Algebra 1 (CCSP)

Section 1.10: Precision and Accuracy

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**: Students will be able to analyze and compare measurements for precision and

accuracy.

Students will be able to use choose an appropriate level of accuracy when reporting

measurements.

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| **Main Idea** | **Notes** |
| **Exploration:** | 1.10 Exploration: Precision and Accuracy |
| **Introduction to Precision:** | When you measure an object, you must use an instrument that will give an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ measurement.  A scale to measure the mass of a person may show mass to the nearest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  A scale to measure chemicals in a lab may show mass to the nearest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
| **Vocabulary: Precision** | **Precision** is the level of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a measurement.  It is determined by the smallest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that you can reasonably measure.  Sometimes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ determines the precision.  Other times, measurements are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to a specified precision.  A scale that shows the mass of an object to the nearest milligram is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  precise than a scale that shows the mass to the nearest kilogram.  This is because a milligram is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ unit of measure.  A scale that shows the mass of an object as 24.23 grams is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ precise than a scale that reads 24.2 grams. |
| **Example 1: Which is More Precise?**  **Example 1 (Continued): Which is More Precise?** | Chose the more precise measurement.  a) 0.8 kilometers or 830.2 meters  b) 2.45 inches or 2.5 inches  c) 100 centimeters or 1 meter  d) 2 pounds or 17 ounces |
| **Vocabulary: Accuracy** | A precise measurement is only useful if the measurement is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  The **accuracy** of a measurement is the closeness of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_value to  the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ value. |
| **Example 2: Accuracy vs. Precision** | Ida works in a deli.  She is testing the scales to make sure they are accurate.  She uses a weight that is exactly 1 pound and gets the following results:  Scale 1: 1.019 lb  Scale 2: 1.01 lb  Scale 3: 0.98 lb  a) Which scale is the most precise?  b) Which scale is most accurate? |
| **Homework:** | 1.10 Exercises  Examples: 1 – 10, 37-42 |
| **Vocabulary: Tolerance** | When you measure a group of objects that are expected to be the same, you may find that there  are variations from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ describes the amount by which an object is permitted to vary from a specified value.  Tolerance is often expressed as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Example:  5 mm ± 0.3 mm  This means 4.7 mm – 5.3 mm |
| **Example 3: Tolerance in the Real World** | Bright Days Blinds makes window shades.  The width of a 30-inch shade should be within 0.18 in. of 30 in.  A batch of shades has the widths shown in the table.   |  |  | | --- | --- | | **Shade** | **Width (in.)** | | A | 30.06 | | B | 29.75 | | C | 29.84 | | D | 30.12 | | E | 29.93 |  1. What is the tolerance? 2. Do all the shades measure within the specified tolerance? 3. If not, which shades are not within the specified tolerance? |
| **Vocabulary: More on Tolerance**  **Example 4: Writing Tolerance as a Range** | Tolerance can also be expressed as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Example:  A measurement written as 5 mm ± 5% means that the value can be greater than or less than the amount by 5% of 5 mm.  To find the tolerance:  5% of 5 mm 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mm  Lowest: 5 – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Highest: 5 + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Tolerance: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Write the tolerance as a range for each measurement.  a) 12 lb 3%    b) 15 oz 1.5%    c) 3 m 0.2% |
| **Exit Ticket:** | Explain the difference between precision and accuracy.  ( Do this On a separate piece of paper. I will collect this for a grade) |
| **Homework:** | 1.10 Additional Practice Worksheet |