Lesson 2.3 Dividing in Scientific Notation (Day 2)

Objective

*multiply and divide numbers in scientific notation

- **Common Core State Standards** *8.EE.4*

Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size…Interpret scientific notation that has been generated by technology.

- **Mathematical Practices** 1.Solve problems/persevere 6. Attend to precision.

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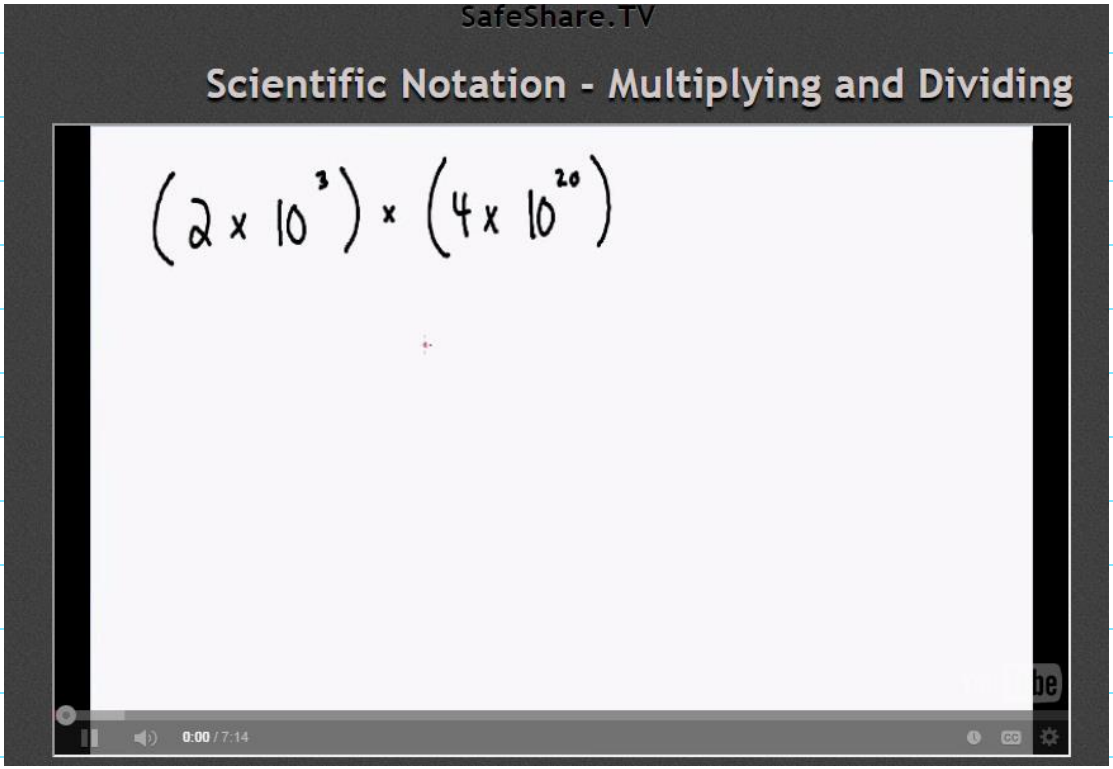
Connect (What's your first thought?) **Write Answers in Scientific Notation**	**Compare** (Discuss with your partner how they solved this problem?)	**Correct/Collaborate** (Collect information from video. Be discuss with partner about learning)
$\frac{(3 \times 10^{2})}{(6 \times 10^{5})} =$		What is the quotient of powers property? How does the quotient of powers property help you with this problem?

Ticket Out the Door

What did you learn about multiplying and dividing in scientific notation?

Lesson 2.3 Multiplying in Scientific Notation (Day 1)



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Lesson 2.3 Dividing in Scientific Notation (Day 2)

Some of the smaller planets in the solar system are Mercury and Mars.

a) The planet Mercury has an approximate mass of $3.3 \cdot 10^{23}$ kilograms. Mars has a mass of about $6.4 \cdot 10^{23}$ kilograms. How many times as great as the mass of Mercury is the mass of Mars? Round the coefficient to the nearest tenth.

Did you use the product of powers or quotient of powers property?

Lesson 2.3 Dividing in Scientific Notation (Day 2)

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Did you use the product of powers or quotient of powers property?

