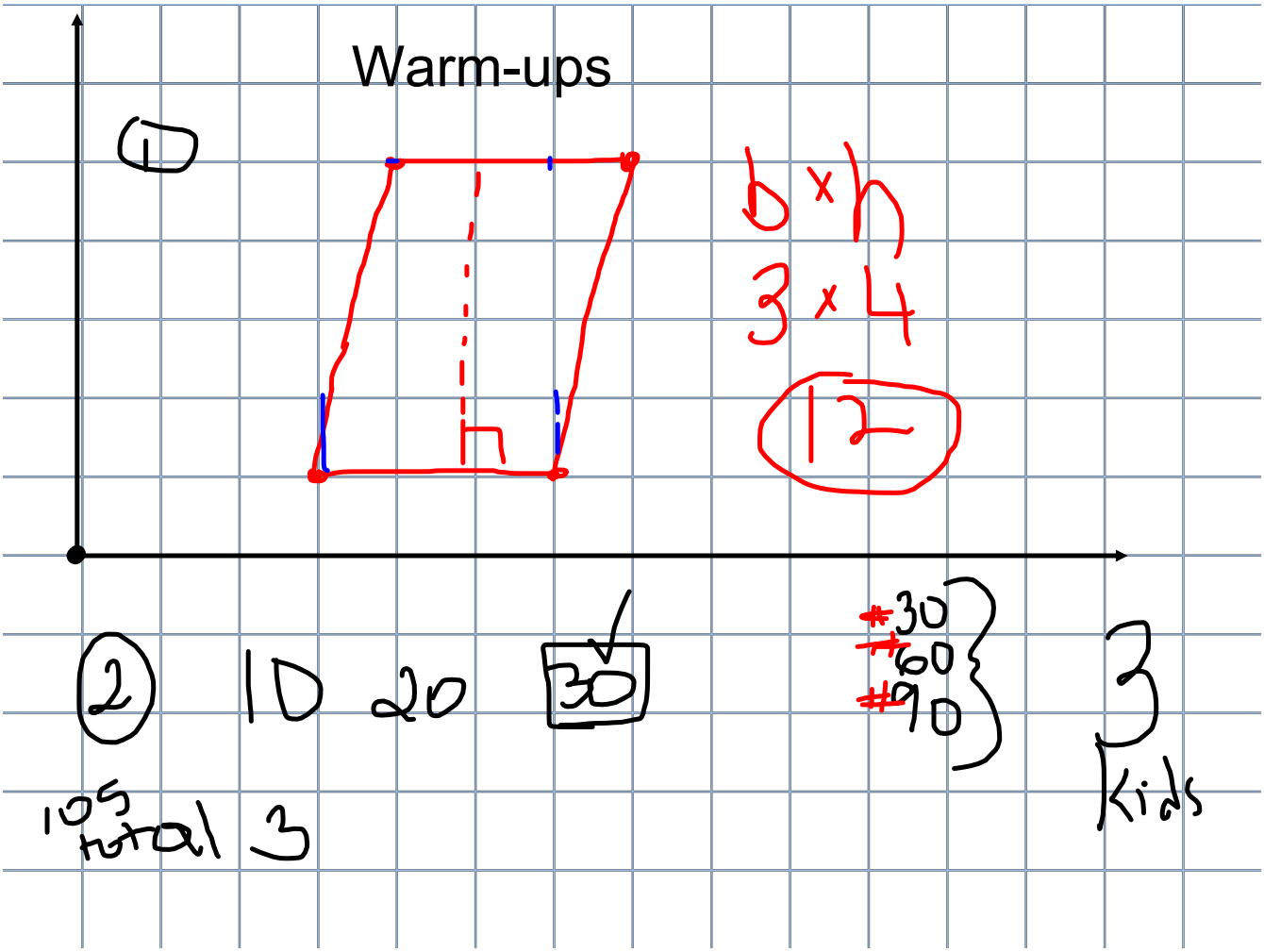
5/5/17 CCM6+7+

Understand and apply the x and ÷ laws of exponents.

