NEGATIVE INTEGERS

Consider the quotient: $\frac{6^2}{6^5}$.

Apply the quotient rule: $\frac{6^2}{6^5} = 6^{2-5} = 6^{-3}$.

Now divide out common factors of 6: $\frac{6^2}{6^5} = \frac{6 \cdot 6}{6 \cdot 6 \cdot 6 \cdot 6 \cdot 6} = \frac{1}{6 \cdot 6 \cdot 6} = \frac{1}{6^3}$

We see that $6^{-3} = \frac{1}{6^3}$. This suggests the following definition of negative exponents.

If x is any nonzero real number and n is a natural number, then

$$x^{-n} = \frac{1}{x^n} \quad \text{and} \quad \frac{1}{x^{-n}} = x^n.$$

EXAMPLE: Evaluate

a.) 3^{-5} b.) $(-5)^{-3}$ c.) $\frac{1}{5^{-2}}$ d.) $\frac{8^{-2}}{3^{-4}}$

Changing the sign on the numerators exponent has the effect of ___________________________.
Changing the sign on the denominators exponent has the effect of ___________________________.

EXAMPLE: Simplify the following

a.) x^{-5} b.) $-6y^5y^{-6}$ c.) $\left(x^{-3}x^{-4}\right)^{-2}$ d.) $\left(\frac{15z^4}{z^3}\right)^{-2}$

e.) $y^{3n}y^{-5n}$ f.) $\frac{z^{8c}}{z^{10c}}$

Use the properties of exponents to write the result without using negative exponents.

a.) $\frac{12a^3b^4}{4a^5b^2}$ b.) $\left(-\frac{x^3y^2}{xy^{-3}}\right)^{-2}$