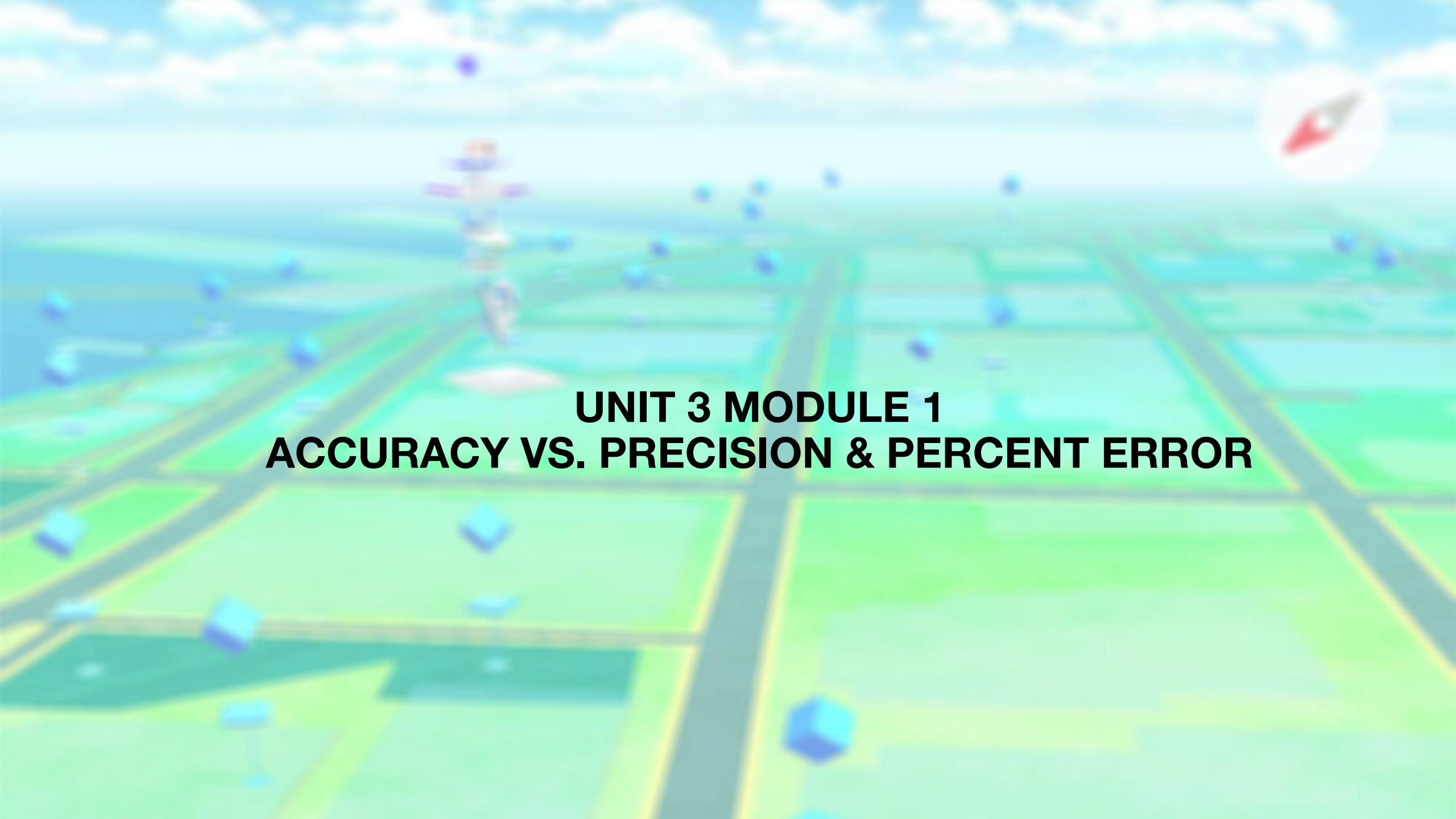


UNIT 3 MODULE 1
ACCURACY VS. PRECISION & PERCENT ERROR

Module Concepts

- Accuracy
- Precision
- Percent Error

Accuracy

- Accuracy refers to how close a measured value is to an accepted value. Percent Error is a measure of how accurate a measurement is.
- Accuracy is when the average of a set of measurements is close to the “true” or “accepted” value.
- Notice on the dart board how all the throws hit on or very close to the bulls eye. The person who threw these darts was very accurate.

Accuracy - Continued

- Example: A student determines through measurement that the density of a sample of water is 0.98 g/mL. The true or accepted value for the density of water is 1.0 g/mL. This student's data is accurate because the two values are so close to each other.

Precision

- Precision refers to how close a series of measurements are to each other. In other words, precision is reproducibility in measured quantities.
- Precision is getting a similar answer every time the measurement is made.
- Notice on the dart board here, the throws are all close to each other, though not necessarily on the bulls eye. The person who threw these darts has good precision.

