

**Bell Work, Sept 29- Oct 3, 2013**

**Mass and Volume, Precision  
(Science Project)**

# Bell Work, Monday, Sept 30, 2013

*Draw the section of the cylinder in the red box:*

**1. What is the uncertainty?**

$$\frac{0.2 \text{ mL}}{2} = 0.1 \text{ mL}$$

**2. What is the measurement shown in mL?**

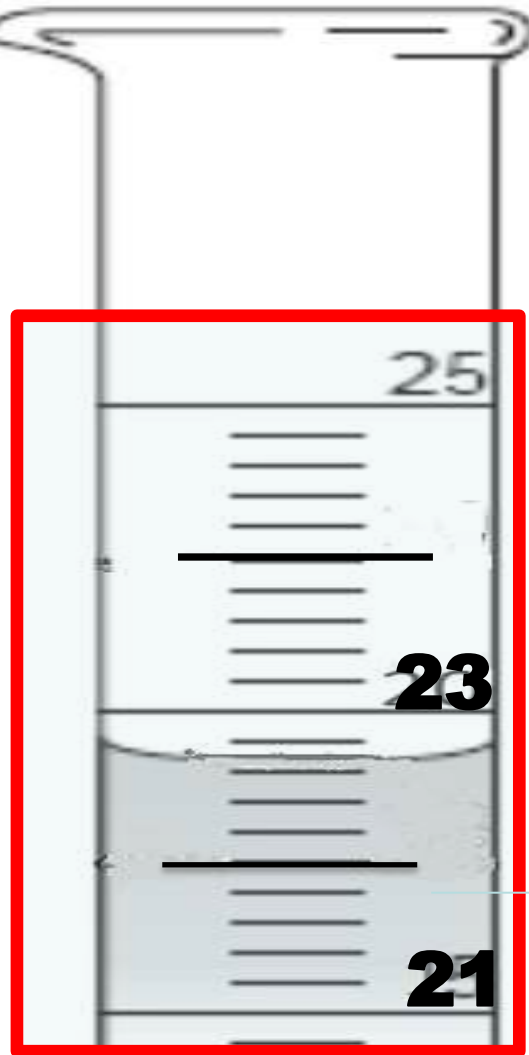
**22.7 mL**

**3. Write the measurement with the uncertainty.  $22.7 \text{ mL} \pm 0.1 \text{ mL}$**

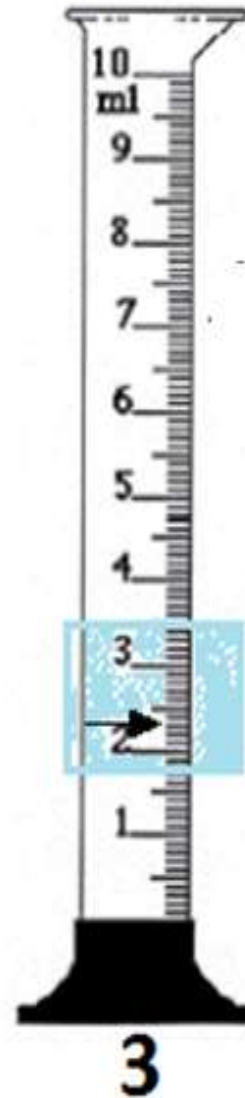
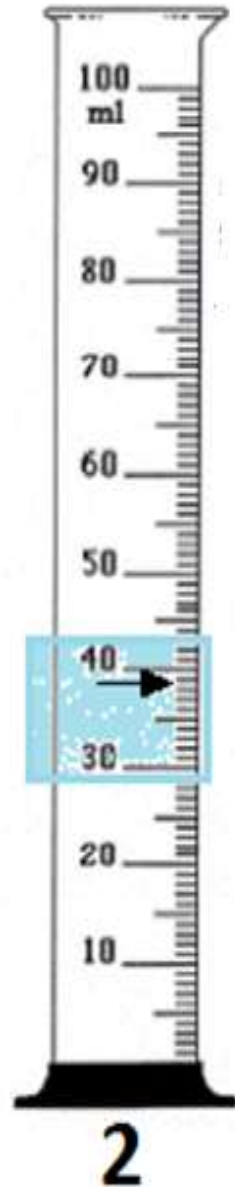
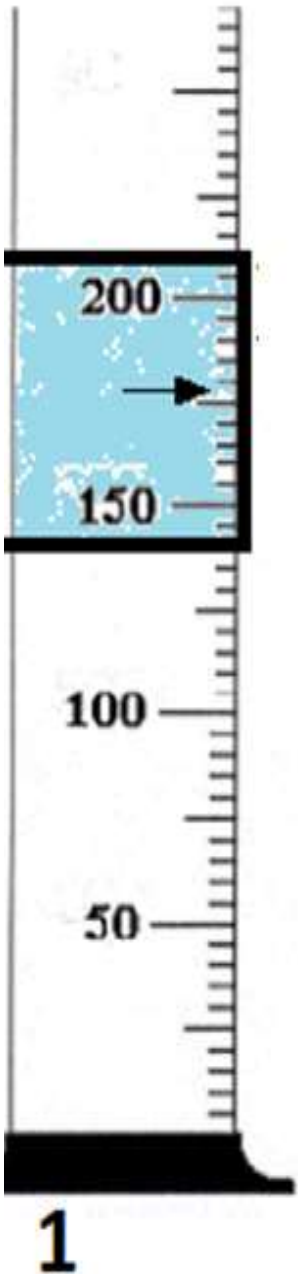
**4. What does  $22.7 \pm 0.1 \text{ mL}$  mean?**

**The accurate measurement could be as high as  $22.7 + 0.1 = 22.8 \text{ mL}$  or as low as  $22.7 - 0.1 \text{ mL} = 22.6 \text{ mL}$  or  $22.6 - 22.8 \text{ mL}$**

**5. What is the precision of this cylinder?**  
 **$\pm 0.1 \text{ mL}$**



# Bell Work, Monday, Sept 30, 2013



6. What is the precision for each graduated cylinder

1.  $\frac{5\text{mL}}{2} = 2.5, \pm 2.5$

2.  $\frac{1\text{mL}}{2} = 0.5, \pm 0.5$

3.  $\frac{0.1\text{ mL}}{2} = 0.05, \pm 0.05$

$\pm \text{Smallest mark}/2$

# Bell Work, Tues, Oct 1,, 2013

**1. Name two types of errors.**

**Random error and Systematic error.**

**2. What cause random errors?**

**Random error are due to the precision of an instrument.**

**3. Give an example of a random error**

**Measure the mass of a ring three times using the same balance : 17.46 g, 17.42 g, 17.44 g.**

**4. How do you minimize random errors?**

**Using large numbers of trials and averaging.**

**5. What causes systematic error**

# Bell Work, Tues, Oct 1,, 2013

5. What causes systematic error –

**Poor technique, mistakes and instruments that are not calibrated (zeroing a scale).**

**6. Give an example of a systematic error.**

**Not reading a graduated cylinder's water level from the bottom of the meniscus.**

**7. How do you minimize systematic error?**

**Improve your technique.**

# Bell Work, Wednesday, Oct 2

1. Write the linear equation (equation of a straight line).

$$**y = mx + b**$$

2. Explain this equation:  $y = 4.75x + 0.465$

The equation is a linear equation because it has the form of  $y = mx + b$ .

