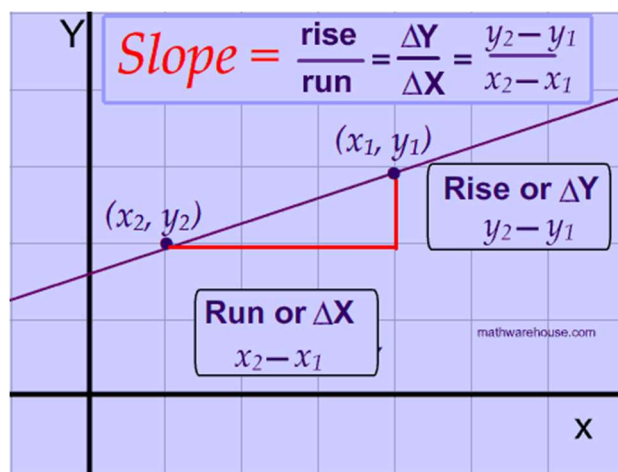
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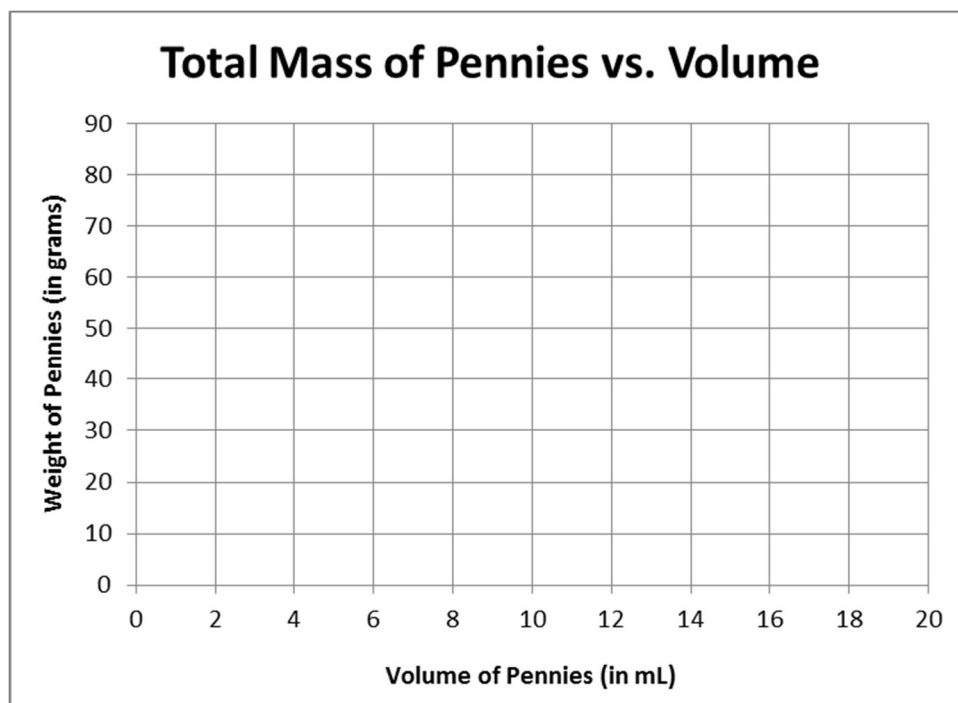
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 - b. Weigh 25 post-1982 pennies the same way in groups of 5.
- B. Entering This in Data Tables and and Plotting Graphs
 - a. Fill out the table below, then plot it in two different colors.

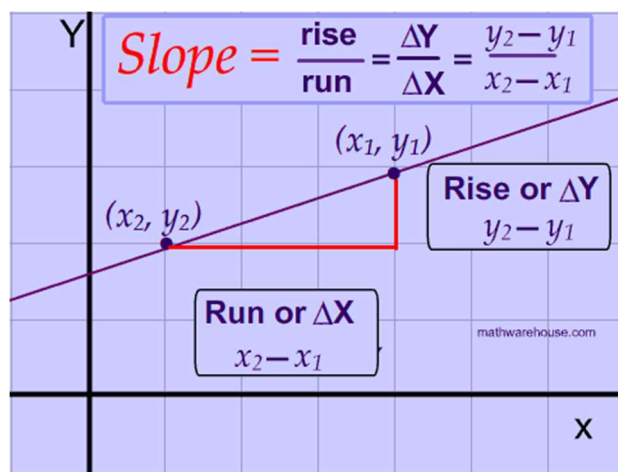
Data Table for Pre-1982 Pennies				
Trial	Mass of 5 ¢ (g)	Total # ¢	Total Mass ¢ (g)	Total Volume Displaced (mL)
1		5		
2		10		
3		15		
4		20		
5		25		

Data Table for Post-1982 Pennies				
Trial	Mass of 5 ¢ (g)	Total # ¢	Total Mass ¢ (g)	Total Volume Displaced (mL)
1		5		
2		10		
3		15		
4		20		
5		25		



C. Determining the Slope of These Plots to Get the Densities

- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
- Use the equation:



Slope of pre-1982
Pennies = g/mL

Slope of post-1982
Pennies = g/mL

c.

