Warm-up

① Simplify, then evaluate

$$(-2)^3 + 2^4 \cdot (-2)^1 = -8 + 16 \cdot -2 = -8 + (-32) = -40$$

② Simplify to a single exponential

a) $$\frac{(-3)^3 \cdot 3^6 \cdot 5^4}{(-5)^1 \cdot (-3)^4} = \frac{-3^3 \cdot 3^6 \cdot 5^4}{-5^1 \cdot +3^4} = \frac{3^9 \cdot 5^4}{5^1 \cdot 3^4} = 3^5 \cdot 5^3$$

b) $$\frac{5^{4a-3}}{5^{a+1} \times 5^{2a-2}} = \frac{5^{4a-3}}{5^{3a-1}} = 5^{(4a-3)-(3a-1)}$$

$5^{(a+1)+(2a-2)}$

$$= 5^{(4a-3)+(-3a+1)}$$

$$= 5^{a-2}$$

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c) $\dfrac{5^{4a-3} \cdot 5^{3-a}}{5^{2a+1}} = \dfrac{5^{(4a-3)+(3-a)}}{5^{2a+1}}$

$= \dfrac{5^{3a+0}}{5^{2a+1}} = 5^{(3a+0)-(2a+1)}$

$= 5^{(3a+0)+(-2a-1)}$

$= \boxed{5^{a-1}}$

Next week

Math 9 Section 1.7 – Exponent Rules Part 2

Homework: Section 1.7 on Pg. 40; 1all,2-3 right, 5-6 right, 8left, 10-11left – Answers on Pg. 364

Write the following in repeated factor form, then as a single exponential. What do you notice?

$(2^3)^3 = \underbrace{2^2 \times 2^2 \times 2^2}_{3 \text{ times}} = \underbrace{(2\times2)\times(2\times2)\times(2\times2)}_{6 \text{ total}} = 2^6$

$2 \cdot 3$

Power of a Power Rule: $\boxed{(a^n)^m = a^{n \cdot m}}$

When we raise an exponential to another power, we multiply the powers and keep the base the same.

For example, write as a single exponential:

$(4^5)^4 = 4^{5\cdot4} = 4^{20}$

$((-2)^4)^{10} = (-2)^{4\cdot10} = (-2)^{40}$

Write the following in repeated factor form, then as a single exponential. What do you notice?

$(4\times6)^2 = \underbrace{(4\times6)\times(4\times6)}_{\text{reorder}} = (4\times4)\times(6\times6) = 4^2\times6^2$

Power of a Product Rule: $\boxed{(a\times b)^n = a^n \times b^n}$

When we raise a product (multiplication) to a power, we can take each part of the product and raise it to the same power.

For example, simplify to a product of exponential(s):

$(8\times7)^5 = 8^5\times7^5$

$(8^3\times7^2)^5 = (8^3)^5\times(7^2)^5 = 8^{15}\times7^{10}$

$(8+7)^5 =$ Not product No Rule use BEDMAS $= 15^5$

Write the following in repeated factor form, then as a single exponential. What do you notice?

$\left(\frac{7}{8}\right)^3 = \frac{7}{8} \times \frac{7}{8} \times \frac{7}{8} = \frac{7 \times 7 \times 7}{8 \times 8 \times 8} = \frac{7^3}{8^3}$

Power of a Quotient Rule: $\left(\frac{a}{b}\right)^n = (a \div b)^n = a^n \div b^n$

When we raise a ~~fraction~~ Quotient (division) to a power, we can take the numerator as well as the denominator and raise both to the same power.

For example, simplify to a fraction:

$\left(\frac{5}{12}\right)^3 = \frac{5^3}{12^3}$

$\left(\frac{2^3}{3^2}\right)^4 = \frac{(2^3)^4}{(3^2)^4} = \frac{2^{12}}{3^8}$

All of these are **WRONG!!** Explain **why** and **fix** the mistakes!

$2^3 \times 2^4 = 2^{3+4} = 2^7$ same base

$5^3 \times 5^4 = 5^{3+4} = 5^7$ add exp

$\frac{3^8}{3^2} = 3^{8-2} = 3^6$ same base

$\frac{9^6}{9^2} = 9^{6-2} = 9^4$ Sub exp

$8^0 = 1$ $a^0 = 1$

$(6+7)^4 = 6^4 + 7^4 = 13^4$ add NOT mult, no rule

$(3^4)^9 = 3^{36}$ Mult powers

$\left(\frac{5}{7}\right)^3 = \frac{5^3}{7^3}$ Power on top and bottom