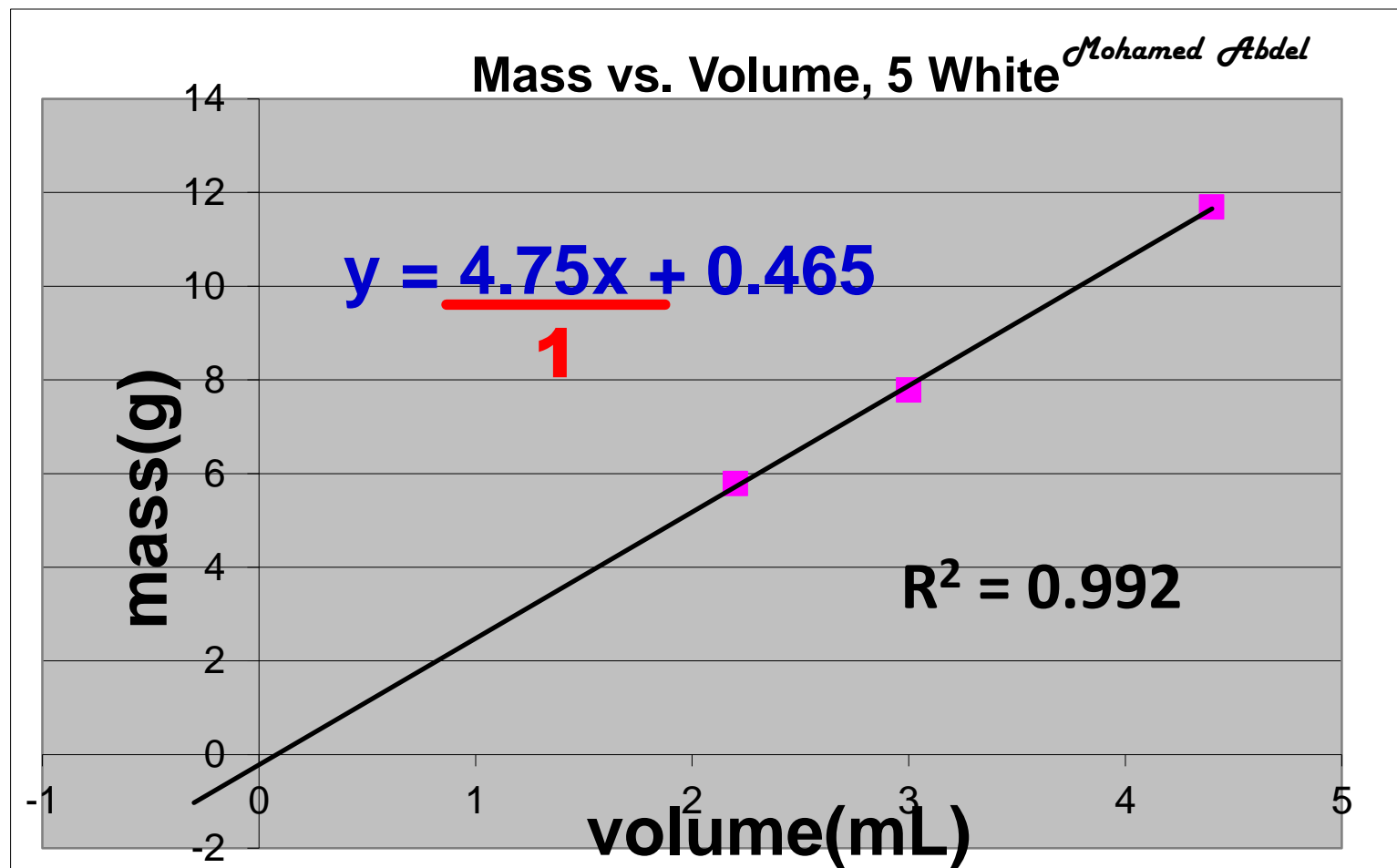
3.

