Check your understanding:

1. $8^{\frac{2}{3}} = \left(\sqrt[3]{8}\right)^2$

$= \sqrt[3]{8^2}$

$= 4$

2. $125^{-\frac{1}{3}} = \frac{1}{125^{1/3}} = \frac{1}{5}$

3. $32^{-\frac{7}{5}} = \frac{1}{32^{7/5}}$

$= \frac{1}{\left(\sqrt[5]{32}\right)^7}$

$= \frac{1}{128}$

4. $\frac{3^1}{9^{-\frac{3}{2}}} = 3 \cdot 9^{3/2}$

$= 3\left(\sqrt{9}\right)^3$

$= 81$

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

$$= \frac{1}{9}$$

$$\frac{2}{3^{-2}} = 2(3^2)$$

$$= 18$$

Now for the grand finale!!

Evaluate the following...

$$-2^4+\left(\frac{1}{3}\right)^{-2}-64^{-\frac{2}{3}}+4w^0+(-3)^2+\frac{2^{-2}}{4}$$

$$-16+\left(\frac{3}{1}\right)^2-\frac{1}{\left(\sqrt[3]{64}\right)^2}+4+9+\frac{1}{2^2\cdot 4}$$

$$-16+9-\frac{1}{16}+4+9+\frac{1}{16}$$

$$=6$$

4.6 Applying the Exponent Laws

THINK ABOUT IT

Work on your own. -3^6

What is the value of $\left(\frac{a^6b^9}{a^5b^8}\right)^{-2}$ when $a = -3$ and $b = 2$?

$$\left[\frac{(-3)^6(2)^9}{(-3)^5(2)^8}\right]^{-2} = \left[(-3)^1(2)^1\right]^{-2}$$

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

$$\frac{1}{(-3)^2} \cdot \frac{1}{(2)^2}$$

$$\frac{1}{9} \cdot \frac{1}{4} = \frac{1}{36}$$

Let's put all of our exponent skills to the test...

Don't forget the basic laws:

$2^3 \cdot 3^4$

Make Connections

Recall the exponent laws for integer bases and whole number exponents.

Product of powers:	$a^m \cdot a^n = a^{m+n}$
Quotient of powers:	$a^m \div a^n = a^{m-n}, a \neq 0$
Power of a power:	$(a^m)^n = a^{mn}$
Power of a product:	$(ab)^m = a^m b^m$
Power of a quotient:	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$

$b^0 = 1$

Warm Up

Simplify or evaluate each of the following:

1. $(-3)^2 = 9$

2. $-3^2 = -9$

3. $(2x^3y^6)^4 = 16x^{12}y^{24}$

4. $\dfrac{(-5a^3)(2a^2)^3}{(2a^3)^2} = \dfrac{(-5a^3)(8a^6)}{4a^6} = \dfrac{-40a^9}{4a^6} = -10a^3$

5. $4w^0 = 4$

6. $5^{-2} = \dfrac{1}{5^2} = \dfrac{1}{25}$

7. $\dfrac{2^{-1}}{3} = \dfrac{1}{3(2)^1} = \dfrac{1}{6}$

8. $(2^3 - 3^2)^{10} = (8-9)^{10}$
$2^{30} - 3^{20} = (-1)^{10}$
$= 1$

9. $5^8 \times (5^3)^{12} \div 5^8 \times (5^7)^2 =$