Virtual Learning

Essential Math 4

Unit 11

Lesson 4: Equivalent Exponents

May 15, 2020

Essential Math 4
Lesson: May 15, 2020

Learning Target:
I can use exponent rules and other methods to evaluate equivalent exponents.

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You will explore the use of multiplication and its relationship to exponents.

Directions:

1. Click through the slides.
2. Watch all videos on slides.
3. Do what each slide asks on a separate sheet of paper.

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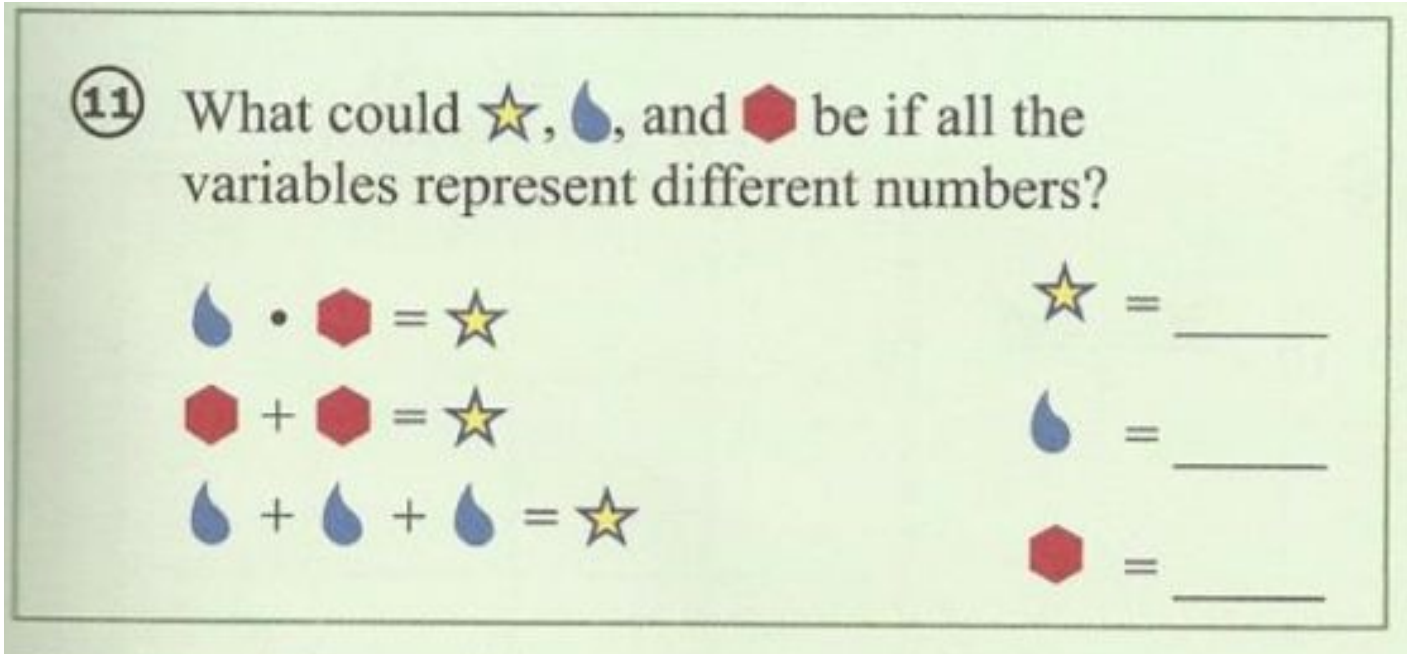
Bell Work:
May 15, 2020



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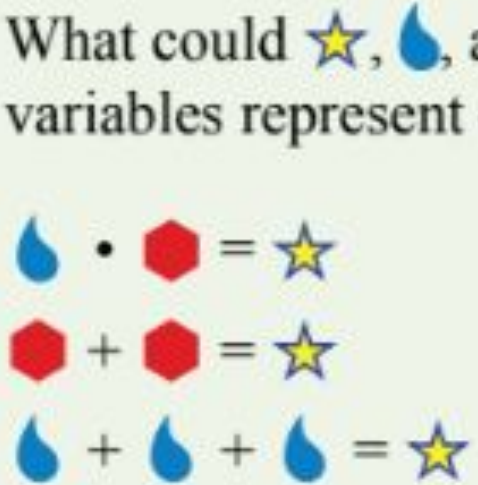
Bell Work Key
May 15, 2020

(11) What could ☆, 💧, and ⬢ be if all the variables represent different numbers?



☆ = 6

💧 = 2

⬢ = 3

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Unit 11 Lesson 4 (page 17)

Algebraic Habits of Mind: **Seeking and Using Structure**

Division is a form of un-multiplication. As you evaluate these expressions, keep aware of how integer exponents, positive or negative, record a number of multiplications or divisions. Use what you know about multiplication and division to help you make sense of exponents.

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Practice Problems: Unit 11 Lesson 4 (page 17, # 2)

(2) Cross out the one expression that isn't equivalent to all the others.

The equivalent expressions all equal _____.

x^3x $\quad \frac{x^8}{x^4} \quad$ xx^2x

$\frac{x^5}{x} \quad$ $x^{-3}x^7 \quad$ $\frac{x^{12}}{x^3}$

Essential Math 4

Answer Key: After completing the problems, check your answers for page 17 here.