D. Further Discussion

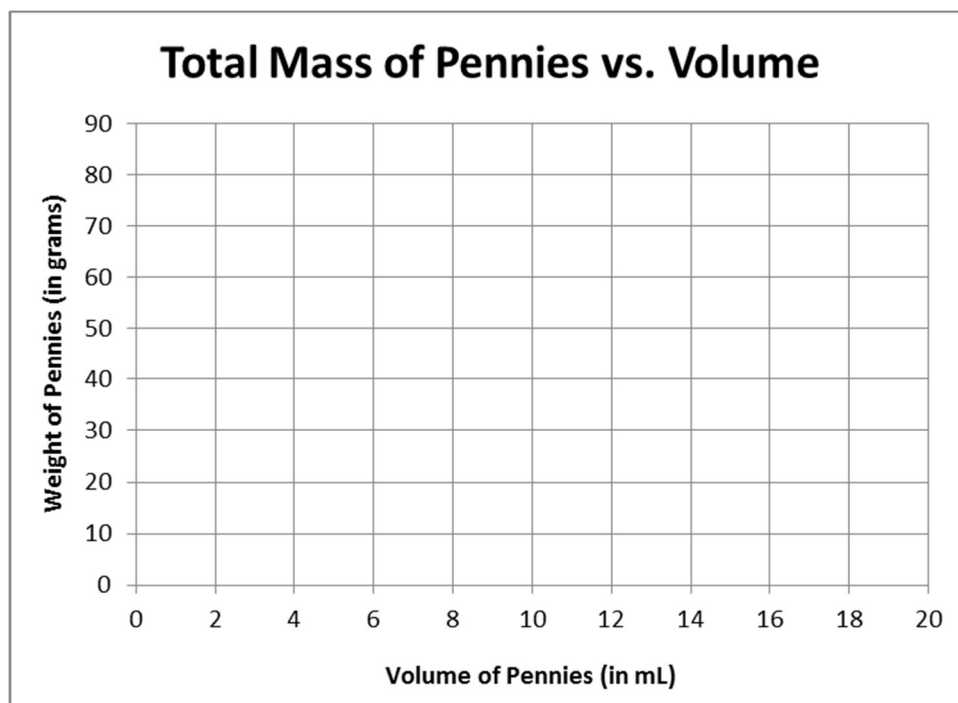
- Can you determine if a penny was minted before or after 1982 by its density?
- Can you determine when a penny was minted just by its mass?
- Explain how the relationships among volume, mass, and density support using a mass-only identification.
- At home, look up the expected densities for pennies pre-1982 and post-1982. List those below and discuss how well your measurements did in lab today.
- What were possible sources of error in your measurements?

A very commonly used property of matter is its density. We will be using that to determine the date of a penny as differing amounts of zinc and copper have been used in US pennies over the past 50 years (with a large change in 1982).

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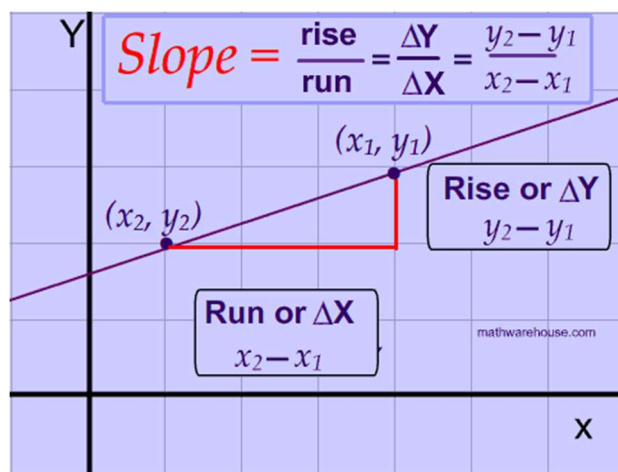
Data Table for Pre-1982 Pennies				
Trial	Mass of 5 ¢ (g)	Total # ¢	Total Mass ¢ (g)	Total Volume Displaced (mL)
1		5		
2		10		
3		15		
4		20		
5		25		

Data Table for Post-1982 Pennies				
Trial	Mass of 5 ¢ (g)	Total # ¢	Total Mass ¢ (g)	Total Volume Displaced (mL)
1		5		
2		10		
3		15		
4		20		
5		25		



C. Determining the Slope of These Plots to Get the Densities

- Calculate the slope of each of these lines using two points on your best-fit line to find the density of each grouping of pennies
- Use the equation:



Slope of pre-1982
Pennies = g/mL

Slope of post-1982
Pennies = g/mL

c.

D. Further Discussion

- Can you determine if a penny was minted before or after 1982 by its density?
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