

$$6 + 2 = 8$$

$$6 \times 2 = 12$$

$$6 - 2 = 4$$

$$6 \div 2 = 3$$

$$6^2 = 36 = 6 \times 6$$

Don't let them tell you

$$4^2 = 16 = 4 \times 4$$

"factored form" for

$$3^2 = 9 = 3 \times 3$$

$$9^2 = 9 \times 9$$

Factored Form

I need an # for a base

$$7^3 = 7 \times 7 \times 7$$

my exponent is 3 now.
 ← What is factored form for 7^3 ?

Q:
 Base does what?
 Exponent does what?

$$3 \cdot 3 \cdot 3 \cdot 3 = \square \square$$

$$4 = \square$$

Back words
 Ask to write using an exponent

$$2^0 =$$

1st

Guesses for: 2^{12}
 4^7
 4^{12}
 2^7

$$2^3 \cdot 2^4 =$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^7$$

Could kids answer this by just using what we know so far.

Hmm: I wonder if there is another way to get 2^7 without writing all this!

Don't take answer as first one unless they all have their hands up

$$3^5 \cdot 3^4 =$$

$$3^{100} \cdot 3^{1000} =$$

Guesses
 Do it
 Hmm...
 How could we do this

$$a^b \cdot a^c =$$

$$2^0 =$$

How could we use additive law to figure out what $2^0 =$?

Guesses

$$2^0 = 0$$

Let the element of surprise unfold

Suggest a problem using additive law:

3+0

← where did 3 come from?

$$2^3 \cdot 2^0 = 2^3$$

~~8 · 1 = 8~~

$$8 \cdot 1 = 8$$

SMOYF how many things in that we don't know yet? 1

Kids object

CAN't be zero

$$8 \cdot \text{what} = 8?$$

$$8 \cdot 1 = 8$$

KMP are surprised by that?

So, 2^0 must be 1. (not 0.)

$$10^0 =$$

Who can give me an additive law of exponents problem?

$$\begin{array}{r} 10^3 \cdot 10^0 = 10^3 \\ \downarrow \qquad \qquad \downarrow \\ 1000 \cdot \underline{1} = 1000 \end{array}$$

1st guesses:

$$\frac{2^7}{2^3} = \frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2 \cdot 2}$$

Just defⁿ of expⁿ?

$$= 2 \cdot 2 \cdot 2 \cdot 2$$

$$= 2^4$$

what problem using ↑ that rule could you use to get what

2^0 must be.

$$\frac{2^4}{2^4} = 2^{4-4} = 2^0$$

$$\frac{2^4}{2^4} = 2^0$$

any #
itself = 1
∴ $2^0 = 1$

↓
I unknown in this equation.
↑

May 24, 2013 (6)

$$2^{-3}$$

$$8 \rightarrow 2^3 \cdot 2^{-3} = 1$$

$$8 \cdot \frac{1}{8} = 1$$

$$1 \rightarrow 2^0$$

$$9^{1/2}$$

$$77 \frac{1}{77}$$

$$\frac{9^{1/2}}{9^{1/2}} = 1$$

$$\frac{10}{2} = 5$$

$$\frac{0}{0} = 17$$

$$9^3 = 729$$

$$9^2 = 81$$

$$9^1 = 9$$

$$9^0 = 1$$

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

How could you figure out $1\frac{1}{2}$

$9^{\frac{1}{2}}$?

$$\boxed{9^{\frac{1}{2}}} \cdot \boxed{9^{\frac{1}{2}}} = \boxed{9^1}$$

$$\frac{\boxed{9^1}}{\boxed{9^{\frac{1}{2}}}} = \boxed{9^{\frac{1}{2}}}$$

Then solve

$\frac{9}{\text{what}} = \text{same what}$

$9^{\frac{1}{2}} \cdot 9^2 = 9^{2\frac{1}{2}}$
 unknowns? ops 2

And agree there is 1 unknown?

$8^{\frac{1}{3}}$	Guesses	$8^{\frac{2}{3}}$
$8^{\frac{1}{3}} \cdot 8^{\frac{1}{3}} \cdot 8^{\frac{1}{3}} = 8^1$		

$32^{\frac{1}{5}} = ?$

$32^{\frac{1}{5}} \cdot 32^{\frac{1}{5}} \cdot 32^{\frac{1}{5}} \cdot 32^{\frac{1}{5}} \cdot 32^{\frac{1}{5}} = 32^1$

$32^{\frac{3}{5}} = ?$

$$27^{1/3} = 3$$

Guesses!

$$27^{2/3}$$

$$27^{1/3} \cdot 27^{2/3} = 27^{3/3}$$

known
unknown
known

4/3 = 2

$$27^{2/3} \cdot 27^{2/3} \cdot 27^{2/3} = 27$$

↑
↑
↑

| unknown

$$27^{1/3} \cdot 27^{1/3} = 27^{2/3}$$

$$3 \cdot 3 = ?$$