

Name: _____

Date: _____

Math 9
Lesson 2.1 ~ What Is A Power?

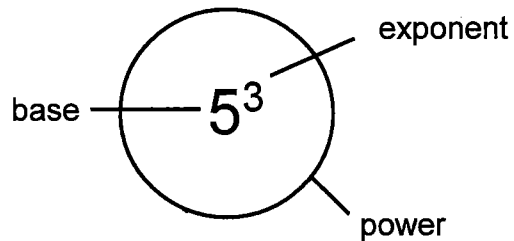
When an integer, other than 0, can be written as a product of equal factors, we can write the integer as a **power**.

For example, $5 \times 5 \times 5 = 5^3$

5 is the _____

3 is the _____

5^3 is the _____



We say: _____

A power can also be negative or have a base that is a negative integer.

For example, $(-8) \times (-8) \times (-8) \times (-8) = (-8)^4$

Key Terms in the Instructions:

"Product" or "Repeated Multiplication"	$7 \times 7 \times 7 \times 7$
"Power"	7^4
"Standard Form" or "Evaluate"	2401

Example # 1: Write each product as a power.

a) $3 \times 3 \times 3 \times 3 \times 3 \times 3$

b) 12

Example # 2: Write as a repeated multiplication and in standard form.

a) 9^5

b) 11^4

Example #3: Identify the base of each power, and then evaluate the power.

a) $(-3)^4$

Base: _____

b) -3^4

Base: _____

c) $-(-3)^4$

Base: _____

Practice

1. Write as a power.

a) $\underbrace{8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8}_{7 \text{ factors of } 8}$

$8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 =$

b) $\underbrace{10 \times 10 \times 10 \times 10 \times 10}_{5 \text{ factors of } 10}$

So, $10 \times 10 \times 10 \times 10 \times 10 =$

c) $\underbrace{(-2)(-2)(-2)}_{3 \text{ factors of } \underline{\hspace{1cm}}}$

So, $(-2)(-2)(-2) =$

d) $(-13)(-13)(-13)(-13)(-13)(-13)$
_____ factors of _____

So, $(-13)(-13)(-13)(-13)(-13)(-13) =$

2. Write each expression as a power.

a) $9 \times 9 \times 9 \times 9 =$

b) $(5)(5)(5)(5)(5)(5) =$

c) $11 \times 11 =$

d) $(-12)(-12)(-12)(-12)(-12) =$

3. Write each power as repeated multiplication.

a) $3^2 =$ _____

b) $3^4 =$ _____

c) $2^7 =$ _____

d) $10^8 =$ _____

Identify the base first.

4. State whether the answer will be positive or negative.

a) $(-3)^2$ _____

b) 6^3 _____

c) $(-10)^3$ _____

d) -4^3 _____

5. Write each power as repeated multiplication and in standard form.

a) $(-3)^2 =$ _____
= _____

b) $6^3 =$ _____
= _____

c) $(-10)^3 =$ _____
= _____

d) $-4^3 =$ _____
= _____

Predict.
Will the answer be positive or negative?

6. Write each product as a power and in standard form.

a) $(-3)(-3)(-3) =$ _____
= _____

b) $(-8)(-8) =$ _____
= _____

c) $-(8 \times 8 \times 8) =$ _____
= _____

d) $-(-1)(-1)(-1)(-1)(-1)(-1)(-1) =$ _____
= _____

7. Identify any errors and correct them.

a) $4^3 = 12$ _____

b) $(-2)^9$ is negative. _____

c) $(-9)^2$ is negative. _____

d) $3^2 = 2^3$ _____

e) $(-10)^2 = 100$ _____

Lesson 2.2 ~ Powers of Ten & the Zero Exponent

Complete the table below.

Exponent	Base	Power	Repeated Multiplication	Standard Form
4	2			
3	2			
2	2			
1	2			
0	2			

Zero Exponent Law: A power with an integer base, other than 0, and an exponent 0 is equal to 1.

For example: $n^0 = 1, n \neq 0$

Example # 4: Evaluate each expression.

a) 4^0

b) -4^0

c) $(-4)^0$

Now complete the following table with a base of 10.

Number in Words	Power	Standard Form
One billion		1 000 000 000
One hundred million		100 000 000
Ten million		10 000 000
One million		1 000 000
One hundred thousand		100 000
Ten thousand		10 000
One thousand		1 000
One hundred		100
Ten		10
One		1

Example # 5: Write 60 million using powers of 10.

Example #6: Write 3452 using powers of 10.

Practice

1. a) Complete the table below.

Power	Repeated Multiplication	Standard Form
5^4	$5 \times 5 \times 5 \times 5$	625
5^3	$5 \times 5 \times 5$	
5^2		
5^1		

b) What is the value of 5^1 ? _____

c) Use the table. What is the value of 5^0 ? _____

2. Evaluate each power.

a) $2^0 = \underline{\hspace{2cm}}$

b) $9^0 = \underline{\hspace{2cm}}$

c) $(-2)^0 = \underline{\hspace{2cm}}$

d) $-2^0 = \underline{\hspace{2cm}}$

e) $10^1 = \underline{\hspace{2cm}}$

f) $(-8)^1 = \underline{\hspace{2cm}}$

If there are no brackets, the exponent applies only to the base.

3. Write each number as a power of 10.

a) 10 000 = $10^{\underline{\hspace{1cm}}}$

b) 1 000 000 = $10^{\underline{\hspace{1cm}}}$

c) Ten million = $\underline{\hspace{2cm}}$

d) One = $\underline{\hspace{2cm}}$

e) 1 000 000 000 = $\underline{\hspace{2cm}}$

f) 10 = $\underline{\hspace{2cm}}$

4. Evaluate each power of 10.

a) $-10^6 = \underline{\hspace{3cm}}$

b) $-10^0 = \underline{\hspace{2cm}}$

c) $-10^8 = \underline{\hspace{3cm}}$

d) $-10^1 = \underline{\hspace{2cm}}$

5. One trillion is written as 1 000 000 000 000.

Write each number as a power of 10.

a) One trillion = $1\,000\,000\,000\,000 = \underline{\hspace{2cm}}$

b) Ten trillion = $10 \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$

c) One hundred trillion = $\underline{\hspace{3cm}} = \underline{\hspace{2cm}}$

6. Write each number in standard form.

a) $5 \times 10^4 = 5 \times 10\,000$
 $= \underline{\hspace{3cm}}$

b) $(4 \times 10^2) + (3 \times 10^1) + (7 \times 10^0) = (4 \times 100) + \underline{\hspace{2cm}}$
 $= \underline{\hspace{2cm}}$
 $= \underline{\hspace{2cm}}$

c) $(2 \times 10^3) + (6 \times 10^2) + (4 \times 10^1) + (9 \times 10^0)$
 $= \underline{\hspace{3cm}}$
 $= \underline{\hspace{3cm}}$
 $= \underline{\hspace{3cm}}$

d) $(7 \times 10^3) + (8 \times 10^0) = \underline{\hspace{2cm}}$
 $= \underline{\hspace{2cm}}$
 $= \underline{\hspace{2cm}}$