1. Agenda...HW is p.9-10 and EOG EE
2. Get out p. 6 to check.
3. Do the Friday warm-ups

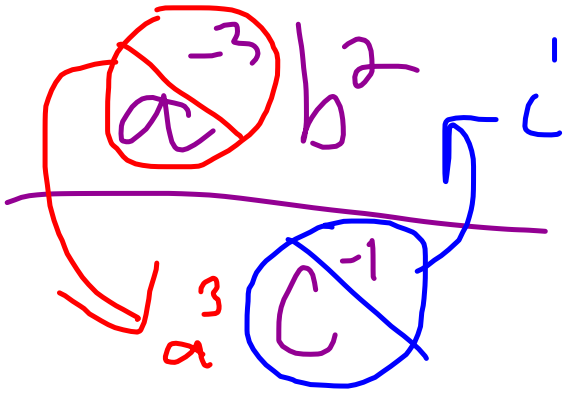
Warm-ups



-3^2 | $(-3)^2$ | $-(3^2)$

opp of 3^2

-9 | $-3 \cdot -3$ 9 | -9


a -3 b 2 c 1
a 3 c -1

✓ HW

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1) Simplify:

a) 6^0 = 1

b) $4x^0y^{-2}$ $4 \cdot 1 \cdot \frac{1}{y^2} = \frac{4}{y^2}$

c) $-5x^{-4}$ $-5 \cdot \frac{1}{x^4} = \frac{-5}{x^4}$

d) $\frac{2}{3}x^{-6}$ $\frac{2}{3} \cdot \frac{1}{x^6} = \frac{2}{3x^6}$

e) $\frac{1}{4^{-3}}$ $\frac{4^3}{1} = 64$

2) Evaluate when $a = 2, b = -1, c = -3$

a) $4a^2b^0$ $4 \cdot 2^2 \cdot (-1)^0 = 4 \cdot 4 \cdot 1 = 16$

b) $5a^{-3}$ $5 \cdot \frac{1}{2^3} = \frac{5}{2^3} = \frac{5}{8}$

c) $\frac{6c^2}{b^{-1}}$ $6 \cdot (-3)^2 \cdot (-1)^1$ $6 \cdot 9 \cdot -1 = -54$

d) $-2a^{-3}b^{-2}$ $-2 \cdot \frac{1}{2^3} \cdot \frac{1}{(-1)^2} = -2 \cdot \frac{1}{8} \cdot \frac{1}{1} = \frac{-2}{8} = -\frac{1}{4}$

3) Simplify $a^n \cdot a^{-n}$. What is the mathematical relationship of a^n and a^{-n}? Justify your answer.

$\frac{a^n}{1} \cdot \frac{1}{a^n} = 1$

*reciprocals
*multiplicative inverse

4) Are $3x^{-2}$ and $3x^2$ reciprocals? Explain.

$\frac{3}{x^2}$ $3x^2$

No. $\frac{1}{3x^2}$ is the inverse.

5) Choose a fraction to use as a value for the variable a. Find the values of a^{-1}, a^2, and a^{-2}.

$a = \frac{1}{2}$

$\left(\frac{1}{2}\right)^{-1} = \frac{2}{1} = 2$	$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$	$\left(\frac{1}{2}\right)^{-2} = \frac{2}{1} \cdot \frac{2}{1} = 4$

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① $\frac{3x^{-2}y^{2}}{2x^{0}}$

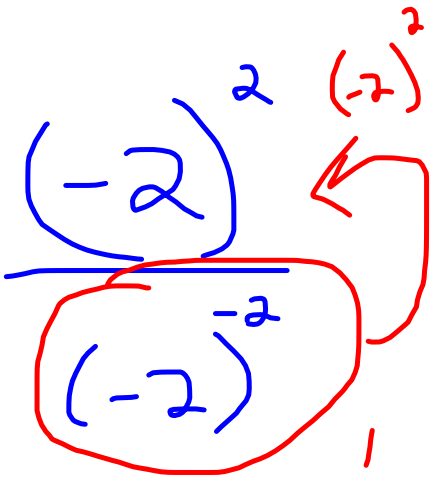
$\frac{3y^{2}}{2x^{2}}$

② $x=2 \quad y=-3$

$2 \cdot x^{-2} \cdot y$

$2 \cdot \frac{1}{2^{2}} \cdot (-3)$

$2 \cdot \frac{1}{4} \cdot -3 = \frac{-6}{4} = \frac{-3}{2}$


2
(-2)
(-2)
-2
(-2)
1

is $-3^2 = -9$ $(-3)^2 = 9$

?