Solution

$$\frac{\text{Mass of Mars}}{\text{Mass of Mercury}}$$

$= \dfrac{6.4 \cdot 10^{23}}{3.3 \cdot 10^{23}}$ Substitute.

$= \dfrac{6.4}{3.3} \cdot \dfrac{10^{23}}{10^{23}}$ Divide the coefficients, and divide the powers of 10.

$\approx 1.9 \cdot 10^{23-23}$ Round off the coefficient and use the quotient of powers property.

$= 1.9 \cdot 10^{0}$

$= 1.9$ Simplify. Write in standard form.

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b) Sun's diameter is about $1.4 \cdot 10^6$ kilometers. Moon's diameter is approximately $3.5 \cdot 10^3$ kilometers. How many times as great as the diameter of the moon is the diameter of the Sun?

Did you use the product of powers or quotient of powers property?

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b) Sun's diameter is about $1.4 \cdot 10^6$ kilometers. Moon's diameter is approximately $3.5 \cdot 10^3$ kilometers. How many times as great as the diameter of the moon is the diameter of the Sun?

Did you use the product of powers or quotient of powers property?

Solution

$$\frac{\text{Diameter of the Sun}}{\text{Diameter of the moon}}$$

$= \dfrac{1.4 \cdot 10^6}{3.5 \cdot 10^3}$ Substitute.

$= \dfrac{1.4}{3.5} \cdot \dfrac{10^6}{10^3}$ Divide the coefficients, and divide the powers of 10.

$= 0.4 \cdot 10^{6-3}$ Use the quotient of powers property.

$= 0.4 \cdot 10^3$ Simplify.

$= 400$ Write in standard form.

The diameter of the Sun is approximately 400 times as great as the diameter of the moon.

Lesson 2.3 Dividing in Scientific Notation (Day 2)

Your Turn- Look inside purple math book

Guided Practice

Complete. Round each coefficient answer to the nearest tenth.

3 The Jean-Luc Lagardere plant in France is the second largest building in the world. It has an approximate volume of $5.6 \cdot 10^6$ cubic meters. The NASA vehicle assembly building in Florida has a volume of about $3.7 \cdot 10^6$ cubic meters. How many times as great as the volume of the NASA vehicle assembly building is the volume of the Jean-Luc Lagardere plant?

$$\frac{\text{Volume of Jean-Luc Lagardere plant}}{\text{Volume of NASA vehicles assembly building}}$$

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$$\frac{\text{Volume of Jean-Luc Lagardere plant}}{\text{Volume of NASA vehicles assembly building}}$$

$= \frac{? \cdot ?}{? \cdot ?}$ Substitute. $\frac{5.6 \cdot 10^6}{3.7 \cdot 10^6}$

$= \frac{?}{?} \cdot \frac{?}{?}$ ___?___ the coefficients, and ___?___ the powers of 10. $\frac{5.6}{3.7}$; $\frac{10^6}{10^6}$; Divide; divide

$\approx$ ___?___ $\cdot$ ___?___ Use the quotient of powers property. 1.5; 10^{6-6}

$=$ ___?___ $\cdot$ ___?___ Simplify. 1.5; 10^0

$=$ ___?___ Write in standard form. 1.5

The volume of the Jean-Luc Lagardere plant is about ___?___ times as great as the 1.5 volume of the NASA vehicle assembly building.

Lesson 2.3 Dividing in Scientific Notation (Day 2)

Your Turn- Look inside purple math book

4 The Abraj Al-Bait towers in Saudi Arabia has a floor area of about $1.5 \cdot 10^6$ square meters. The Palazzo in Las Vegas has an approximate floor area of $6.5 \cdot 10^5$ square meters. How many times as great as the floor area of the Palazzo is the floor area of the Abraj Al-Bait towers?

