

12.2: What Is the Percentage? 10 mins.

3 min work partner whole class

BARTLETT

1. A salesperson sold a car for \$18,250 and their commission is \$693.50. What percentage of the sale price is their commission?

3.8% because $693.50 \div 18,250 = 0.038$

2. The bill for a meal was \$33.75. The customer left \$40.00. What percentage of the bill was the tip?

~18.52% since the tip is \$6.25 and $6.25 \div 33.75 \approx 0.1852$

3. The original price of a bicycle was \$375. Now it is on sale for \$295. What percentage of the original price was the markdown?

~21.33% because the price was marked down by \$80 and $80 \div 375 \approx 0.2133$

12.3: Info Gap: Sporting Goods 20 mins. 10 mins. per card set

Calculators

Your teacher will give you either a problem card or a data card. Do not show or read your card to your partner.

Misconceptions:
 - Rent out multiple cars/packages
 - Discount applied before tax
 - which items fall under what discount?

If you have Problem 1:

1. Elena will pay \$52.08

2.

3. $36.55 + 12 = 48.55$

4. $(1.085)(48.55) = 52.08$

If you have Problem 2 (before tax):

Andre saved about 8.7%

4

$\frac{4}{46} \approx 0.087$

to your partner.
 - How did you solve the problem?
 - How did you check your answer?
 - What calculations did you use?
 - Why did you use those calculations?
 - If your partner solves the problem, ask them to explain their reasoning and listen to their explanation.
 - If you have a new set of cards and repeat the activity, trading roles with your partner.

Pause here so your teacher can check your work and activity, trading roles with your partner.

partner solves the problem, ask them to explain their reasoning and listen to their explanation.

Unit 4, Lesson 13: Measurement Error THREE CAPTIVATIONS

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

13.1: Measuring to the Nearest

³ mins. ³ stations work whole class discussion Rulers

Your teacher will give you 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 first 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 second column of the table.

line segment	length (cm) as measured with the first ruler	length (cm) as measured with the second ruler
A	7	6.7
B	7	6.9
C	7	7.3

0.3 error long
0.1 error long
0.3 error short

Measurement error is the result of the precision of a measuring device

13.2: Measuring a Soccer Field 10 mins.

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 the error?

$$\begin{array}{r} 360 \text{ ft} \\ - 358 \text{ ft } 10 \text{ inches} \\ \hline 1 \text{ ft } 2 \text{ inches (14 inches)} \end{array}$$
2. Express the error as a percentage of the actual length of the field.

0.32%

$$120 \text{ yds} = 360 \text{ ft} = 4320 \text{ inches}$$

measurement error = 14 inches

$$\frac{14}{4320} \approx 0.00324$$

Q5:
 ① What is the possible cause of the error?
 • not positioned right
 • not a straight line - longer
 • incorrect usage

NAME

DATE

PERIOD

2 items each 5 mins, then partner evaluate class

13.3: Measuring Your Classroom 10 mins.

Your teacher will tell you which three items to measure. Keep using the paper rulers from the earlier activity.

1. Between you and your partner, decide who will use which ruler.
2. Measure the three items assigned by your teacher and record your measurements in the first column of the appropriate table.

$$\frac{|actual - measured|}{actual}$$

Students fill in first two columns ONLY

item	measured length (cm)	actual length (cm)	difference	percentage
Stapler		15.5cm		≈ 0.71%
Book 1		20.2cm		≈ 3.2%
Book 2		22.25cm		≈ 2.47%

do one per table

0.00709
0.03229
0.02473

Red Pen

Using the mm ruler: Tape

14.1cm

Tape 14.1

item	measured length (cm)	actual length (cm)	difference	percentage
Stapler		15.5cm		
Book 1		20.2cm		
Book 2		22.25cm		

Tissues 25.55

Red Pen

15.19cm

3. After you finish measuring the items, share your data with your partner. Next, ask your teacher for the actual lengths.

4. Calculate the difference between your measurements and the actual lengths in both tables.

NAME _____

DATE _____

PERIOD _____

5. For each difference, what percentage of the actual length is this amount? Record your answers in the last column of the tables.

