

Measurement

January 13– 16, 2014

Measurement, Inquiry

Bell Work, Monday, Jan 13, 2014

m = meter, cm = centimeter, mm = millimeter, dm = decimeter,
km = kilometer

1. How many dm = 1 meter? $10 \text{ dm} = 1 \text{ m}$

2. How many cm = 1 meter? $100 \text{ cm} = 1 \text{ m}$

3. How many mm = 1 meter? $1000 \text{ mm} = 1 \text{ m}$

4. How many mm = 1cm $10 \text{ mm} = 1 \text{ cm}$

5. How many micrometers (μm) = 1 meter



$1,000,000 \mu\text{m} = 1 \text{ m}$

6. How many meters = 1 km? $1000 \text{ m} = 1 \text{ km}$

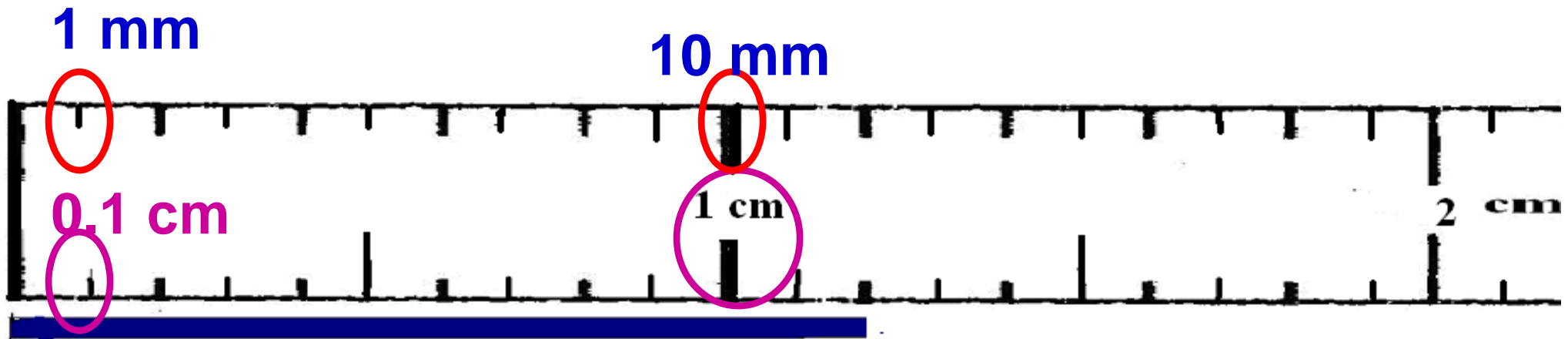
Bell Work, Monday, Jan 13, 2014

7. See the ruler from last Tuesday's bell work .

Record the length of the blue line in centimeters & millimeters and underline the uncertain digit.

1.20 cm

12.0 mm



Bell Work, Tuesday, Jan 14

Copy the following data

Unit	Measurement
Meters	0.3
decimeters	3.1
centimeters	31.40
millimeters	314.0

1. As the units decrease
the measurements
increase by a factor of
10

2. As the units decrease ($m \rightarrow mm$) what happens to the value of the measurement?

The measurement increases, or:

Bigger unit to smaller unit = bigger number ($B \rightarrow S$ = bigger #)

3. As the units increase ($mm \rightarrow m$) what happens to the value of the measurement?

The measurement decreases, or:

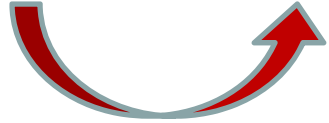
Smaller unit to bigger unit = smaller number ($S \rightarrow B$ = smaller #)

Bell Work, Tuesday, Jan 14

4. How many meters is 1.20 cm?

Big unit → small unit, or small unit to big unit?

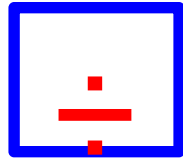
1.20 cm → ? m $S \rightarrow B = S$



How do you get a smaller #? Multiply or divide?

