Fill in the next three entries in the right-hand column

As you move down the column subtract one from the exponent.

As you move down the column divide by 2.

2^4	16
2^3	8
2^2	4
2^1	2
2^0	1
2^{-1}	$\frac{1}{2}$

$a^0 = 1$ any nonzero number raised to the zero power equals 1.

$a^{-n} = \frac{1}{a^n}$ any nonzero number raised to a negative integer power is the reciprocal of that number to the positive power.

Some rules of exponents:

$a^1 = a$

$a^0 = 1$

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

$a^n \cdot a^m = a^{n+m}$ Product of Powers: Add exponents

$(a^n)^m = a^{nm}$ Power to a Power: Multiply exponents

$(a^n b^m)^x = a^{nx} \cdot b^{mx}$ Power of a Product: "distribute" the exponent to everything inside parentheses.

$\frac{a^n}{a^m} = a^{n-m}$ Quotient of Powers: Subtract exponents

$\left(\frac{a^n}{b^m}\right)^x = \frac{a^{nx}}{b^{mx}}$ Power of a Quotient: "distribute" the exponent to everything inside parentheses.

From Yesterday

Simplify each. Make sure exponents in your answer are neither zero nor negative.

5. $\frac{24a^3b^{-2}}{3a^{-4}b^{-9}}$ $\longrightarrow$ $\frac{24}{3} \cdot \frac{a^3}{a^{-4}} \cdot \frac{b^{-2}}{b^{-9}}$

$= 8 \cdot a^3 a^4 \cdot \frac{b^9}{b^2}$

$= 8a^{3+4}b^{9-2}$

$= 8a^7b^7$

This is one of several way to arrive at the same answer.

6. $(5c^{-4}d^3)^2(2cd^2)$

$(25c^{-8}d^6)(2cd^2)$ First apply the Power of a Product rule to simplify the first parentheses.

$50c^{-7}d^8$ Secondly apply the Product of Powers rule to simplify the product of the two parentheses

$\frac{50d^8}{c^7}$ Finally, use the definition of a negative exponent to simplify.

Section 7-4

What should be in each blank?

$4^3 =$		$4^3 =$	64	$4^3 =$	64
$4^2 =$		$4^2 =$	16	$4^2 =$	16
$4^1 =$		$4^1 =$	4	$4^1 =$	4
		$4^{?} =$	?	$4^{\frac{1}{2}} =$	2
$4^0 =$		$4^0 =$	1	$4^0 =$	1

Using a graphing calculator do the following:

1. Enter the following into Y_1: $Y_1 = x\text{^}(1/2)$
2. Press 2ND WINDOW set it up so that you see the following:
   TblStart = 0
   △Tbl = 1
   Indpnt: Auto Ask
   Depend: Auto Ask
3. Press 2ND GRAPH to get to the table.
4. Scroll up and down. Notice when Y_1 is an integer value.

Raising a number to the $\frac{1}{2}$ power is the same as doing what?

anything to the half power is the same as taking the square root of the base.

Why does the calculator give an ERROR message when x is negative?

Because the square root of a negative number is imaginary and the calculator is set to give only real number answers.

X	Y1
-1	ERROR
0	0
1	1
2	1.414
3	1.732
4	2
5	2.236
6	2.45
7	2.646
8	2.828
9	3
⋮	⋮
16	4
⋮	⋮
⋮	⋮
25	5

$a^{\frac{1}{n}} = \sqrt[n]{a}$ "the nth root of a"

$\sqrt{}$ This symbol is called a radical

it indicates finding a root.

The number in this spot is called the Index.

It tells what root you are to find.

If there is no index it means Square Root.

This quantity is called the Radicand

Rational Exponents represent radicals (roots)

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} \text{ or } (\sqrt[n]{a})^m$$