

NAME: _____
EXPONENTS

DATE: _____
PERIOD: _____

How Do You Multiply Numbers With the Same Base? (Topic #1)

1. Complete the table.

Exponential Form	Read	Product of a Repeated Factor	Standard Form
2^1			
2^2			
2^3			
2^4			
2^5			

2. Compare the exponent of 2 in the first row of the table to the number of times the factor 2 is repeated. Does this relation hold for all rows of the table?
3. You can use a(an) _____ to help represent a repeated factor in multiplication.
4. The repeated factor is called the _____.

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^5$$

5. A(an) _____ tells how many times the factor is repeated or multiplied by itself.
6. A power with an exponent of 1 means that the base is a factor only _____.
Example: $3^1 = 3$

NOTE: When you write a power with a negative number as the base, it is important to use grouping symbols to avoid confusion.

Example:

Evaluate each power.

7. x^2 for $x = -5$

8. x^3 for $x = 4$

9. y^3 for $y = 2$

10. y^2 for $y = -2$

You can use your calculator to find the value of a number raised to a power. Use a calculator to evaluate.

11. $(-8)^5$

12. -15^4

Multiplying Powers with the Same Base

Example: $5^3 \cdot 5^4$

STEP 1: Write the factors for each power.

STEP 2: Write the product in Exponential form.

Multiplying Powers with the Same Base		
Words	Arithmetic	Algebra
To multiply numbers or variables with the same base: 1. 2.		

Write each expression using a single exponent.

13. $8^4 \cdot 8^7$

14. $a^3 \cdot a^4$

15. $5^3 \cdot 5^4$

16. $a^2 \cdot a^5$

17. $(-8)^4 \cdot (-8)^5$

18. $n^6 \cdot n^2$

19. $m^3 \cdot m^6$

20. $(-7)^4 \cdot (-7)^2$

21. $(-3)^2 \cdot (-3)^2$

Homework #1

Write each expression using exponents.

1. $8 \cdot 8 \cdot 8 \cdot 8 \cdot 8$

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

3. $x \cdot x \cdot x \cdot x \cdot x \cdot x$

4. $(-3m)(-3m)(-3m)$

5. $4 \cdot t \cdot t \cdot t$

6. $(5v)(5v)(5v)(5v)(5v)$

Write each expression as a product of the same factor.

7. a^2

8. 19^3

9. -6^2

10. $-x^3$

Evaluate each power.

11. $(-5)^4$

12. 4^3

13. -10^2

14. 20^1

Write each expression using a single exponent.

15. $3^2 \cdot 3^5$

16. $1^3 \cdot 1^4$

17. $5^4 \cdot 5^3$

18. $(-3)^2 \cdot (-3)^3$

19. $a^1 \cdot a^2$

20. $(-y)^3 \cdot (-y)^2$

21. $-z^3 \cdot z^9$

22. $x^2 \cdot x^7$

Evaluate each expression for the given value.

23. $4x^2$ for $x = 3$

24. $(5b)^2$ for $b = 2$

25. $-6x^2$ for $x = 3$

26. $(-3g)^2$ for $g = 2$

Choose a calculator, paper and pencil, or mental math to evaluate each expression.

27. 3^5 _____

28. -2^4 _____

29. -10^3 _____

30. -8^3 _____

Choose A, B, C, or D.

31. In Westville, there is a house. In the house, there are 6 people. Each person in the house has 6 pets. Which of the following expressions represents the total number of people and pets? Explain your answer.

A. 6^3

B. $3(6)$

C. 63

D. $6^2 + 6$

How Do You Multiply Numbers With the Same Base?

(Topic #1)

1. Complete the table.

Exponential Form	Read	Product of a Repeated Factor	Standard Form
2^1	2 to the 1st power	2	2
2^2	2 to the 2nd power or 2 squared	$2(2)$	4
2^3	2 to the 3rd power or 2 cubed	$2(2)(2)$	8
2^4	2 to the 4 th power	$2(2)(2)(2)$	16
2^5	2 to the 5 th power	$2(2)(2)(2)(2)$	32

2. Compare the exponent of 2 in the first row of the table to the number of times the factor 2 is repeated. Does this relation hold for all rows of the table?
3. You can use a(an) exponent to help represent a repeated factor in multiplication.
4. The repeated factor is called the base.

