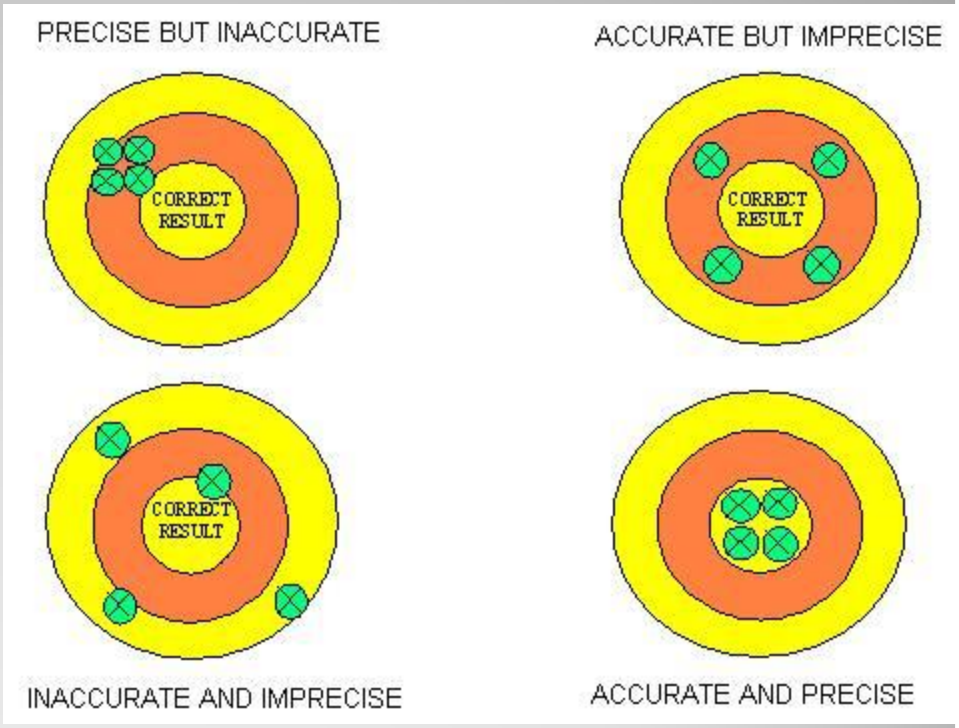
Accuracy and Precision

Objective:

- Distinguish between accuracy and precision.
- Use significant figures in measurements and calculations.

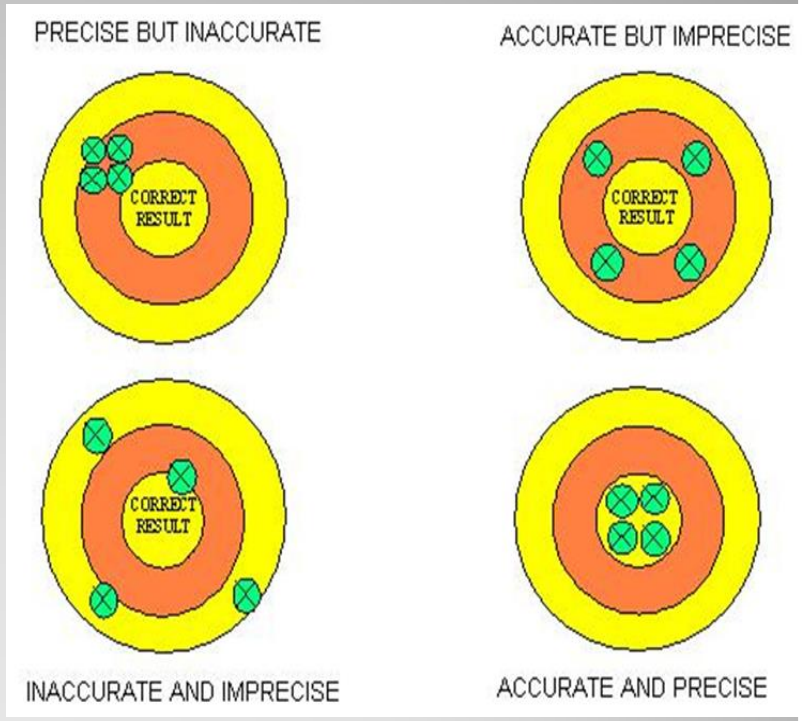
- **<u>Accuracy</u>** – the extent to which a reported measurement approaches the true value of the quantity measured.