No

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Multiplication Property of Exponents

Ex. $6^4 \cdot 6^5 =$ $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 = 6^9$

Ex. $e^5 \cdot e =$ $e \cdot e \cdot e \cdot e \cdot e \cdot e = e^6$

Ex. $f^6 \cdot f^7 \cdot f^{125} =$ _____ $= f^{138}$

$3^2 \cdot 2^4 = 144$

Rule To multiply numbers or variables that are raised to a power, add the exponents of the numbers or variables with the base.

Examples. ~~Simplify each expression completely~~ exp form

1. $3 \cdot 3^3$ 3^4	2. $m^5 \cdot m^7 \cdot m^{87}$ m^{99}	3. $a^5 \cdot a \cdot b^2 \cdot a^{11}$ $a^{17} b^2$
4. $x^2y^4x^3y$ $x^5 y^5$	5. $(3^2)(3)(2^3)$ $3^3 \cdot 2^3$	6. $c^4 \cdot d^7 \cdot c^{17}$ $c^{21} d^7$

What do you do when there are coefficients?

Example: $6a^3 \cdot 3a \cdot 2a^5$

1. $6y^2 \cdot 3y^3 \cdot 2y^4$ $36y^9$	2. $2y^3 \cdot 7x^2 \cdot 2y^4$ $28x^2y^7$	3. $5m \cdot 2p^4 \cdot 3m^8$ $30m^9p^4$

Multiplication with Exponents

$$5^2 \times 5^3 = (5 \bullet 5) \bullet (5 \bullet 5 \bullet 5) = 5^?$$

Rule: $x^a \bullet x^b = x^?$

Example 1: Rewrite using one base.

$4^6 \bullet 4^7 =$

Example 2: Simplify

a) $a \bullet a^4 \bullet a^2 =$

b) $4x^3 \bullet 3x^{-5} =$ $12x^{-2} = \frac{12}{x^2}$

c) $a^{-2} \bullet b^4 \bullet a^6 \bullet b^3 =$ $a^4 b^7$

d) $4x^2 \bullet 3y^3 \bullet 6x^5 \bullet y^7 =$

HW

Let's Try!

Simplify:

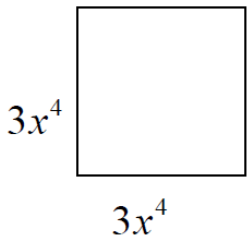
1) $a^{2} \bullet a^{-4}$

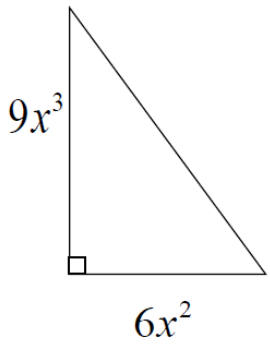
2) $2x^{4} \bullet 3x^{5}$

3) $(6x^{2}y)(2xy^{3})$

4) $(5x^{-3}y)(6x^{7}y^{-4})$

Find the area of each figure below. Write your answer is simplest exponential form.





HW

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Division Property of Exponents

Ex. $\frac{6^5}{6^3} = \frac{6 \cdot 6 \cdot 6 \cdot 6 \cdot 6}{6 \cdot 6 \cdot 6} = \frac{6^2}{1} =$

Ex. $\frac{x^4}{x^2} = \frac{x \cdot x \cdot x \cdot x}{x \cdot x} = x^2$

Rule To divide numbers or variables with the same non-zero base, _____ the exponents. Or, look for where the base is "heavier" and leave the remainder.

Examples. Simplify each expression completely. exp form

1. $\frac{10^7}{10^3}$ 10^4	2. $\frac{x^{25}}{x^{18}}$ x^7
3. $\frac{5^{24}}{5^{27}}$ $5^{-3} = \frac{1}{5^3}$	4. $\frac{3^4}{3^4}$ 1
5. $\frac{12m^5}{3m}$	6. $\frac{6b^3}{18}$
7. $\frac{5^{-3}}{2^2}$	8. $\frac{x^5y^6}{x^8y^3}$
9. $\left(\frac{2}{3}\right)^3$	10. $\left(\frac{4}{5}\right)^{-2}$