How many cm = how many m? 100 cm = 1 m

1.20cm



100

=

0.0120 m

Given

÷ or
X

Relationship
number

Answer

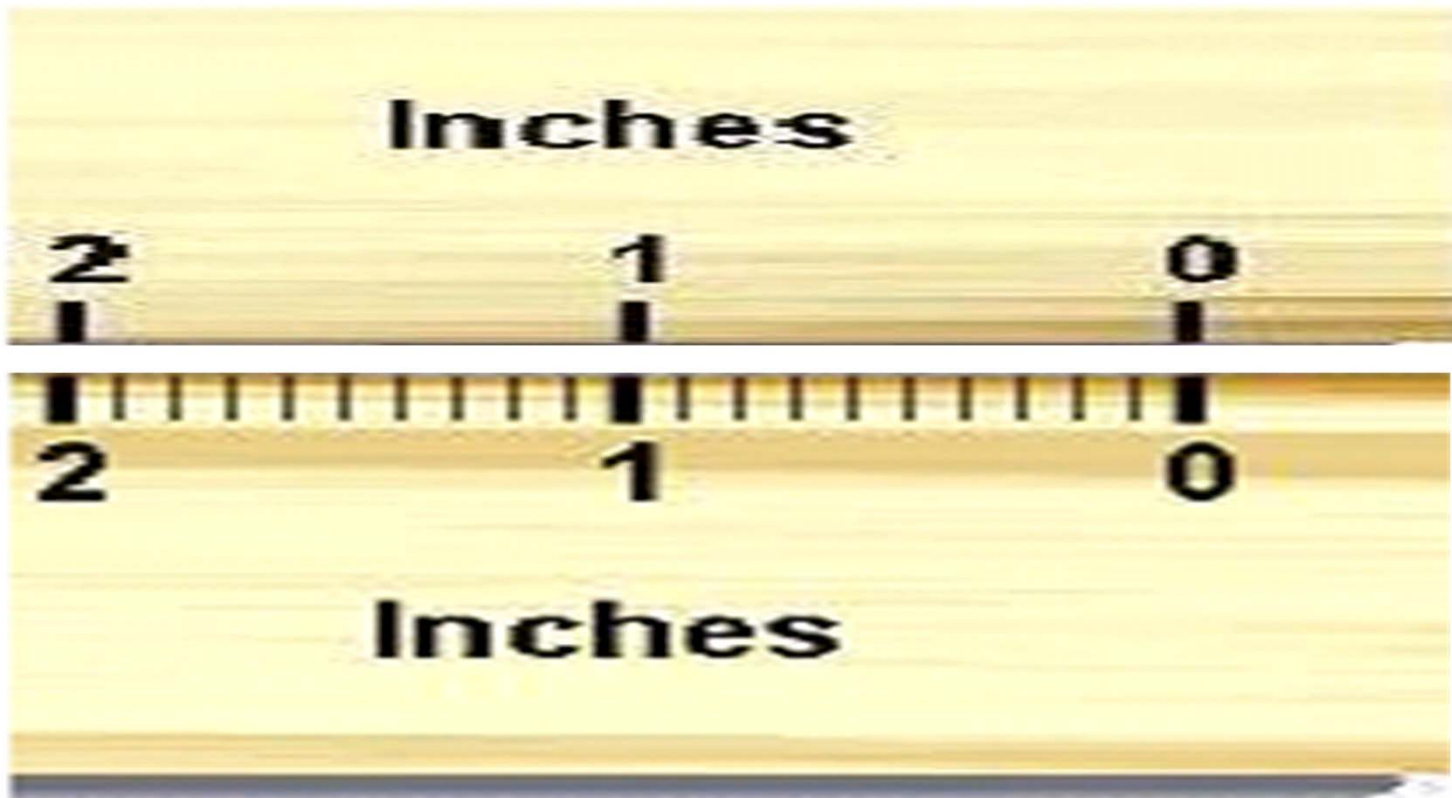
Bell Work, Wednesday, Jan 15

1. Compare and contrast accuracy and precision in measurements.

Precision is the lack of uncertainty.

More decimals (or smaller measuring sizes) = greater precision.

The greater the precision, the less the uncertainty.



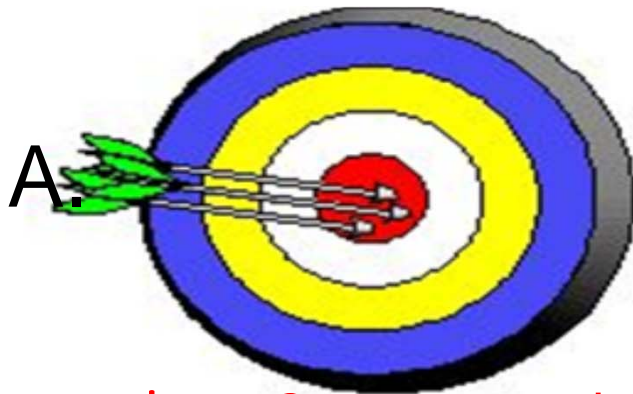
You do not need to draw the rulers.

