

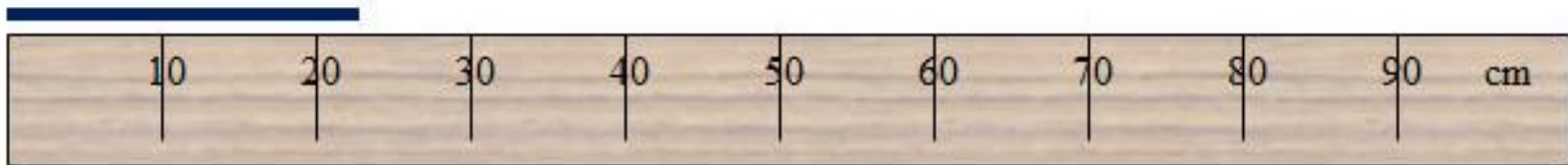
Week 2: Coke vs. Diet Coke

Dr. Turner

Overview

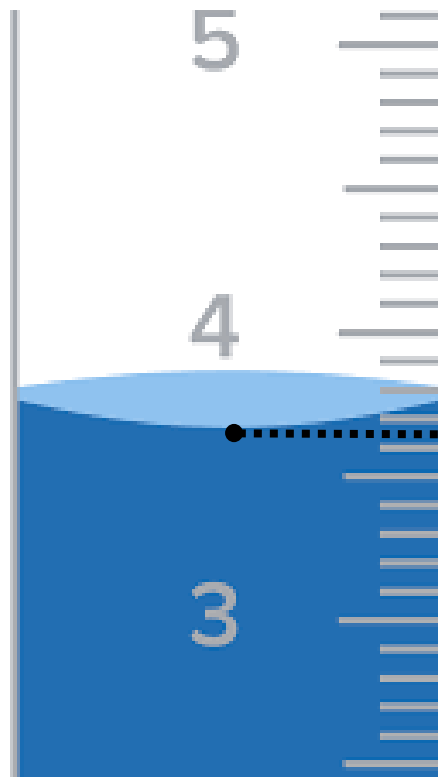
- ❑ Measuring
- ❑ Part 1: Does glassware impact a measurement?
- ❑ Part 2: Does density vary with sample size?

Measuring



- ❑ The blue segment is between the “20” and “30” graduation marks
- ❑ Add an additional digit to suggest how close or how far from the graduations the segment extends
- ❑ Acceptable answers are 22 or 23 depending on the judgement of the individual
- ❑ There is inherent error associated with this
- ❑ However, the error gives the scientist a better answer than just reading to the closest graduation, 20.

