learning focus:
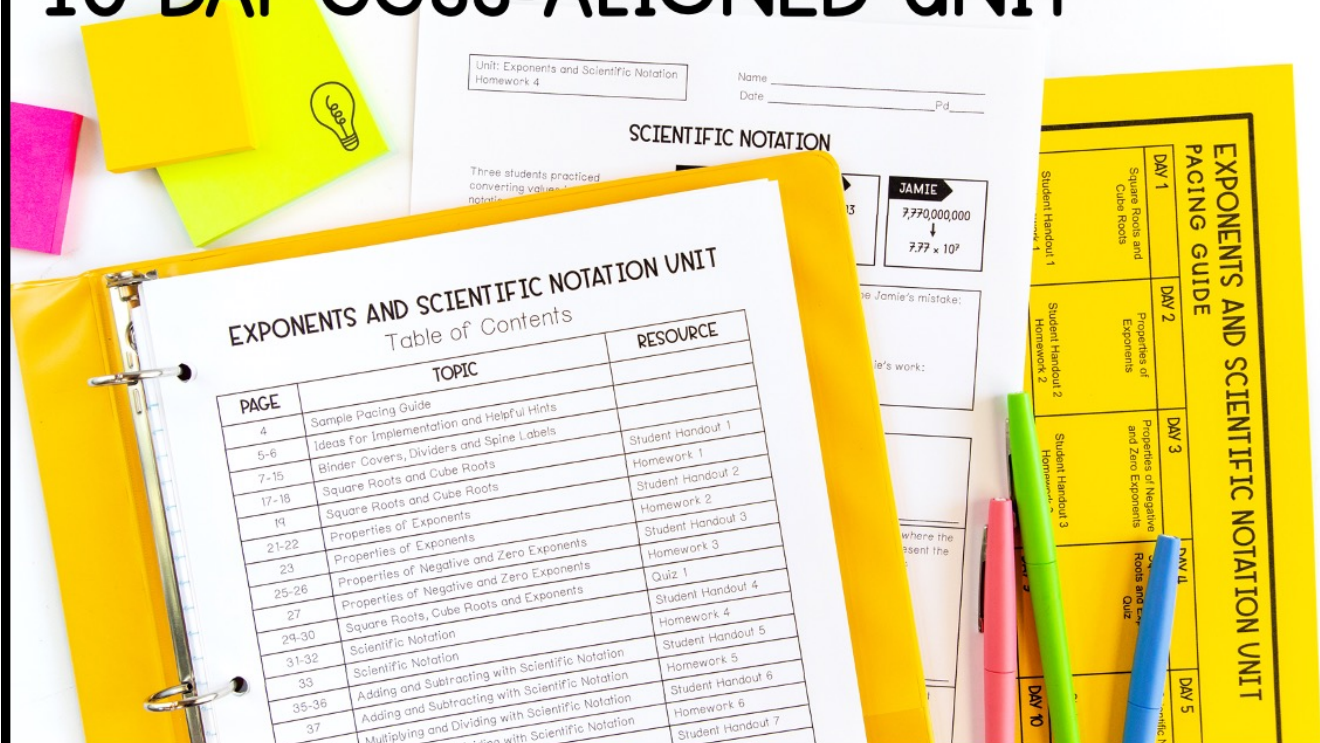
✓ evaluate square and cube roots

✓ know and apply the properties of exponents

✓ perform operations with numbers in scientific notation, including estimating quantities

EXPONENTS & SCIENTIFIC NOTATION UNIT
10 DAY CCSS-ALIGNED UNIT

8th GRADE

A MANEUVERING THE MIDDLE ® RESOURCE

EXPONENTS & SCIENTIFIC NOTATION

8th GRADE

ready-to-go, scaffolded student materials

EXPONENTS AND SCIENTIFIC NOTATION UNIT
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EXPONENTS & SCIENTIFIC NOTATION

8th GRADE

a 10 day CCSS-aligned unit
CCSS: 8.EE.1, 8.EE.2, 8.EE.3, 8.EE.4
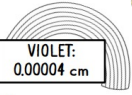
student friendly + real-world application

scaffolded concepts

Unit: Exponents and Scientific Notation
Student Handout 4

Name _____
Date _____ Pd _____

SCIENTIFIC NOTATION

In a science lab, Dominic's instructor wrote the wavelength for violet light on the board as shown at the right.

