Today's Materials

- calculator
- pencil
- notebook
- glue
- highlighter

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Measurement Error

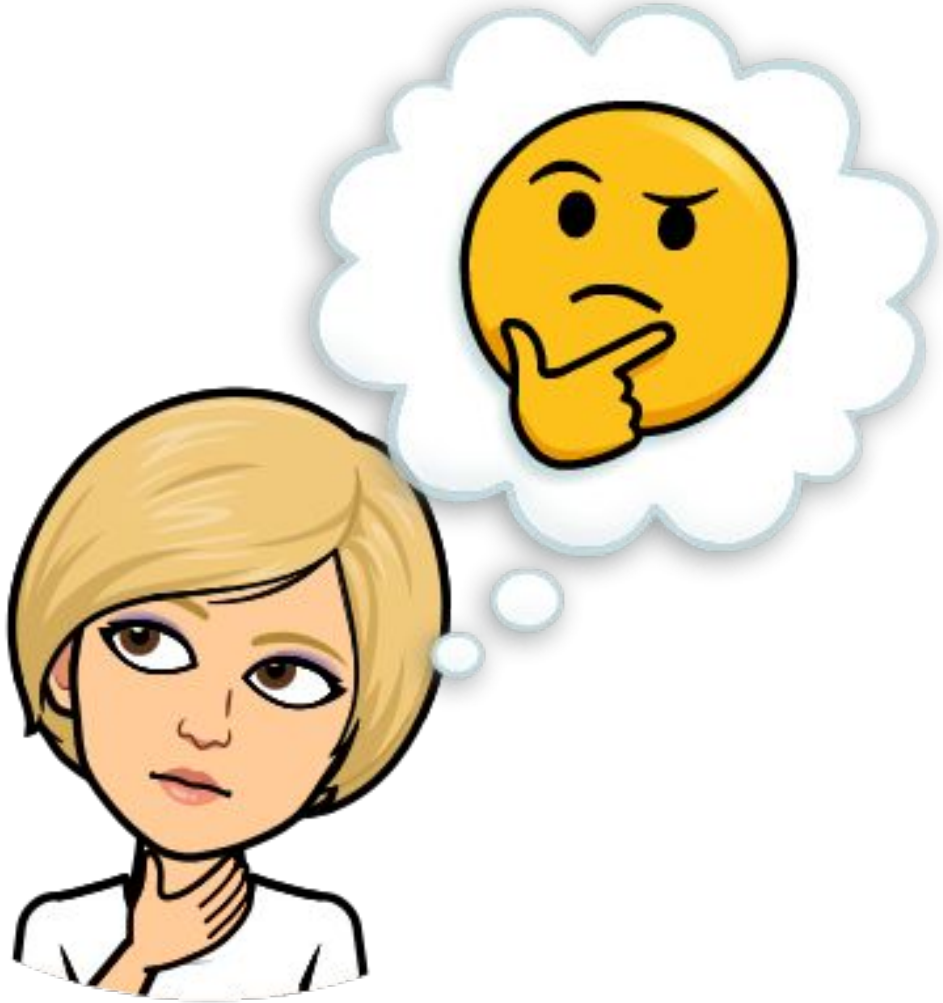
Lesson 13

CCSS Standards: Building on	• 2.MD.A.2 • 5.NBT.B.7
CCSS Standards: Addressing	• 7.RP.A.3
CCSS Standards: Building towards	• 7.RP.A.3

Let's use percentages to describe how accurately we can measure!

Today's Goals

- ❑ I can represent measurement error as a percentage of the correct measurement.
- ❑ I understand that all measurements include some error.



Measuring to the Nearest

Warm Up

For your Warm Up, you will use two rulers and three line segments labeled A, B, and C.

1. Use the centimeter ruler to measure each line segment to the nearest centimeter. Record these lengths in the middle column of the table.
2. Use the millimeter ruler to measure each line segment to the nearest tenth of a centimeter. Record these lengths in the last column of the table.

Assuming the measurements to the nearest tenth are exact, by how much was each measurement in error when you used the centimeter-scaled ruler?

What did you notice about the lengths that you got using the two different measuring devices?

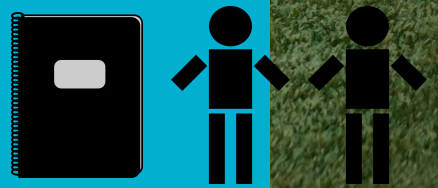
Measurement error can result from the precision level of your measuring device.

Assuming the measurements to the nearest tenth are exact, by how much was each measurement in error when you used the centimeter scaled ruler?

Measuring a Soccer Field

Activity 1

- **Think Pair Share**



A soccer field is 120 yards long.

- How can you measure that length using a 30-foot-long tape measure?
- Would we all get the same measure using this method?

Begin with 2 minutes of Quiet Think Time.

Discuss your thinking with a teammate.

What is the possible cause of the error in the Soccer Field problem?

- ➔ He did not position the tape measure precisely every time he measured another 30 feet.
- ➔ He didn't go in a completely straight line.
- ➔ Han did not correctly use the measuring tape.

A soccer field is 120 yards long. Han measures the length of the field using a 30-foot-long tape measure and gets a measurement of 358 feet, 10 inches.

1. **What is the amount of error?**

2. **Express the error as a percentage of the actual length of the field.**

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measurement error

the positive difference between the measurement and the actual value

percent error

the error expressed as a percentage of the actual value

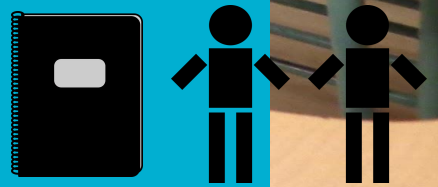
measurement error ÷ actual value = % error

When might percent error be more useful than measurement error?

Measuring the Classroom

Activity 2

- 5 Practices



Directions:

1. Between you and your partner, decide who will use which paper ruler.
2. Measure the three items and record your measurements in the second column of the appropriate table.
    - Each partner needs to record measurements using each ruler.
3. Ask your teacher for the actual lengths.
4. Calculate the difference between your measurements and the actual lengths.
5. Find and record the percent error in the last column of the table.

Fill in the following items in the “**Item Measured**” column of your table.

-
-
-

Using the cm ruler:

item	measured length (cm)	actual length (cm)	difference	percentage

Using the mm ruler:

item	measured length (cm)	actual length (cm)	difference	percentage

“Are you ready for more?”

Before there were standard units of measurement, people often measured things using their hands or feet!

1. Measure the length of your foot to the nearest centimeter with your shoe on.
2. How many foot-lengths long is your classroom? Try to determine this as precisely as possible by carefully placing your heel next to your toe as your pace off the room.
3. Use this information to estimate the length of your classroom in centimeters.
4. Use a tape measure to measure the length of your classroom. What is the difference between the two measurements? Which one do you think is more accurate?

What is measurement error?

What causes measurement error?

Measurement error is the difference between a measurement of an object and it's actual measure.

Human error can cause it, like when using a measuring tool wrong!

How can we minimize the amount of error?

Use accurate measuring tools and use them carefully.

What is the relationship between measurement error and percent error?

Percent error is the measurement error divided by the actual number.

$$\frac{\text{measurement error}}{\text{percent error}}$$

Today's Goals

- ❑ I can represent <u>measurement error</u> as a percentage of the correct measurement.
- ❑ I understand that all measurements include some error.

Off by a Little Bit?

Cool Down