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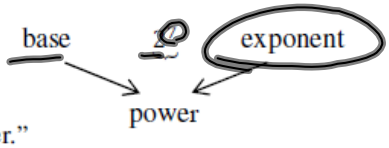
An expression used to represent a factor as repeated multiplication is a power. A power consists of a base and an exponent. The base of a power is the number or expression used as a factor for repeated multiplication. The exponent of a power is the number of times that the base is used as a factor of repeated multiplication.



The power can be read as:

"Two to the seventh power."

"The seventh power of two."

"Two raised to the seventh power."

$1^2 = 1$ $\quad 3^3 = 27$

$2^2 = 2$

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3) Identify the base(s) and exponent(s) in each. Then, write each in expanded notation. Finally, evaluate the power to calculate the product.

a) $(-9)^2$ b) -1^3 c) $(-4x)^2$ d) $4x^2$ e) $-(4x)^2$

$4x^2$

4) Describe the role of the parentheses in Question 3, parts (b) through (e).

establish the base that we are taking the power of

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5) Write each in expanded notation. Then, evaluate the power to calculate the product.

a) -1^2 $-(1\cdot 1)=-1$	b) $-1^3=-1$	c) $-1^4=-1$	d) $-1^5=-1$
e) $(-1)^2$ $(-1)(-1)=1$	f) $(-1)^3=-1$	g) $(-1)^4=1$	h) $(-1)^5=-1$

i) Identify the base of each power in Question 5, parts (a) through (d), and the base of each power in Question 5, parts (e) through (h).

j) What conclusion can you make about a negative number raised to an odd power?

when in ( ), we will neg. answer.

k) What conclusion can you make about a negative number raised to an even power?

when in ( ), we will pos. answer.

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6) Write each as a power.

a) $8\cdot 8\cdot 8\cdot 8 = 8^4$

b) $-c\cdot c\cdot c\cdot c\cdot c$ $-c^5$

c) $(-m)(-m)(-m)(-m)(p)(p)$ $(-m)^4(p)^2=m^4p^2$

d) $7\cdot 7\cdot 7\cdot r\cdot r\cdot z\cdot z\cdot z\cdot z$ $7^3r^2z^4$

7) What is the difference between a base and an exponent?

base: the # or term that is being multiplied.

exponent: # of times we multiply the base

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8) Write each expression in expanded notation and record the number of factors for each base.

a) $2^4 \cdot 2^3$ **b)** $(a^1)(a^3)$ **c)** $m^2p^2m^3p^1$ **d)** $9^3 \cdot y^2 \cdot 9^2 \cdot y^5$

$(2 \cdot 2 \cdot 2 \cdot 2) \cdot (2 \cdot 2 \cdot 2)$ $(a) \cdot (a \cdot a \cdot a)$ $(m \cdot m)(p \cdot p) \cdot (m \cdot m \cdot m)(p)$ $9 \cdot 9 \cdot 9 \cdot y \cdot y \cdot 9 \cdot 9 \cdot y \cdot y \cdot y \cdot y \cdot y$

e) Write each expanded notation from Question 8 as a power.

- 2^7
- a^4
- m^5p^3
- 9^5y^7

f) What relationship do you notice between the exponents in the original expression and the number of factors?

with the same base, we add exponents

g) Write a rule that you can use to simplify the ~~product of powers~~.

$a^m \cdot a^n = a^{m+n}$

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Sometimes, a power can be raised to a power. The exponential expression $(4^2)^3$ is a **power to a power**. It can be written as an expression with a factor of repeated multiplication using the definition of a power.

$(4^2)^3 = (4^2) \cdot (4^2) \cdot (4^2)$ factor of repeated multiplication

$= (4)(4) \cdot (4)(4) \cdot (4)(4)$ expanded notation

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9) Use the definition of a power to write each power to a power as a factor of repeated multiplication, and in expanded notation. Then, record the number of factors.

a) $(8^2)^3$

$(8^2)(8^2)(8^2)$

$8 \cdot 8 \cdot 8 \cdot 8 \cdot 8 \cdot 8$

8^6

b) $(5^4)^2$

$(5^4)(5^4)$

$(5 \cdot 5 \cdot 5 \cdot 5)(5 \cdot 5 \cdot 5 \cdot 5)$

5^8

c) $(j^3)^4$

$(j^3)(j^3)(j^3)(j^3)$

j^{12}

d) $(-2p^3)^2$

$(-2)(-2) \cdot p^3 \cdot p^3 \cdot p^3$

$4p^9$

new power

e) What relationship do you notice between the exponents in the original expression in Question 9 and the number of factors?

multiplied exponents.

f) Write a rule that you can use to simplify a power of powers.

$$(a^m)^n = a^{m \cdot n}$$

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10) Use the definition of a power to write each numerator and denominator in expanded notation.

a) $\frac{9^5}{9^2} = \frac{9 \cdot 9 \cdot 9 \cdot 9 \cdot 9}{9 \cdot 9} = 9^3$

b) $\frac{5^6}{5^3}$

c) $\frac{z^8}{z^6} = \frac{z \cdot z \cdot z \cdot z \cdot z \cdot z \cdot z \cdot z}{z \cdot z \cdot z \cdot z \cdot z \cdot z} = z^2$

d) $\frac{u^2}{u}$

e) Simplify each expanded notation you wrote. Then, write the simplified expression using exponents.

f) What relationship do you notice between the exponents in the numerator and denominator and the exponent in the simplified form?

Subtract your exponents

g) Write a rule that you can use to simplify a quotient of powers.

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

13) Simplify each fraction.

a) $\frac{4}{4}$ $\frac{4}{4}=1$ $4^1=4^{1-1}=4^0=1$ **b)** $\frac{9}{9}$ $\frac{9}{9}=1$ $9^0=1$ **c)** $\frac{25}{25}$ $\frac{25}{25}=1$ $25^0=1$ **d)** $\frac{m}{m}$ $\frac{m}{m}=1$ $m^0=1$

e) What is the quotient of any number divided by itself?

f) Use powers to rewrite each numerator and denominator. Then rewrite each fraction using the Quotient Rule of Powers. Leave your answer as a power.

g) Although each power has a different base, what is the value of each exponent?

h) Write a rule that you can use when raising any base to the zero power.

$a^0=1$, $a\neq 0$ "except zero"

UNIT 6: Intermediate Algebra B Name: _____ Period: _____

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Use this guide to help you evaluate where you are at in this chapter, and identify areas that you need extra help in.

☺=Proficient (you are awesome at this) 😐=Middle (you need some improvement) ☹=Not Proficient (HELP!)

Intermediate Algebra Unit 6 : Solving Polynomial functions					
Date Covered	**LT Letter**	**Learning Target (LT)** (What you should know)	**Practice Problems**	**Number of Test Questions/Points**	**Self-Evaluation** (Do you know it?)
5/1	6.1 A & 6.1 B	I graph polynomial functions and identify the significant features of the graph.	6.1 A #1, 4-6 (P-77) 6.1 B #1-13 (P-83)		☹ 😐 ☺
5/4	6.2 A		6.2 A #1-15 (P-93)		☹ 😐 ☺
5/5 Quiz (Exit Ticket) 5/6 Quiz (Warm-up)	6.2 B & 6.2C	I can demonstrate understanding of operations with polynomials.	6.2 B #3-15(odds), 21, 22 (P-95) 6.2 C #2-22(evens)		☹ 😐 ☺