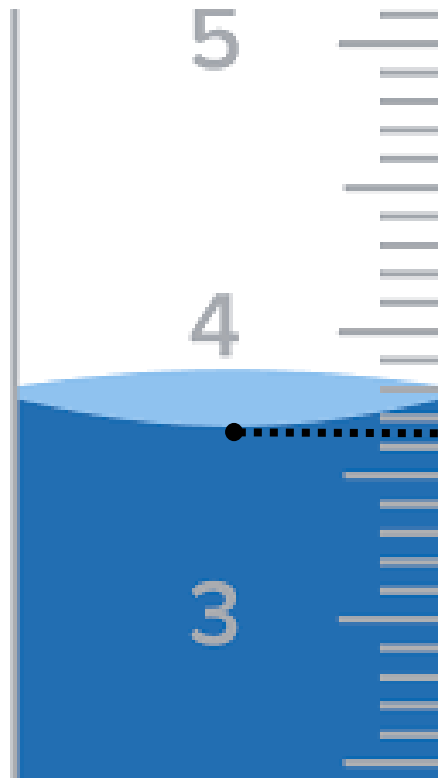
Measuring Liquids



Measure from
the bottom of
the meniscus

Measuring Liquids

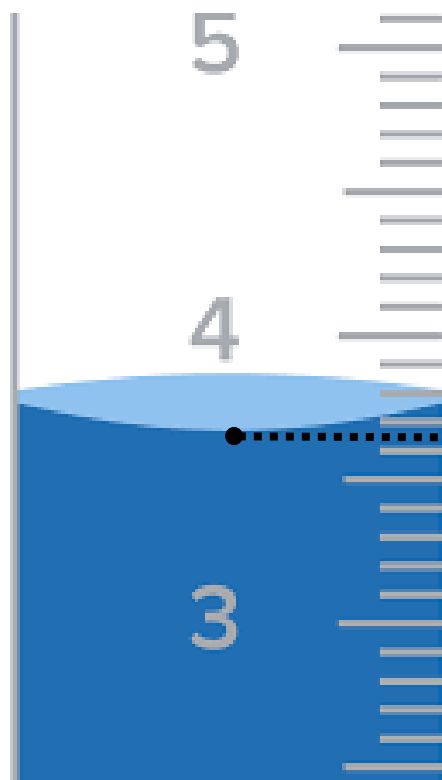
The graduations are separated by tenths, so measure to the hundredths place.



Measure from the bottom of the meniscus

Measuring Liquids

The graduations are separated by tenths, so measure to the hundredths place.

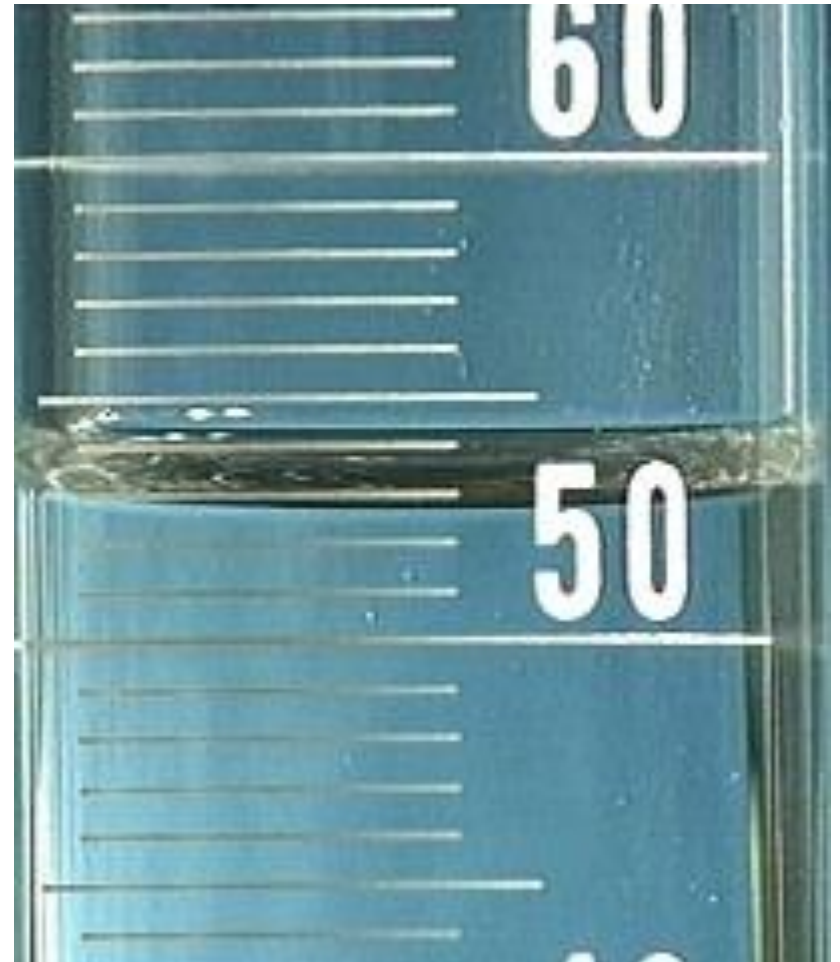


3.65 mL

3.63, 3.64, 3.66, and 3.67
would all be reasonable
readings based on the
judgement of the
chemist

