Curriculum Outcome

(N1) Demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by: representing repeated multiplication using powers; using patterns to show that a power with an exponent of zero is equal to one; solving problems involving powers.

(N2) Demonstrate an understanding of operations on powers with integral bases (excluding base 0) and whole number exponents.

Student Friendly:
“Powers of tens and the ZERO exponent"

Warm Up
Grade 9

Write the following as a repeated multiple and evaluate

1) $-(-7)^5$ 2) (-3^5) 3) -2^6 4) $-(-4)^2(6)^3$

Write as a power then evaluate

1) $(-4)(-4)(4)(4)(-5)(-5)$ 2) $-(3)(3)(-7)(-7)(-7)$

Write as a base of 3

a) 2187

Warm Up
Grade 9

Write the following as a repeated multiple and evaluate

1) $-(-7)^5$

$-(-7)(-7)(-7)(-7)(-7)$

$-(-16807)$

16807

2) (-3^5)

$-(3)(3)(3)(3)(3)$

-243

3) -2^6

$-(2)(2)(2)(2)(2)(2)$

-64

4) $-(-4)^2(6)^3$

$-(-4)(-4)(6)(6)(6)$

$-(16)(216)$

-3456

Write as a power then evaluate

1) $(-4)(-4)(4)(4)(-5)(-5)$

$(-4)^2(4)^2(-5)^2$

$(16)(16)(25)$

6400

2) $-(3)(3)(-7)(-7)(-7)$

$-(3)^2(-7)^3$

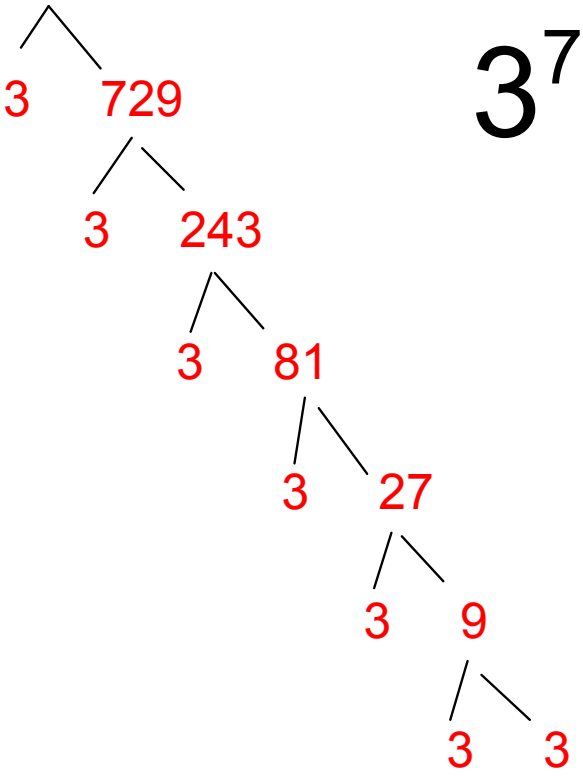
$-(9)(-343)$

$-(-3087)$

3087

Write as a base of 3

a) 2187



$3^x = 2187$

3^7

Me again... Try these!

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#17ac,18,19,20,21,23

Worksheet (on next slide)

Name _____ Date _____

Master 2.17

Extra Practice 1

Lesson 2.1: What Is a Power?

1. Identify the base of each power.
a) 6^3 **b)** 2^7 **c)** $(-5)^4$ **d)** -7^0

2. Use repeated multiplication to show why 3^5 is not the same as 5^3.

3. Complete this table.

Power	Base	Exponent	Repeated Multiplication	Standard Form
4^4				
$(-10)^3$				
	-6	2		
			$1 \times 1 \times 1 \times 1 \times 1$	

4. Write each product as a power, then evaluate.
a) 6×6
b) $3 \times 3 \times 3 \times 3 \times 3 \times 3$
c) $10 \times 10 \times 10 \times 10$
d) $-(8 \times 8 \times 8)$
e) $(-8)(-8)(-8)$
f) $-(-8)(-8)(-8)$

5. Write each power as repeated multiplication, then evaluate.
a) 7^5 **b)** 4^6 **c)** -9^3 **d)** $(-5)^5$

6. Evaluate each power. For each power:
- Are the brackets needed?
- If your answer is yes, what purpose do the brackets serve?

a) $(-6)^5$ **b)** $-(6)^5$ **c)** $-(-6)^5$ **d)** (-6^5)

7. Predict whether each answer is positive or negative, then evaluate.
a) $(-3)^2$ **b)** $(-3)^3$ **c)** -3^2 **d)** $-(-3)^3$

8. Is the value of -2^4 different from the value of $(-2)^4$? Explain.

9. Stamps are sold in a 10 by 10 sheet. The total value of a sheet of stamps is $60.00.
a) Express the number of stamps as a power and in standard form.
b) Use grid paper. Draw a picture to represent this power.
c) What is the value of one stamp?

Section 2.2

Powers of Ten and the Zero Exponent

Avogadro's number = 6.0221415×10^{23}

The speed of light = $2.99\ 792\ 458 \times 10^{8}$ m / s

Temperature of the Sun's Core = 1.5 x 10^{7}°C

since 15000000 kelvin = 14999726.85 degree Celsius

Light years= 4.96×10^{12} km

Distance related to Powers of 10
http://vimeo.com/819138

Any number (except 0) with an exponent 0 will equal 1

$2^0 = 1$

$13^0 = 1$

$199^0 = 1$

$(-6)^0 = 1$

Why???

Zero Exponent LAW

A power with a base not equal to zero, and an exponent of 0 is equal to 1

Any number raised to the power of ZERO is equal to 1

$$x^0 = 1$$

$(2007)^0 = 1$

$(-328)^0 = 1$

$-(-5)^0 = -1$

$-5^0 = -1$

Read this number to me

426

Four hundred
Twenty
Six

$$\begin{array}{rr} & 400 \\ + & 20 \\ + & 6 \\ \hline \end{array}$$

In elementary school you may have expressed it in this form

$$400 + 20 + 6$$

Powers of 10

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Number in Words	Standard Form	Power
One billion	1 000 000 000	10^9
One hundred million	100 000 000	10^8
Ten million	10 000 000	10^7
One million	1 000 000	10^6
One hundred thousand	100 000	10^5
Ten thousand	10 000	10^4
One thousand	1 000	10^3
One hundred	100	10^2
Ten	10	10^1
One	1	10^0

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Writing Numbers Using Powers of Ten

Standard form

Write 96 713 as a power of 10

10^4	10^3	10^2	10^1	10^0
10 000	1000	100	10	1
Ten Thousands	Thousands	Hundreds	Tens	Ones
9	6	7	1	3

Expanded form:

$(9 \times 10000) + (6 \times 1000) + (7 \times 100) + (1 \times 10) + (3 \times 1)$

Powers of ten form:

$(9 \times 10^4) + (6 \times 10^3) + (7 \times 10^2) + (1 \times 10^1) + (3 \times 10^0)$

10^6 10^5 10^4 10^3 10^2 10^1 10^0

7 605 404 **Standard form**

Write in powers of ten form:

$(7\times10^6)+(6\times10^5)+(5\times10^3)+(4\times10^2)+(4\times10^0)$

$$(5 \times 10^4) + (3 \times 10^2) + (4 \times 10^0)$$

Write in standard form:

10^4 10^3 10^2 10^1 10^0

5 0 3 0 4

PRACTICE TIME

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4(a, b)
5(a, b, c, d)
#6(a, c, e)
#8(a, c, e)
#9(a, c, e)
#10 all
#11
#13