VIOLET: 0.00004 cm

a. Is the wavelength for violet light a large or small value, and how do you know?

b. How would you read the value using co...

Scientific notation is a shorthand way of w...

SCIENTIFIC NOTATION	Scientific notation...
	• The first numbe...
	• The second num...

In A and B, rewrite the value in scientific notation using the steps described in the table at the right.

A STANDARD: 6,980,000
SCIENTIFIC: _____

B STANDARD: 0.000000083
SCIENTIFIC: _____

In 1-4, convert each given value to scient...

1. 1,850,000

_____

3. 0.007826

_____

5. Express the wavelength for violet light...

Values represented in scientific notation can also be rewritten in standard notation.

STEPS TO CONVERT SCIENTIFIC TO STANDARD

• Move the decimal the same number of places as the _____.

• If the exponent is **positive**, move the decimal to the _____ in order to make the number _____. (Add zeros as placeholders if neces...

• If the exponent is **negative**, move th... _____ in order to make the nu... (Add zeros as placeholders if neces...

In A and B, rewrite the value in standard notation using the steps described in the table at the left.

A SCIENTIFIC: 4.25×10^6
STANDARD: _____

In 6-9, convert each given value to sta...

6. 7.83×10^7

_____

8. 8.345×10^{-6}

_____

10. Raul is aboard a cruise ship that we... aboard a cruise ship that weighs appro... cruise ship weighs more, and how muc...

11. Mr. Sanchez asked his students to w... and 0.008. Natalie wrote the value show...

7.5×10^{-3}

12. Complete the table by rewriting each given value in the missing notation.

Unit: Exponents and Scientific Notation
Homework 4

Name _____
Date _____ Pd _____

SCIENTIFIC NOTATION

Three students practiced converting values into scientific notation as shown. In 1-3, describe the mistake each student made and correct their work.

ISLA	LENNY	JAMIE
12,560,000	0.0000383	7,770,000,000
↓	↓	↓
12.56×10^6	3.83×10^5	7.77×10^7

1. Describe Isla's mistake:	2. Describe Lenny's mistake:	3. Describe Jamie's mistake:
Correct Isla's work:	Correct Lenny's work:	Correct Jamie's work:

In 4-6, convert each scientific notation value into standard notation.

4. 5.5×10^{-8}	5. 1.625×10^7	6. 3×10^{-4}

7. Gabi is converting 0.000098 into scientific notation as shown below. Which correctly represents the missing power of 10?

$9.8 \times 10^?$

a. 5
b. -5
c. 6
d. -6

8. Asher is involved in a competition where the grand prize is $150,000 dollars. Represent the amount of the grand prize in scientific notation.

9. Mrs. Ferreria asked her students to write a number in scientific notation that is greater than 500 but less than 5,000. Circle the name of any student who correctly completed the task.

JUSTICE	BLAIRE	DENZEL	PIPER
5.25×10^3	6.1×10^3	5.78×10^2	3.5×10^3

error analysis

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EXPONENTS & SCIENTIFIC NOTATION

8th GRADE

a 10 day CCSS-aligned unit
CCSS: 8.EE.1, 8.EE.2, 8.EE.3, 8.EE.4

streamline your planning process with unit overviews

✓ key vocabulary

✓ vertical alignment

sample pacing calendar

teaching ideas

EXPONENTS AND SCIENTIFIC NOTATION
OVERVIEW

CCSS

STANDARDS

8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

8.EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.

