Module 1.2: Exponent Rules

Product Rule:

When you multiply two exponential expressions with the same base, you keep the base the same and add the powers

Examples: Simplify the following.

1. $-8x^7 \cdot 3x$
2. $2y^8 \cdot 3u^5 y^9 \cdot 8u$
3. $3w^2 \cdot 2y \cdot 7y^4 w^7$

Power Rule:

If you apply a power to an exponential expression, multiply the powers and keep the base the same.

Examples: Simplify the following.

1. $\left(z^4\right)^3$
2. $\left(7u\right)^2$
3. $\left(3x^2\right)^4$

Quotient Rule:

If you divide two exponential expressions with the same base, keep the base the same and subtract the bottom power from the top power.

Examples: Simplify the following.

1. $\frac{y^7}{y^3}$
2. $\frac{4u^6}{40u^2}$
3. $\frac{32w^4}{8w^7}$

Negative Exponents: If b is a nonzero real number and n is a positive integer, then $b^{-n}=$¿¿

Examples: Simplify the following without using any negative exponents

1. $\frac{20v^3}{45v^7}$

2. $\frac{32w^4}{24w^7}$

Zero Exponents

If b is a nonzero real number then $b^0 =$ ¿¿.

Examples: Simplify the following.

1. $(-7)^0$

2. $2\left(\frac{1}{7}\right)^0$

3. $-\left(\frac{5}{4}\right)^0$

All together:

Simplify the following without using negative exponents.

1. $\left(x^3\right)^{-4}$

2. $\left(w^{-7}\right)^{-7}$

3. $(-9)^{-1}$

4. $(-3)^{-2}$

5. 4^{-4}

6. $\frac{1}{5^{-2}}$

7. $\left(\frac{2}{5}\right)^{-1}$

8. $\left(\frac{5}{3}\right)^{-2}$

9. $\left(\frac{5}{4}\right)^{-3}$

10. $-4v^{-5}$

11. $\frac{1}{-5m^{-4}}$

12. $\frac{1}{6m^{-5}}$

Module 1.2 Square Roots

$\sqrt{x} = x^{\frac{1}{2}}$

also, $\sqrt[n]{x} = x^{1/n}$

Simplify the following:

1. $\sqrt{x^{64}}$

2. $\sqrt{v^{10}}$

3. $\sqrt{\frac{49}{81}}$

4. $\sqrt{\frac{75}{27}}$

5. $\sqrt{\frac{100}{4}}$

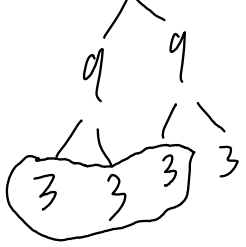
6. $\sqrt{2} * \sqrt{50}$

7. $\sqrt{2} * \sqrt{10}$

8. $\sqrt{2} * \sqrt{75}$

9. $\sqrt{5} * \sqrt{15}$

ex) $\sqrt[3]{81}$



$= \sqrt[3]{3^3 \cdot 3} = \sqrt[3]{3^3} \cdot \sqrt[3]{3}$

$\sqrt[3]{\cdot}$ and $(\cdot)^3$ are functional inverses, hence

$\sqrt[3]{3^3} = 3$

so, have $3 \cdot \sqrt[3]{3} = \sqrt[3]{81}$

10. $\sqrt{32} * \sqrt{2}$