

QUIZ 01: CIRCUMFERENCE AND DIAMETER

Answer the questions using your clicker. If there are no multiple choices, the question is true/false. Use the T and F keys to respond. Please do not mark on this quiz paper. Each question is worth 2 points.

The data on the right were collected by measuring diameter and circumference using the same methods as in lab.

DIAMETER (CM)	CIRCUMFERENCE (CM)
1.27	4.2
6.01	18.9

- The uncertainty associated with the measurement of the diameters is
A) ± 0.0025 cm. C) ± 0.025 cm.
 B) ± 0.005 cm. D) ± 0.05 cm.
- The uncertainty associated with the measurement of each circumference is
 A) ± 0.005 cm B) ± 0.01 cm **C) ± 0.05 cm** D) ± 0.1 cm E) ± 0.5 cm
- True or **false**: The uncertainty associated with the 1.27 cm diameter is the smaller than the uncertainty associated with the 6.01 cm diameter.
- Based on these data, the slope of the circumference vs. diameter graph is closest to
A) 3.10. B) 3.13. C) 3.14. D) 3.15. E) 3.17.
- Compared to the known value of π , the % error in this experimental slope is
 A) -0.3% . B) -0.9% . C) 0% . D) 0.4% . **E) 1.3%**
- How does plotting your data on a graph reveal information about the extent of error in your diameter and circumference measurements?
 A) It doesn't. The graph can show you the mathematical relationship between c and d , but cannot tell you anything about the presence or the extent of error.
B) The scatter in the plotted points show you how much random error affects the data. The farther data points fall away from the best fit line, the more random error is present.
 C) The scatter reveals the presence of systematic, not random error. The closer the data are to the best fit line, the more likely it is that the data are affected by some systematic error.
 D) Data above the best fit line show random error in the circumference (points pushed up), and data that fall to the right of the best fit line show random error in the diameter (points pulled over). Points right on the line are error-free.
- The data above graph with an intercept of 0.26 cm.
 A) This is unusual, because the intercept should be zero. All of the data we graphed in lab had a zero intercept. This makes sense, since an object with zero diameter should have a zero circumference.
 B) This is unusual, because the intercept should be negative. The real data we graphed had a negative intercept, because everyone used the calipers incorrectly and measured the diameters slightly too small.
C) This is typical, because of the technique used to measure the circumference. Wrapping the string around the object results in a circumference slightly larger than the actual object.
 D) This is typical, but happens because of random error. If the slope of the graph is larger than expected, the best fit line misses the origin, giving a positive intercept. When all of the data are combined for each group, the graph should go through the origin.
- True** or false: The vernier calipers are a more precise tool than the ruler.
- True or **false**: The vernier calipers are a more accurate tool than the ruler.

For questions 10–15, use the following multiple choices:

- Doing this will improve either the precision or accuracy of the data or results.**
 - Doing this will *decrease* either the precision or accuracy of the data or results.
 - Doing this will have *no effect* on either the precision or accuracy of the data or results.
- Plotting the data on graph paper with a ruler in your notebook, rather than using a computer to generate the plot.
 - Measuring three items instead of ten.
 - Using a digital caliper to measure the diameter.
 - Tilting the string as you wrap the circumference.
 - Making sure that each cylindrical object selected is the same height.
 - Recording the data in your notebook using ink instead of pencil.