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 metersb) 2.45 inches or 2.5 inchesc) 100 centimeters or 1 meterd) 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 lbScale 2: 1.01 lbScale 3: 0.98 lba) Which scale is the most precise?b) Which scale is most accurate? |
| **Homework:** | 1.10 ExercisesExamples: 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 mmThis 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.

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| **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?
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| **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 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mmLowest: 5 – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Highest: 5 + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Tolerance: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Write the tolerance as a range for each measurement.a) 12 lb $\pm $ 3% b) 15 oz $\pm $ 1.5% c) 3 m $\pm $ 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 |