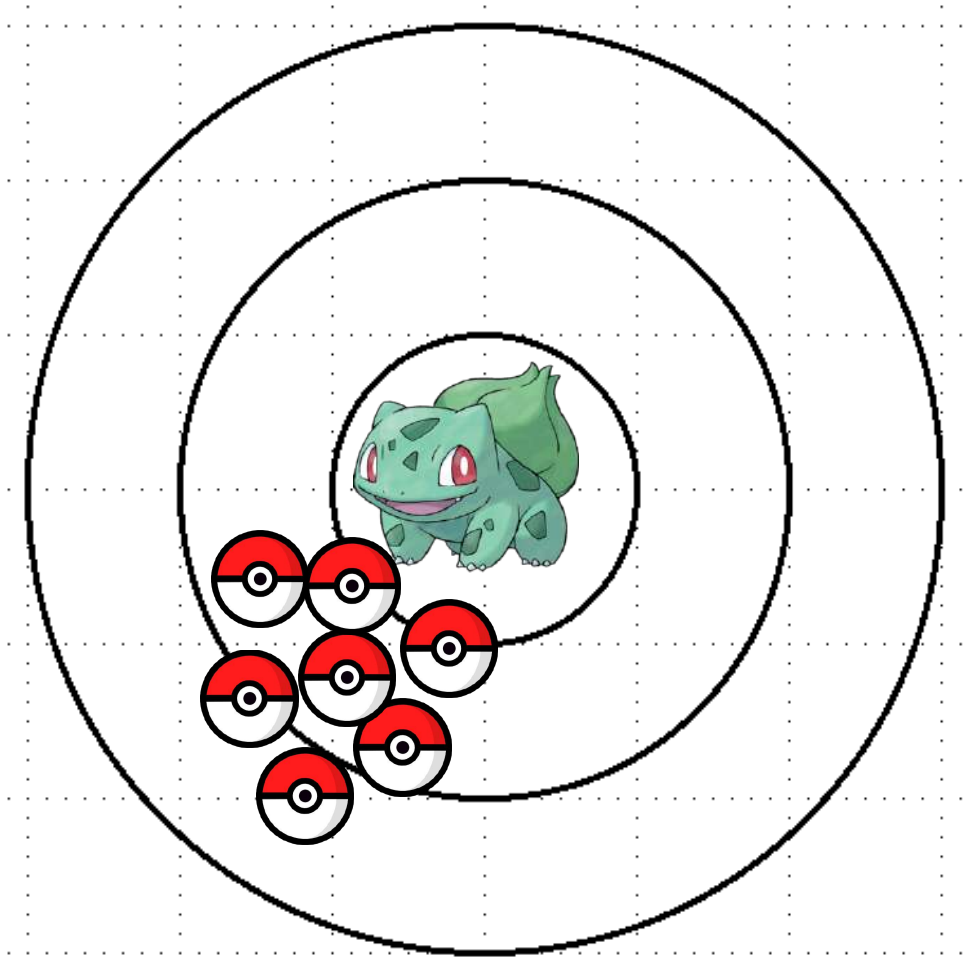
Precision

- Example: A student measures the mass of a piece of chalk three different times using the same balance. She obtains the following data for the mass of the chalk:

Trial 1: 1.2 g
Trial 2: 1.3 g
Trial 3: 1.2 g

This student's data is precise.

Accurate or Precise?



A Bulbasaur has spawned!

