

## What's Going On?

**Minds on**

Our Key Terms

**Action!**

Putting the Pieces Together

**Consolidation**

Condensing, Expanding and Evaluating

**Learning Goal - I will be able to work with exponents!**

## Minds on

## Exponents

What do we already know?

If you were asked to evaluate  $2^5$   
how would you do it? *answer*

- With a calculator

~~$2 \times 2 \times 2 \times 2 \times 2$~~

 $\wedge$ 
 $\times$ 

$7^{10}$

$2^5$

$2 \times 5$

- Without a calculator

$2 \times 2 \times 2 \times 2 \times 2$

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**Minds on**

## Key Terms

**base** **exponent** **expanded form** **power** **solution**

$$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$$

**Action!**

## Puzzled?

Find your group!

Each puzzle is made up of three pieces.

You will need to find the expanded form,  
exponential form (power) and the solution.

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

$$= \frac{1 \times 1 \times 1}{2 \times 2 \times 2}$$

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

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

When we have a fraction to an exponent, we apply the exponent to the numerator **AND** to the denominator! Then just evaluate each!

$$\left(\frac{2}{5}\right)^2 = \frac{2^2}{5^2} = \frac{4}{25} \checkmark$$

$$\left(-\frac{3}{2}\right)^4 = \frac{(-3)^4}{2^4} = \frac{81}{16}$$

↳  $\left(-\frac{3}{2}\right)\left(-\frac{3}{2}\right)\left(-\frac{3}{2}\right)\left(-\frac{3}{2}\right)$   
positive!

$$\left(-\frac{3}{2}\right)^3 = \frac{(-3)^3}{2^3} = \frac{-27}{8}$$

## Consolidation

### Condensing, Expanding and Evaluating

Work with a partner on the questions on your handout.

Check your answers (after every 3 questions) with another partner group

Write as a single power.

a)  $7 \times 7 \times 7 = 7^3$

b)  $5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 = 5^8$

c)  $11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11 \times 11 = 11^{11}$

d)  $(-3) \times (-3) \times (-3) \times (-3) \times (-3) = (-3)^5$

e)  $\left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^7$

f)  $\left(-\frac{3}{4}\right) \times \left(-\frac{3}{4}\right) \times \left(-\frac{3}{4}\right) \times \left(-\frac{3}{4}\right) \times \left(-\frac{3}{4}\right) \times \left(-\frac{3}{4}\right) = \left(-\frac{3}{4}\right)^6$

g)  $\frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} = \left(\frac{5}{7}\right)^{13}$

h)  $b \times b \times b \times b \times b \times b \times b \times b \times b \times b = b^{10}$

Write in expanded form.

$$a) 13^8 = 13 \times 13 \times 13 \times 13 \times 13 \times 13 \times 13 \times 13$$

$$b) 21^2 = 21 \times 21$$

$$c) \left(\frac{1}{4}\right)^7 = \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4}$$

$$d) (-1)^5 = (-1) \times (-1) \times (-1) \times (-1) \times (-1)$$

$$e) g^9 = g \times g \times g \times g \times g \times g \times g \times g \times g$$

Evaluate (you can use a calculator, be careful with the brackets!)

$9^2 = 81$	$(-1)^4 = 1$
$(-8)^3 = -512$	$(-1)^7 = -1$
$(-8)^4 = 4096$	$(-1)^{154} = 1$
$\left(\frac{3}{4}\right)^5 = \frac{243}{1024}$	$(-1)^{221} = -1$
$1^5 = 1$	$7^0 = 1$
$1^{58} = 1$	$(-17)^0 = 1$

**Rules**

1. A negative number to an even exponent is always positive.
2. A negative number to an odd exponent is always negative.
3. Any number to the exponent zero is always one.