Bell Work, Wednesday, Jan 15

- **Precision refers to the closeness of a set of measurements**
- *Example: You weigh a 1.5 kilograms bag of sugar five times and get these measurements:*
- *1.50, 1.51, 1.50, 1.49, 1.51 (all the measurements are close)*
- **Precision is the ability reproduce a measurement.**
- *Rounded to two significant figures, all the above measurements = 1.5 kg, thus giving us 1.5 each time we measure.*
- **Accuracy refers to the closeness of measurements to the correct or accepted value of the quantity measured.**
- *Example: the true value of mass of the sugar is 1.50 kilograms. A measurement of 1.49 is very close to 1.50 and thus is accurate.*
- *A precise measurement should be more accurate than an imprecise measurement. This is not always the case.*

Bell Work, Wednesday, Jan 15

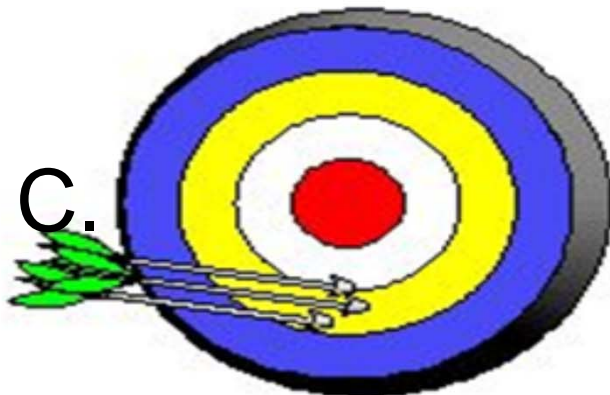
2. Draw the targets. Label as precise, accurate, both or neither. The bulls eye is the “correct value.”



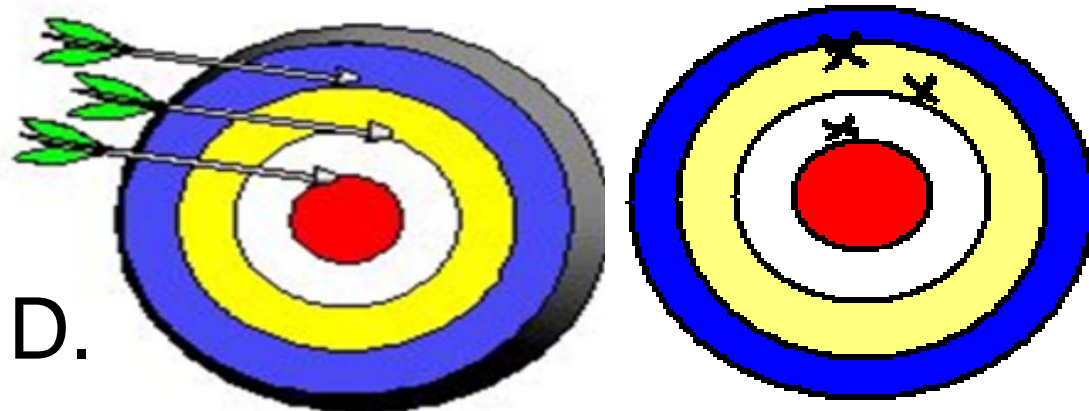
Both precise & accurate



Accurate but not precise



Precise but not accurate

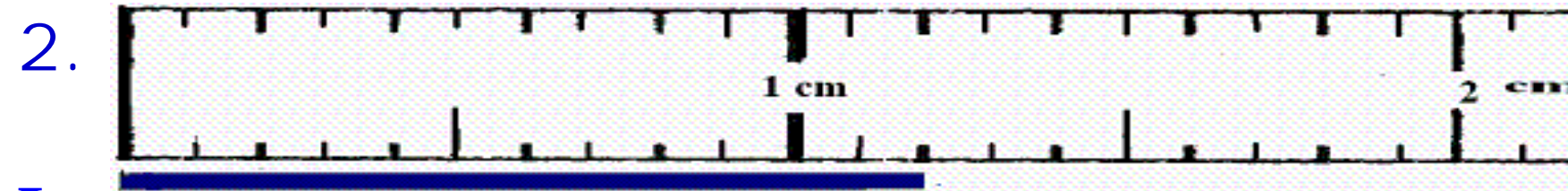


Neither precise nor accurate

Bell Work, Thursday, Jan 16

1. The prefix kilo means:

- a. 1 million times bigger than the unit it precedes
- b. 1 million times smaller than the unit it precedes
- c. 1 thousand times bigger than the unit it precedes
- d. 1 thousand times smaller than the unit it precedes



Look at the illustration above. How many digits with certainty (certain digits) are known for this measurement?

- a. 3
- b. 2
- c. 4
- d. 1

3. Identify the unit that would be most appropriate for expressing the length of a bacterial cell.

- a. nanometers
- b. centimeters
- c. kilometers
- d. micrometers

Bell Work, Thursday, Jan 16

4. Identify the unit that would be most appropriate for expressing the width of a gymnasium

- a. micrometers
- b. nanometers
- c. kilometers
- d. centimeters

5. The closeness of a measurement to its true value is a measure of its ____.

- a. usefulness
- b. reproducibility
- c. accuracy
- d. precision

6. The metric unit for length that is closest to the diameter of a pencil point is the ____.

- a. centimeter.
- b. micrometer.
- c. decimeter.
- d. millimeter.