Are you ready for more? SKIP

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 you 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?

NAME _____

DATE _____

PERIOD _____

Lesson 12 Summary

To find a 30% increase over 50, we can find 130% of 50.

$$1.3 \cdot 50 = 65$$

To find a 30% decrease from 50, we can find 70% of 50.

$$0.7 \cdot 50 = 35$$

If we know the initial amount and the final amount, we can also find the percent increase or percent decrease. For example, a plant was 12 inches tall and grew to be 15 inches tall. What percent increase is this? Here are two ways to solve this problem:

The plant grew 3 inches, because $15 - 12 = 3$. We can divide this growth by the original height, $3 \div 12 = 0.25$. So the height of the plant increased by 25%.

The plant's new height is 125% of the original height, because $15 \div 12 = 1.25$. This means the height increased by 25%, because $125 - 100 = 25$.

Here are two ways to solve the problem: A rope was 2.4 meters long. Someone cut it down to 1.9 meters. What percent decrease is this?

The rope is now $2.4 - 1.9$, or 0.5 meters shorter. We can divide this decrease by the original length, $0.5 \div 2.4 = 0.208\bar{3}$. So the length of the rope decreased by approximately 20.8%.

The rope's new length is about 79.2% of the original length, because $1.9 \div 2.4 = 0.791\bar{6}$. The length decreased by approximately 20.8%, because $100 - 79.2 = 20.8$.

Glossary

- percent error - the measurement error expressed as a percentage of the actual value.

Always a positive number & we use words to describe if the measurement was greater or less than the actual value.

NAME _____

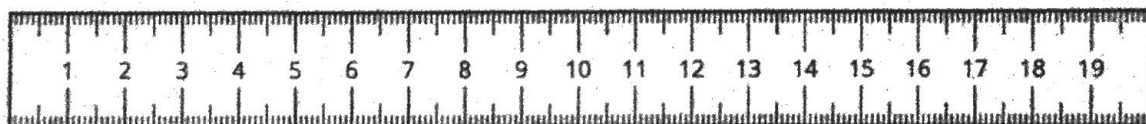
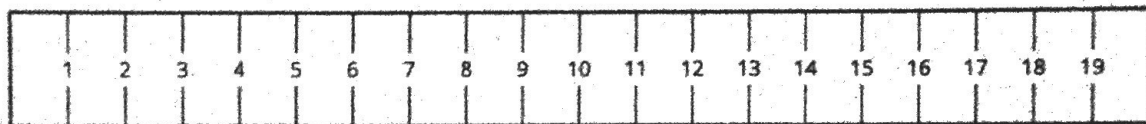
DATE _____

PERIOD _____

Lesson 13 Summary

When we are measuring a length using a ruler or measuring tape, we can get a measurement that is different from the actual length. This could be because we positioned the ruler incorrectly, or it could be because the ruler is not very precise. There is always at least a small difference between the actual length and a measured length, even if it is a microscopic difference!

Here are two rulers with different markings.



The second ruler is marked in millimeters, so it is easier to get a measurement to the nearest tenth of a centimeter with this ruler than with the first. For example, a line that is actually 6.2 cm long might be measured to be 6 cm long by the first ruler, because we measure to the nearest centimeter.

The **measurement error** is the positive difference between the measurement and the actual value. Measurement error is often expressed as a percentage of the actual value. We always use a positive number to express measurement error and, when appropriate, use words to describe whether the measurement is greater than or less than the actual value.

For example, if we get 6 cm when we measure a line that is actually 6.2 cm long, then the measurement error is 0.2 cm, or about 3.2%, because $0.2 \div 6.2 \approx 0.032$.

Lesson 13 Glossary Terms

• measurement error – the positive difference between a measurement of a quantity & the actual quantity.

It is often expressed as a percentage of the actual value.

For example: if we get 6 cm when we measure a line that is actually 6.2 cm long, then the measurement error is 0.2 cm & the percent error is 3.2% because $0.2 \div 6.2 = 0.032$