Abraj Al-Bait
Floor area: $1.5 \cdot 10^6$ m^2

Palazzo
Floor area: $6.5 \cdot 10^5$ m^2

$$\frac{\text{Floor area of Abraj Al-Bait towers}}{\text{Floor area of Palazzo}}$$

$= \frac{? \cdot ?}{? \cdot ?}$ Substitute. $\frac{1.5 \cdot 10^6}{6.5 \cdot 10^5}$

$= \frac{?}{?} \cdot \frac{?}{?}$ ___?___ the coefficients, and ___?___ the powers of 10. $\frac{1.5}{6.5}$; $\frac{10^6}{10^5}$; Divide; divide

$\approx$ ___?___ · ___?___ Use the quotient of powers property. $0.23; 10^{6-5}$

$=$ ___?___ · ___?___ Simplify. $0.23; 10^1$

$=$ ___?___ · ___?___ · ___?___ Write ___?___ in scientific notation. $2.3; 10^{-1}; 10^1; 0.23$

$=$ ___?___ · ___?___ Use the product of powers property. $2.3; 10^{-1+1}$

$=$ ___?___ · ___?___ Simplify. $2.3; 10^0$

$=$ ___?___ Write in standard form. 2.3

The floor area of the Abraj Al-Bait towers is approximately ___?___ times greater than 2.3 the floor area of the Palazzo.

Abraj Al-Bait

Floor area: $1.5 \cdot 10^6$ m^2

Palazzo

Floor area: $6.5 \cdot 10^5$ m^2

Lesson 2.3 Dividing in Scientific Notation (Day 2)

Independent Practice #1-7 & 8-14 Challenge

Practice 2.3

Evaluate each expression in scientific notation, and round the coefficient to the nearest tenth.

1. $7.45 \cdot 10^{6} \cdot 5.4 \cdot 10^{-5}$
2. $6.84 \cdot 10^{-5} \cdot 4.7 \cdot 10^{10}$
3. $5.75 \cdot 10^{-5} \div (7.15 \cdot 10^{7})$
4. $8.45 \cdot 10^{11} \div (1.69 \cdot 10^{-6})$

The table shows the approximate volumes of some planets. Use the information to answer questions 5 to 7. Round your answers to the nearest tenth.

Planets	Volume (km^3)
Venus	$9.4 \cdot 10^{11}$
Earth	$1.1 \cdot 10^{12}$
Mars	$1.6 \cdot 10^{11}$

5. About how many times as great as the volume of Mars is the volume of Venus?
6. About how many times as great as the volume of Mars is the volume of Earth?
7. About how many times as great as the volume of Venus is the volume of Earth?

Solve. Show your work.

8. Suzanne's digital camera has a resolution of $2560 \cdot 1920$ pixels. Douglas' digital camera has a resolution of $3264 \cdot 2448$ pixels.
   a) Express the resolution of the digital cameras in prefix form to the nearest whole unit. Use the most appropriate unit.
9. Bobby downloaded pictures of a cruise ship and a ski run from the internet. The file size of the cruise ship is about 794 kilobytes while the file size of the ski run is about 2.6 megabytes.
   a) What is the total file size, in megabytes and in kilobytes, of a file containing the two pictures?
   b) Calculate the difference in file size, in megabytes and in kilobytes, between the two pictures.
   c) To the nearest tenth, about how many times as great as the file size of the ski run picture is the file size of the ship picture?
   d) Bobby saved the two pictures on a thumb drive with a capacity of 256 megabytes. Find the remaining free capacity of the thumb drive to the nearest tenth megabyte after Bobby saved the two pictures in it.
10. The Georgia Aquarium in Atlanta is about $2.63 \cdot 10^{3}$ inches long, $1.26 \cdot 10^{2}$ inches wide, and $3 \cdot 10^{1}$ inches deep at its largest point. Find its approximate volume.

Homework

Name:_____ Tuesday Homework

Scientific Notation #1-14

Directions: For Numbers 1 through 5, write each number in scientific notation.

1. 67,011 _____
2. 9,521.33 _____
3. 2,066 _____
4. 0.0008549 _____
5. 0.0000901 _____

Directions: For Numbers 6 through 10, write each number in standard form.

6. 7.214×10^{5} _____
7. 5.00024×10^{4} _____
8. 1.02×10^{8} _____
9. 4.00961×10^{-4} _____
10. 6.162×10^{-6} _____

Directions: For Numbers 11 through 14, write each number in standard form or scientific notation.

11. The state of Arizona is about 114,000 square miles. How is 114,000 written in scientific notation?
12. Sound travels 20 feet through water in about 0.00412 seconds. How is 0.00412 written in scientific notation?
13. In 2006, the population of Arizona was about 5.13×10^{6} people. How is 5.13×10^{6} written in standard form?
14. The speed of light is approximately 3×10^{8} meters per second. How is 3×10^{8} written in standard form?

Course 3

Lesson Check #1 & 2 Multiply and Dividing in scientific notation