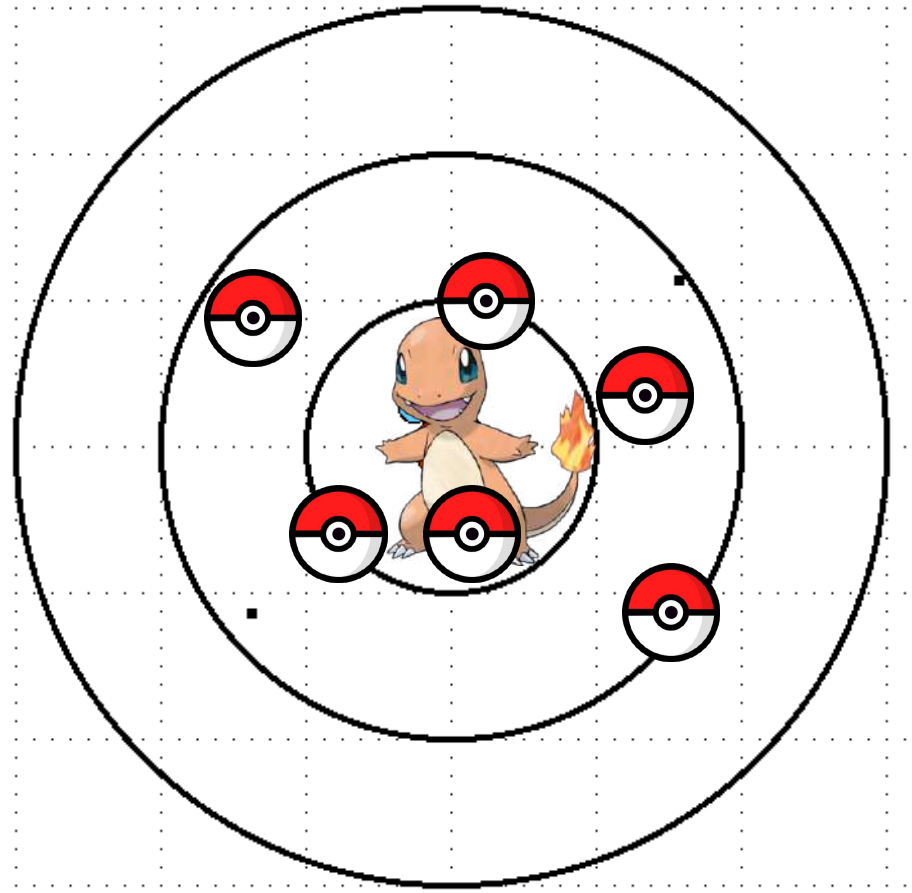
You toss your Pokéballs very precisely, but *not* accurately.

The Pokéball tosses are all close to each other, but not close to the Bulls Eye (i.e. Bulbasaur).

The End Result?

Despite your high precision, you still missed. Bulbasaur ran away because the Pokéballs were thrown with poor accuracy.

Accurate or Precise?



Charmander has spawned!

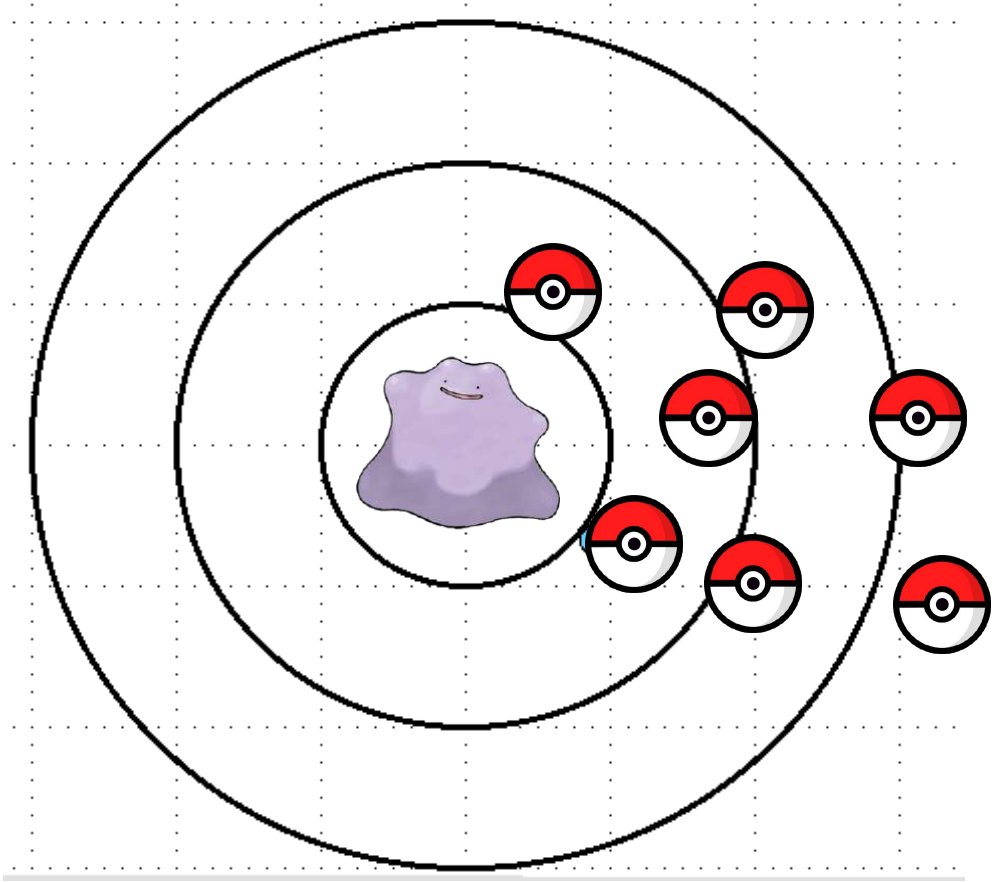
You toss your Pokéballs with high accuracy but poor precision.

Average placement of the Pokéball tosses is close to Bulls Eye.

The End Result?