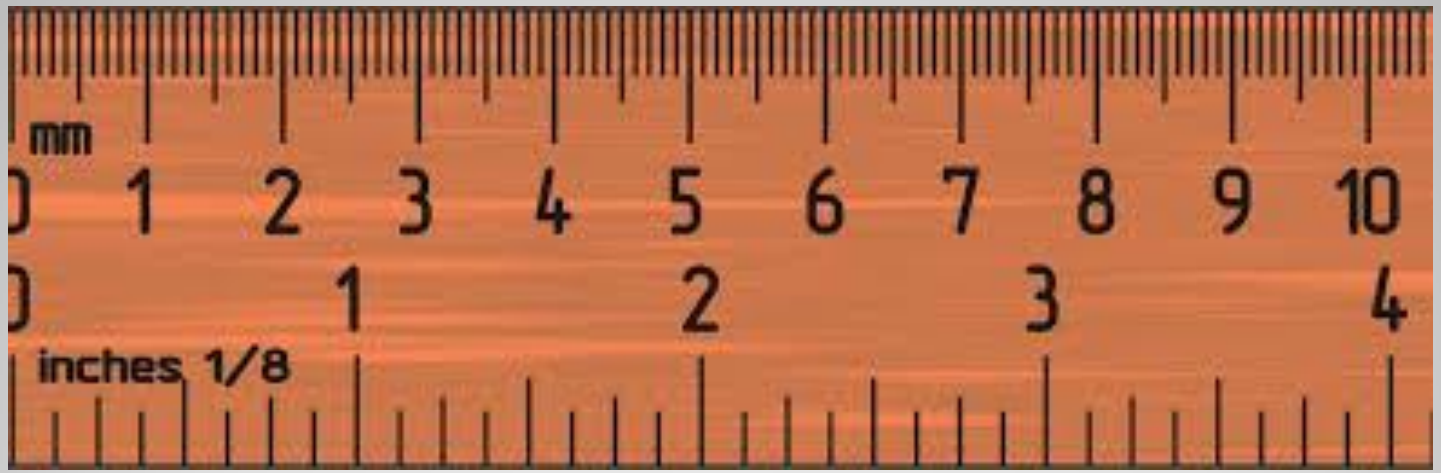


- **<u>Precision</u>** – the degree of exactness or refinement of a measurement.
- Describes the "exactness" of the instrument.

Ex: 1.3m or 1.325m

- You can often improve precision by estimating where a mark may have been.

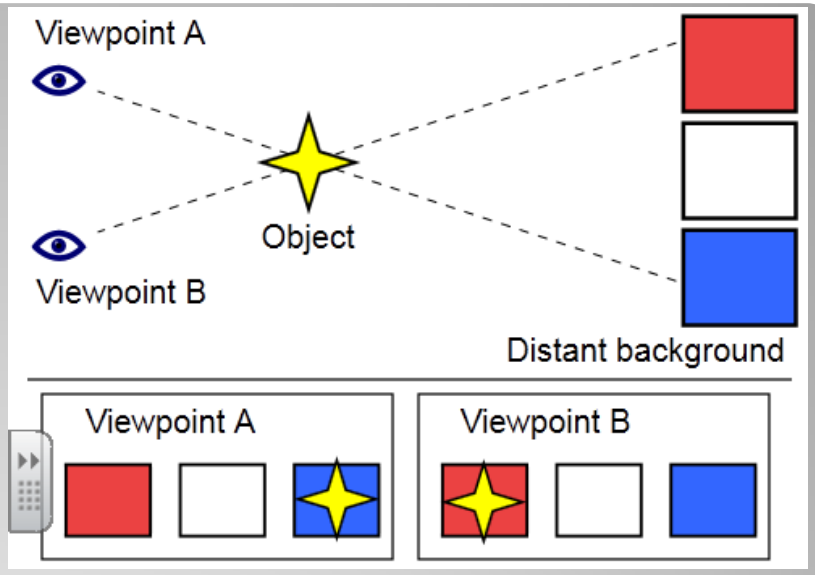



mm
0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4
inches 1/8

Types of Error

- **Human error** - mistakes in reading or recording results.
- **Method error** - some measures taken with one method and others with a different method.

Types of Error



- **Parallax** - an apparent displacement or difference in the apparent position of an object viewed along two different lines of sight. (ruler or graduated cylinder)
- **Instrument error** – improper calibration or damage.

Significant figures help keep track of imprecision.

Significant Digits - The reliable digits reported in a measurement.

- Non-zero digits are always significant.
- All final zero's used after the decimal are always significant.
- Zeros between two other significant digits are always significant.
- Zeros used solely for spacing the decimal point are not significant.

Ex: 2804

2.84

0.0029

0.003068

0.000420100

Operations using significant digits.
Adding and subtracting.

- Only use number of significant digits from the least precise measurement.

	6.89	m
	10.3	m
+	12.795	m
	30.0	m

The final answer should have the same number of digits to the right of the decimal as the measurement with the smallest number of digits to the right of the decimal.

Multiplication and division.

- Do the operation first.
- The final answer has the same number of significant figures as the measurement having the smallest number of significant figures.

5.00 x 4.3 = 22