Notes/Lesson Plan

Lesson 1.3: Reporting with Precision & Accuracy

- Numbers are values without units
- Quantities are real-world values that represent specific amount

Example: 15 is a number
15 grams is a quantity

Precision = The level of detail of a measurement, determined by the smallest unit or fraction of a unit that can be reasonably measured.

Accuracy = The closeness of a given measurement or value to the actual measurement or value.

Complete the Table

Measurement 1	Measurement 2	Smaller Unit	More Precise Measurement
4g	4.3g	0.1g	4.3g
5.71 oz	5.7 oz	0.01 oz	5.71 oz
4.2m	422cm	1cm	422cm
7ft 2in	7.2in	0.1in	7.2in.

- Break students into 4 groups and give them 3 minutes to decide the answers.

Eric is a lab technician. Every week, he needs to test the scales in the lab to make sure that they are accurate. He uses a standard mass that is exactly 8.000 grams and gets the following results:

Scale	Mass
Scale 1	8.02g
Scale 2	7.9g
Scale 3	8.029g

Which ~~scale is~~ measurement is most precise?

Why is it the most precise?

Scale 1: Accuracy = $|8.000 - 8.02| = 0.02$

Scale 2: Accuracy = $|8.000 - 7.9| = 0.1$

Scale 3: Accuracy = $|8.000 - 8.029| = 0.029$

Which scale is more accurate?

Scale 1

Why?

$0.02 < 0.029 < 0.1$

Discussion: Given two measurements of the same quantity, is it possible that the more precise measurement is not the more accurate? Why do you think that is so?

Dissusion

Answer: Yes, The electronic device may not be functioning properly, or a device as a ruler may not have been produced carefully. The person making the measurement may have made a mistake.

- Discuss Number of uncertainty.

Maximum and Minimum

~~Two Books~~ Length and width of Book Cover

~~Book 1~~ : Length = 28.3 cm

Width = 21 cm

Max Length = 28.3cm + 0.05cm = 28.35 cm

Min Length = 28.3cm - 0.05cm = 28.25cm

$28.25 \leq$ length ≤ 28.35cm

Max Width = (21+0.5) = ~~20.5~~ 21.5

Min Width = (21-0.5) = 20.5

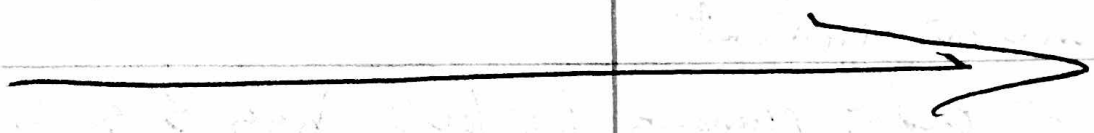
20.5cm $\leq$ width $\leq$ 21.5cm

Find Max and Min Area

Max Area = 28.35cm x 21.5cm $\approx 610 cm^2$

Min Area = 28.25cm x 20.5cm $\approx 579 cm^2$

$579 cm^2$ area $\leq 610 cm^2$



Find the range of values for the actual length and width of the rectangle.

Length = 15.5cm

Width = 10cm

Find the minimum and maximum area.

- Identifying Significant Digits

Significant Digits are the digits in measurement that carry meaning about the the precision of the measurement.

Rule	Example
• All nonzero digits are significant	55.98 has 4 sig digits 115 has 3 digits
• Zeroes between two other significant digits are significant	102 has 3 digits 0.4000008 has 7 sig figs.
• Zeroes at the end of a number to the right of the decimal point are significant	3.900 has 4 sig figs 0.1230 has 4 sig figs
• Zeros to the left of the first nonzero digit in a decimal are not significant	0.00035 has 2 sig figs 0.0806 has 3 sig figs
• Zeroes at end of numbers without a decimal	66,600 has 3 sig figs 77,000,000 has 2 sig figs