(2) Cross out the one expression that isn't equivalent to all the others.

The equivalent expressions all equal x^4.

x^3x $\quad \frac{x^8}{x^4} \quad xx^2x$

$\frac{x^5}{x} \quad x^{-3}x^7 \quad \cancel{\frac{x^{12}}{x^3}}$

Essential Math 4

Practice Problems: Unit 11 Lesson 4 (page 17, # 3)

③ Cross out the one expression that isn't equivalent to all the others.

The equivalent expressions all equal _____.

$x^{-4}x^{7}$ $\quad \frac{x^{4}}{x^{7}} \quad$ $x^{2}x^{-5}$

$x^{-2}x^{-1}$ $\quad 1 \div x \div x \div x \quad$ $1 \div x^{3}$

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Answer Key: After completing the problems, check your answers for page 17 here.

③ Cross out the one expression that isn't equivalent to all the others.

The equivalent expressions all equal x^{-3}.

$x^{-4}x^{7}$ $\quad \frac{x^4}{x^7}$ $\quad x^2x^{-5}$

$x^{-2}x^{-1}$ $\quad 1 \div x \div x \div x$ $\quad 1 \div x^3$

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Unit 11 Lesson 4 (page 17)

Discuss & Write What You Think

④ Kayla and Brandon are debating their strategies for thinking about $a^3 \div a^7$.

Kayla says: "Division can be written with a fraction bar. So that's the same as $\frac{a^3}{a^7} = \frac{a \cdot a \cdot a}{a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a}$."

Brandon says: "You can use negative exponents for division. So that's the same as $a^3 \cdot a^{-7}$."

Explain how they can both be correct.

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Unit 11
Lesson 4
page 17

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Explain how they can both be correct.

(Responses will vary.)

Kayla's way of showing that $a^3 \div a^7$ means multiplying by 3 a's and dividing by 7 a's is to use a fraction format. Dividing 3 a's by 3 a's equals 1. She still has four more a's to divide, so she gets $\frac{1}{a^4}$, a fraction that shows 1 divided by a^4. Brandon writes $a^3 \div a^7$ as multiplication using a negative exponent. He multiplies by adding the exponents in the expected way $a^3 \cdot a^{-7} = a^{-4}$. This is equivalent to Kayla's fraction.

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Practice Problems: Unit 11 Lesson 4 (page 17, # 5-6)

Write three equivalent expressions for each of the following.

(5) n^9

(6) $\frac{w^2}{w^{10}}$

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Answer Key:

After completing the problems, check your answers for page 17 here.

Write three equivalent expressions for each of the following.

⑤ n^9 $\frac{n^{10}}{n}$ $\frac{n^{19}}{n^{10}}$ $n^2 \cdot n^3 \cdot n^4$ $n^{12} \cdot n^{-3}$

(Many possible responses.)

⑥ $\frac{w^2}{w^{10}}$ $\frac{w^3}{w^{11}}$ $\frac{1}{w^8}$ $w^{-5} \cdot w^{-3}$ w^{-8}

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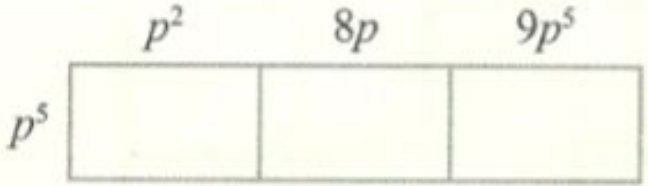
Practice Problems: Unit 11 Lesson 4 (page 17, # 7-8)

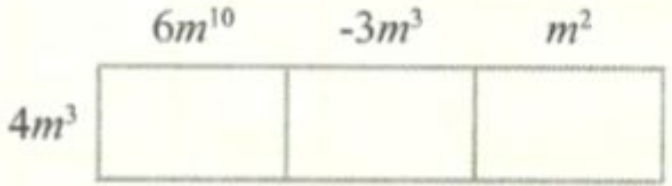
Fill in the area models and use them to write an equation.

⑦



$p^5(p^2 + 8p + 9p^5) =$ _____

⑧



$4m^3(6m^{10} - 3m^3 + m^2) =$ _____

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Answer Key: After completing the problems, check your answers for page 17 here.

Fill in the area models and use them to write an equation.

⑦

	p^2	$8p$	$9p^5$
p^5	p^7	$8p^6$	$9p^{10}$

$p^5(p^2 + 8p + 9p^5) =$ $p^7 + 8p^6 + 9p^{10}$

⑧

	$6m^{10}$	$-3m^3$	m^2
$4m^3$	$24m^{13}$	$-12m^6$	$4m^5$

$4m^3(6m^{10} - 3m^3 + m^2) =$ $24m^{13} - 12m^6 + 4m^5$

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Fun Stuff:

Two Fathers and Two Sons Riddle

Two fathers and two sons sat down to eat eggs for breakfast. They ate exactly three eggs, each person had an egg. The riddle is for you to explain how.

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Fun Stuff Answer:

One of the 'fathers' is also a grandfather. Therefore the other father is both a son and a father to the grandson.

In other words, the one father is both a son and a father.

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make algebra make sense

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