

Warm Up:

Write the following expressions in exponential form.

a) $(2)(2)(2)(2)$

$= 2^4$

b) $(3x)(3x)(3x)$

$= (3x)^3$

OR $3^3 x^3$
 $= 27x^3$

c) $2(xy)(xy)(xy)$

$= 2(xy)^3$

OR $2x^3y^3$



The Power Laws

Lesson objectives

- I can apply the multiplying powers law
- I can apply the dividing powers law
- I can apply the power of a power law
- I can apply the zero power law
- I can apply the negative power law

1.1

Lesson objectives

Teachers' notes

Lesson notes

Nelson Page 222 #s 4ace, 5bdf, 6bdf, 7ace & 8bdf

Exponent Law #1 - Multiplying Powers

When we multiply terms with the same base we **add the exponents** and keep the base the same.

Example:

a) $(2^2)(2^3)$

$$= 2^{2+3}$$

$$= 2^5$$

b) x^4x^6

$$= x^{4+6}$$

$$= x^{10}$$

c) $(2x^3)(-x^2)$

$$= (2)(x^3)(-1)(x^2)$$

$$= -2x^{3+2}$$

$$= -2x^5$$

Exponent Law #2 - Dividing Powers

When we divide terms with the same base we **subtract the exponents** and keep the base the same.

Example:

a) $\frac{4^6}{4^4}$

$$= 4^{6-4}$$

$$= 4^2$$

b) $\frac{(x)^{12}}{(x)^8}$

$$= x^{12-8}$$

$$= x^4$$

c) $\frac{24x^5}{6x^2}$

$$24 \div 6 = 4$$

$$x^5 \div x^2 = x^3$$

$$\Rightarrow 4x^3$$

Exponent Law #3 - Power of a Power Law

When the base of a power is itself a power, **each factor in the base has to have its power multiplied by the power outside the bracket.**

Example:

a) $(x^2)^3$

$$= x^{2(3)}$$

$$= x^6$$

b) $(x^3y^4)^2$

$$= x^{3(2)}y^{4(2)}$$

$$= x^6y^8$$

c) $(2x^2)^3$

$$= 2^{1(3)}x^{2(3)}$$

$$= 2^3x^6$$

$$= 8x^6$$

Exponent Law #4 - Zero Power Law

Anything to the power of 0 is equal to 1.

Example:

a) 3^0

$$= 1$$

b) x^0

$$= 1$$

c) $(12x^3y^7)^0$

$$= 1$$

$$2(6x^3y^2)^4)^0 = 2(1)$$

$$= 2$$

Exponent Law #5 - Negative Power Law

A base raised to a negative power is **equivalent to the reciprocal of the same base raised to the positive exponent.**

Example:

a) 3^{-2}

$$= \frac{1}{3^2}$$

$$= \left(\frac{1}{3}\right)^2$$

b) $\left(\frac{3}{4}\right)^{-3}$

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

c) $\frac{1}{4^{-2}}$

$$= 4^{-(-2)}$$

$$= 4^2$$