Measurement

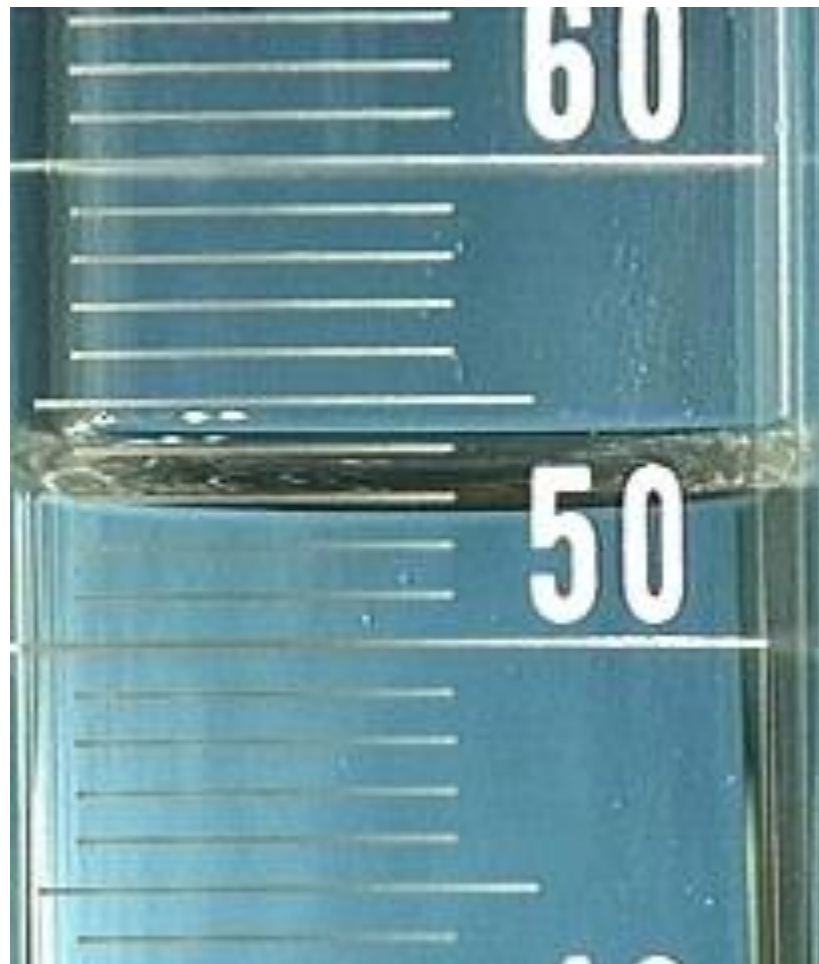
- What is an acceptable measurement for the volume of this graduated cylinder?



Measurement

- What is an acceptable measurement for the volume of this graduated cylinder?

52.8 and 52.7 are ideal answers, and 52.9 and 52.6 are acceptable answers



Measurement Summary

- Figure out the smallest increment of graduations for the measuring tool
- Estimate an additional digit

Part 1

- Question: Does glassware impact a measurement?
- Demo how to use glassware
 - ▣ Include cleaning bulbs
- Discuss how to determine the density of the beverage using the glassware
- Hypothesize which glassware will provide the best data and why?

Part 1

- Assign a drink to each student
- Procedure:
 1. Make a table like the one on the next slide.
 2. Using each piece of glassware each student should measure the density of 25 mL of their drink.
 3. Calculate the density of your drink using each piece of glassware

Glassware	Empty beaker mass (g)	Full beaker mass (g)	Initial Volume (mL)	Final volume (mL)
Graduated cylinder				
Buret				
Volumetric pipet				

Part 2

- Question: Does density vary with sample size?
- Considerations:
 - ▣ What determines the density of a liquid?
 - The ratio of the mass and volume

Part 2

- Procedure:
 - ▣ Each group member will need to measure the density of their drink at 3 different volumes.
 - ▣ All volume measurements in a group must be different.
 - ▣ Thus, a group of 2 will have different 6 volume measurements and a group of 3 will have 9 different volume measurements.