Warm-Up Simplify.

(a)
$$(-3x)^2 = \left(0 \times 2\right)^2$$

(b)
$$\left(\frac{a^3}{2b}\right)^5 = \underbrace{\frac{a^3}{32b^5}}$$

(c)
$$\frac{1}{y^8} \cdot y^{15} = \frac{y^{15}}{y^8} = \frac{y^{15}}{y^8$$

(d)
$$\left(\frac{3x^3}{2y}\right)^2 \cdot \frac{1}{x^2} = \frac{0(6)}{4y^2} \cdot \frac{1}{x^2} =$$



Properties of Exponents

$$a^m \cdot a^n = a^{m+n}$$

$$(a^m)^n = a^{mn}$$

$$(ab)^m = a^m b^m$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

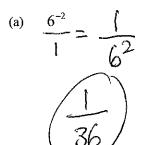
$$a^0 = 1$$

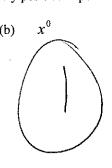
$$a^{-n} = \frac{1}{a^n}$$

$$\frac{1}{a^{-n}} = a'$$

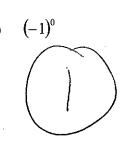
Example 1. Use the Definition of Zero and Negative Exponents

Simplify. Write you answer using only positive exponents.





(c)
$$\left(\frac{2}{3}\right)^{-2} = \frac{2^{-2}}{3^{-2}}$$
 (d) $(-1)^0$ $\left(\frac{3}{2}\right)^2 = \frac{3^2}{2^2} = \frac{9}{4}$



Example 2. Evaluate Exponential Expressions

Evaluate each expression. For this, do not leave any exponents in your answer which means you may

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

 $(-2)^5 + -5$

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

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



$$\frac{10}{70} = \frac{1}{7^2}$$

$$= \frac{1}{49}$$

Try It! Evaluate each expression.

(a)
$$\frac{1}{4^{-2}} = \frac{4^2}{1}$$

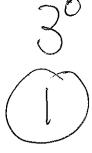


(b)
$$(5^{-2})^{-1}$$

$$5^{2}$$

$$25$$

(c)
$$3^5 \cdot 3^{-5}$$



(d)
$$\frac{2^{-2}}{2^2} = \frac{1}{2^2 2^2}$$

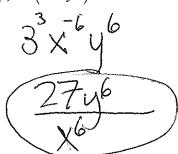
$$=\frac{1}{2^{+}}$$

$$=\frac{1}{16}$$

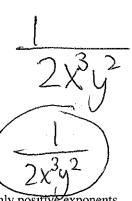
Example 3. Using All Properties of Exponents

Simplify the expression. Write your answer using only positive exponents.

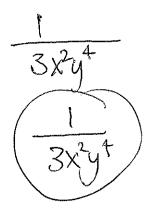
(a)
$$(3x^{-2}y^2)^3$$



(b)
$$\frac{4x^{-2}y^4}{8xy^6}$$

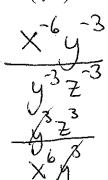


(c)

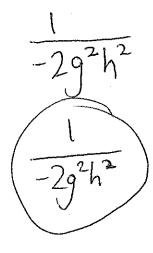


Simplify the expression. Write your answer using only positive exponents.

(b)
$$\left(\frac{x^2y}{yz}\right)^{-1}$$



(c)
$$\frac{7gh^2}{-14g^3h^4}$$



$$\left(-3a^{2}\right)$$



Assignment New: Pg. 506 #4 - 38 (evens)

Review:

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

$$2. \left(2x^{-3}y^2\right)^{-2}$$

3.
$$(3x^3y^{-4})(-2x^{-4}y^6)$$

4.
$$(1+2^{-1})^{-1}$$