PHYSICS WEBSITE 5
Topic : Uncertainty
Link |https://barisciencelab.tech/Physics05.html

5.1 FLIPPED CLASSROOM

UNCERTAINTY:

In the quest to understand the world around us, scientists seek to find relationships among physical quantities that can be measured. Uncertainty Reliable measurements are an important part of physics. But no measurement is absolutely precise. There is an uncertainty associated with every measurement.

Among the most important sources of uncertainty, other than blunders, are the limited accuracy of every measuring instrument and the inability to read an instrument beyond some fraction of the smallest division shown. For example, if you were to use a centimeter ruler to measure the width of a board ,the result could be claimed to be precise to about 0.1 cm (1 mm), the smallest division on the ruler, although half of this value might be a valid claim as well.The reason is that it is difficult for the observer to estimate (or "interpolate") between the smallest divisions. Furthermore, the ruler itself may not have been manufactured to an accuracy very much better than this.When giving the result of a measurement, it is important to state the estimated uncertainty in the measurement. For example, the width of a board might be written as ("plus or minus 0.1 cm") represents the estimated uncertainty in the measurement, so that the actual width most likely lies between 8.7 and 8.9 cm. The percent uncertainty is the ratio of the uncertainty to the measured value, multiplied by 100. For example, if the measurement is 8.8 cm and the uncertainty about 0.1 cm, the percent uncertainty is

uncertainty in a numerical value is assumed to be one or a few units in the last digit specified. For example, if a length is given as 8.8 cm, the uncertainty is assumed to be about 0.1 cm or 0.2 cm. It is important in this case that you do not write 8.80 cm, because this implies an uncertainty on the order of 0.01 cm; it assumes that the length is probably between 8.79 cm and 8.81 cm, when actually you believe it is between 8.7 and 8.9 cm.

5.2 Do Now: Measurement

Tutorial:

1. What is SigFig?
2. 8.11 kg + 2.476 kg =
3. What is uncertainty?
4. What are the connections between both?
5. What is precision?

6. What is accuracy?
7. What are the connections between both?

5.3 Big Idea :

1. What is the area and its uncertainty of a circle of radius 3.8 X 10^4 cm?

2. **Is the diamond yours?** A friend asks to borrow your precious diamond for a day to show her family. You are a bit worried, so you carefully have your diamond weighed on a scale which reads 8.17 grams. The scale's accuracy is claimed to be 0.05grams. The next day you weigh the returned diamond again, getting 8.09 grams. Is this your diamond?

5.4 Exit Slip/Escape Room

1. What is the percent uncertainty for the measurement given as 1.57 m^2.

2. What is the percent uncertainty in the measurement 3.76 plus/minus 0.25 m?

3. Find percent the volume and percent uncertainty when r= 2.86 plus/minus 0.09 m.

5.5 Homework

4. What is the percent uncertainty for the measurement given as 1.57 m^2.

5. What is the percent uncertainty in the measurement 3.76 plus/minus 0.25 m?

6. Find percent the volume and percent uncertainty when r= 2.86 plus/minus 0.09 m.