You got lucky here. Despite your poor precision, your high accuracy made it possible for you to catch Charmander.

Accurate or Precise?



Ditto has spawned!

Your hand starts trembling out of excitement. All your Pokéball tosses are neither accurate nor precise.

The Pokéball tosses are not close to each other and not close to Bulls Eye.

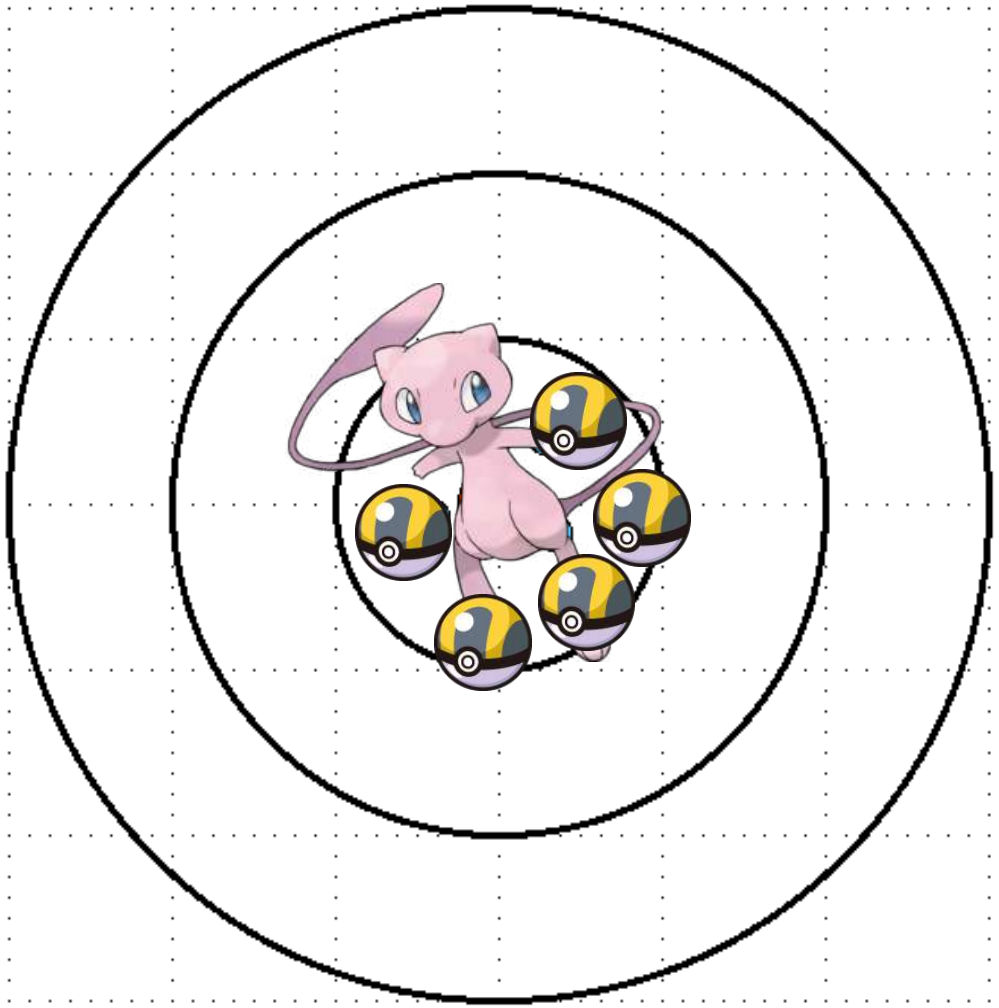
The End Result?

Ditto ran away because the Pokéballs were thrown with poor accuracy AND precision.

Such poor accuracy and precision….

(Hover over the image and click on the play button)

Accurate or Precise?



The elusive Mew has finally spawned! To prove your worth as a Pokémon master, you throw your Pokéballs with a high level of accuracy and precision.

The Pokéball tosses are close to each other and close to the Bulls Eye.

The End Result?

Your high accuracy and precision made it possible for you to catch Mew!

You go Glen Coco!

Another Application of Accuracy in Pokémon Go

Once you place your finger on the Pokeball, you'll notice the circle starts shrinking. If your Pokeball lands on the target Pokemon within that circle, you'll receive bonus experience points, **with the bonus increasing as the circle shrinks.**

Low Accuracy

Medium Accuracy

High Accuracy BONUS POINTS!

Percent Error

When we do labs, sometimes we want to know how close our measurements are to the actual value. To do so, we can calculate the percent error for our experimental measurements. This percent error is a quantitative description of experimental accuracy.

$$\% \text{ error} = \frac{\text{theoretical} - \text{experimental}}{\text{theoretical}} \times 100$$

This error is almost always reported as a positive number, so take the absolute value!


i found this humerus.