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 for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

BIG IDEAS

- Expressions can be simpl
- Scientific notation can be

ESSENTIAL QUESTI

- In what kinds of situations v
- How can expressions with i
- How can numbers in scienti
- What are some advantages
  standard notation? Disadvar

EXPONENTS AND SCIENTIFIC NOTATION UNIT
PACING GUIDE

CCSS

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Square Roots and Cube Roots	Properties of Exponents	Properties of Negative and Zero Exponents	Square Roots, Cube Roots and Exponents Quiz	Scientific Notation
Student Handout 1 Homework 1	Student Handout 2 Homework 2			

DAY 6	DAY 7
Adding and Subtracting Scientific Notation	Multiplying and Dividing Scientific Notation
Student Handout 5 Homework 5	Student Handout 6 Homework 6

EXPONENTS AND SCIENTIFIC NOTATION UNIT
OVERVIEW

CCSS

TOPIC	TEACHING TIPS
Properties of Exponents	• Visit www.learnalberta.ca , choose "English" as your language, and search "Exploring Laws of Exponents." You'll find an interactive math resource that "uses the scenario of a paleontological dig to allow the user to explore the laws of exponents."
Square Roots and Cube Roots	• Have students cut out or shade in squares from graph paper to explore the relationship between the area of a square and the side length of the square, as well as the concept of perfect squares. Also, have students use blocks to build various cube towers to explore the relationship between the volume of a cube and the side length of the cube, as well as the concept of "perfect cubes."
Scientific Notation	• Display a very large or small value (ex. The distance from earth to the moon is 15,130,000,000,000 inches) and have students volunteer to try to read the value aloud. Then, discuss when scientific notation can be helpful.
Operations with Scientific Notation	• Visit https://spacemath.gsfc.nasa.gov/Modules/8Module3.html for a NASA themed exploration and several resources for practice with scientific notation operations. PDF practice pages with answer keys are also included on the site.

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EXPONENTS & SCIENTIFIC NOTATION

a 10 day CCSS-aligned unit
CCSS: 8.EE.1, 8.EE.2, 8.EE.3, 8.EE.4

unit study guide + assessments

Unit: Exponents and Scientific Notation
Quiz 1

Name _____
Date _____ Pd_____

QUIZ: SQUARE ROOTS, CUBE ROOTS & EXPONENTS

In 1-2, simplify the expression. Write your answer as a single base with a positive exponent.

Answers

1. _____
2. _____
3. _____

1. $(x^2)^3 \cdot x^{-9}$

$b^3 \cdot b^6$

3. Which of the following is a true statem

A. $(7^1)^q = 7^5 \cdot 7^5$

B. $\dfrac{y^{13}}{(y^2)^6} = y^{-10} \cdot y^q$

C. $b^4 \cdot b^{-6} = \dfrac{b \cdot b^3}{b^6}$

D. All of the above

4. If $x^3 = 512$, find the value of x.

5. Which of the following is equivalent to

    A. $12^4 \cdot 12^4$ B. $(12^4)^2$

6. Which of the following expressions is

    A. $x^6 y^8$ B. $2x^3 y^4$

Unit: Exponents and Scientific Notation
Review

Name _____
Date _____ Pd _____

EXPONENTS AND SCIENTIFIC NOTATION STUDY GUIDE

Solve each of the problems below. Be sure to ask questions if you need more help with a topic.

I CAN APPLY PROPERTIES OF INTEGER EXPONENTS.

Apply the properties of exponents to simplify each expression in 1-6.

1. $a^{10} \cdot a^4$

2.

4. $\dfrac{d^{-3} \cdot d^2}{(d^2)^3}$

5.

7. Circle any of the expressions bel equivalent to 1.

a. $(n^3)^{-3}$

b. $2^4 \cdot 2^{-5} \cdot 2$

c. $\dfrac{6^7}{(6^3)^2}$

d. $\dfrac{y^8 \cdot y^2}{y^{10}}$

9. Find the value of x needed to mal following equation true.

$\dfrac{n^{10}}{n^{14}} = (n^2)^x$

✓ quizzes
✓ editable unit test

EIGHTH GRADE CURRICULUM

EXPONENTS AND SCIENTIFIC NOTATION

UNIT TWO: ANSWER KEY

answer keys included