flippingphysics.com

Flipping Physics Lecture Notes: Introduction to Accuracy and Precision

Accuracy is how close your observed (or measured) values are to the accepted value.

Precision is how close your observed (or measured) values are to one another. (Repeatability)

Precision is also the degree of exactness of a measurement, or how many significant digits it has. However, when comparing Accuracy to Precision, this is not the definition we use.

Example Problems question:
Which of the following is true about the Accuracy and Precision represented by this target?
1) High Accuracy & High Precision   2) Low Accuracy & High Precision
3) Low Accuracy & Low Precision   4) High Accuracy & Low Precision
5) Can't determine Accuracy or Precision
6) Can't determine Precision   7) Can't determine Accuracy

1st Example: All the arrows are near the bull's eye, so all the measurements would be near the Accepted Value, so it's High Accuracy. All the arrows are near one another, so your measurements are highly repeatable, so High Precision as well. So the answer is #1.

2nd Example: Just like in the previous example all the arrows are close to one another so it is still highly accurate. However, now the measurements aren't near the accepted value, so it is low accuracy. So the answer is #2.
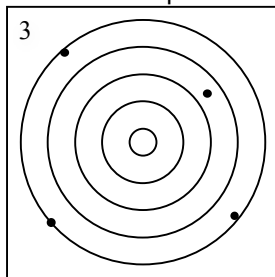
3rd Example: All the arrows are far from one another, so the precision is low. If you take the average of all of the arrows or measurements, then you actually get an average measurement that is close to the accepted value. So the answer is #4, High Accuracy and Low Precision.

4th Example: There is high accuracy because the arrow or measurement is near the bull's eye or accepted value. There is only one measurement so we can't compare it to any of the other measurements so we can't determine Precision. The correct answer is #6.

$$E_r = \frac{O - A}{A} \times 100$$

E_r = Relative Error; O = Observed Value; A = Accepted Value.

Relative Error is a measurement of Accuracy.

Because the Observed Value and the Accepted Value have the same dimensions, the dimensions cancel out and Relative Error is a percentage.

Enjoy the outtakes. It took a really long time to get these 11 shots to stick to the board and to hit where I needed them.