4.75 is the slope (m)

0.465 is where the line crosses the y axis (the y-intercept) (b)

# Bell Work, Wednesday, Oct 2

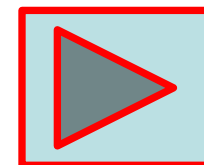
Silver	
x, volume	y, mass
2.2	5.78
3	7.78
4.4	<b>11.69</b>



4. For a piece of silver metal, what does a slope of 4.75 mean?

5. What does the y-intercept of 0.465 mean?

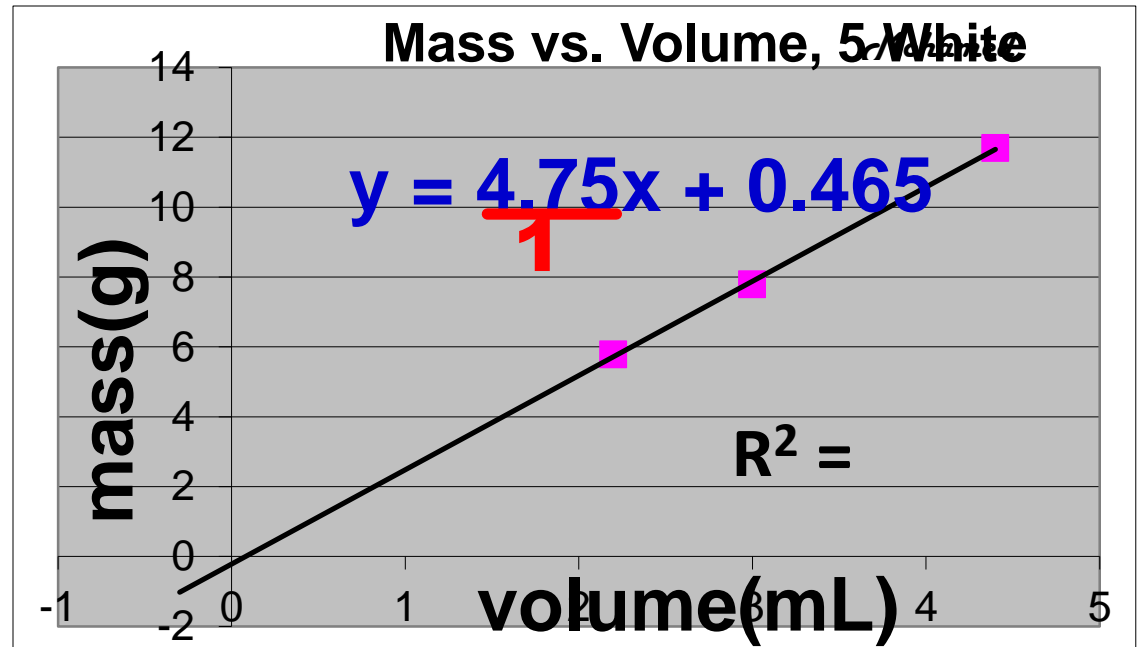
6. Is the y-intercept on this graph negligible?



# Bell Work, Wednesday, Oct 2

4. For a piece of silver metal, what does a slope of 4.75 mean?

1 mL has a mass of 4.75 g.  
Every time the volume changes by 1 mL, the mass changes by 4.75 g.



5. What does the y-intercept of 0.465 mean?

When the volume is zero, the mass = 0.465 g



6. Is the y-intercept on this graph negligible?

Do the 5% test. 11.59 is the max y value.

5% of 11.6 (  $0.05 \times 11.6$  ) = 0.579       $0.465 < 0.579$  . So,  
the y-intercept is negligible and can be assumed to be zero.

# Bell Work, Thursday, Oct 3, 2013

1. Identify the IV (circle it) and the DV (rectangle it) in the following: The Effect of Submersion Time on Absorption

2. Construct a format for writing a hypothesis from #1.

*If the \_\_\_\_\_ is \_\_\_\_\_*  
*(independent variable) (explain how the IV is changed)*  
*then the \_\_\_\_\_ will \_\_\_\_\_.*  
*(dependent variable) (explain how the DV will change)*

3. Skip.

What is the IV from the paper towel experiment?

What is the DV from the paper towel experiment?

# Bell Work, Wednesday, Sept 11, 2013

4. If the **submersion time** is **increased**  
(independent variable) (explain how the independent is changed)  
then the **absorption** will **increase**.  
(dependent variable) (explain how the dependent will change)

Identify the IV (circle it) and the DV (rectangle it) in the following: The Effect of Submersion Time on Absorption