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^5 \leftarrow 5 \text{ is the exponent}$$

↑
2 is the base

5. A(an) exponent tells how many times the factor is repeated or multiplied by itself.
6. A power with an exponent of 1 means that the base is a factor only once.
Example: $3^1 = 3$

NOTE: When you write a power with a negative number as the base, it is important to use grouping symbols to avoid confusion.

Example: $(-4)^4 = (-4)(-4)(-4)(-4) = 256$

↑
The base is -4.

$$-4^4 = -1 \cdot 4^4 = -1(4)(4)(4)(4) = -256$$

↑
The base is 4.

Evaluate each power.

7. x^2 for $x = -5$

$$\begin{aligned} x^2 &= x \cdot x \\ &= (-5)(-5) \\ &= 25 \end{aligned}$$

8. x^3 for $x = 4$

$$\begin{aligned} x^3 &= x \cdot x \cdot x \\ &= 4 \cdot 4 \cdot 4 \\ &= 64 \end{aligned}$$

9. y^3 for $y = 2$

$$\begin{aligned} y^3 &= y \cdot y \cdot y \\ &= 2 \cdot 2 \cdot 2 \\ &= 8 \end{aligned}$$

10. y^2 for $y = -2$

$$\begin{aligned} y^2 &= y \cdot y \\ &= (-2)(-2) \\ &= 4 \end{aligned}$$

You can use your calculator to find the value of a number raised to a power. Use a calculator to evaluate.

11. $(-8)^5 = -32,768$

12. $-15^4 = -50,625$

Multiplying Powers with the Same Base

Example: $5^3 \cdot 5^4$

$$\begin{aligned} &5^3 \cdot 5^4 \\ &(5 \cdot 5 \cdot 5) \cdot (5 \cdot 5 \cdot 5 \cdot 5) \\ &5^7 \end{aligned}$$

STEP 1: Write the factors for each power.

STEP 2: Write the product in Exponential form.

Multiplying Powers with the Same Base		
Words	Arithmetic	Algebra
To multiply numbers or variables with the same base:	$3^2 \cdot 3^5$	$a^m \cdot a^n$
1. Keep the base.	$3^{(2+5)}$	a^{m+n}
2. Add the exponents.	3^7	

Write each expression using a single exponent.

13. $8^4 \cdot 8^7$

$$8^{4+7} = 8^{11}$$

14. $a^3 \cdot a^4$

$$a^{3+4} = a^7$$

15. $5^3 \cdot 5^4$

$$5^{3+4} = 5^7$$

16. $a^2 \cdot a^5$

$$a^{2+5} = a^7$$

17. $(-8)^4 \cdot (-8)^5$

$$(-8)^{4+5} = (-8)^9$$

18. $n^6 \cdot n^2$

$$n^{6+2} = n^8$$

19. $m^3 \cdot m^6$

$$m^{3+6} = m^9$$

20. $(-7)^4 \cdot (-7)^2$

$$(-7)^{4+2} = (-7)^6$$

21. $(-3)^2 \cdot (-3)^2$

$$(-3)^{2+2} = (-3)^4$$

NAME: (KEY)
 EXPONENTS

DATE: # 1-26
 PERIOD: _____

Homework #1

Write each expression using exponents.

1. $8 \cdot 8 \cdot 8 \cdot 8 \cdot 8$
 8^5

2. $(-2)(-2)(-2)(-2)$
 $(-2)^4$

3. $x \cdot x \cdot x \cdot x \cdot x \cdot x$
 x^6

4. $(-3m)(-3m)(-3m)$
 $(-3m)^3$

5. $4 \cdot t \cdot t \cdot t$
 $4t^3$

6. $(5v)(5v)(5v)(5v)(5v)$
 $(5v)^5$

Write each expression as a product of the same factor.

7. a^2
 $a \cdot a$

8. 19^3
 $19 \cdot 19 \cdot 19$

9. $-6^2 = -1 \cdot 6^2$
 $-1 \cdot 6 \cdot 6$

10. $-x^3 = -1 \cdot x^3$
 $-1(x)(x)(x)$

Evaluate each power.

11. $(-5)^4$
 625

12. 4^3
 64

13. -10^2
 -100

14. 20^1
 20

Write each expression using a single exponent.

15. $3^2 \cdot 3^5$
 $3^{2+5} = 3^7$

16. $1^3 \cdot 1^4$
 $1^{3+4} = 1^7$

17. $5^4 \cdot 5^3$
 $5^{4+3} = 5^7$

18. $(-3)^2 \cdot (-3)^3$
 $(-3)^{2+3} = (-3)^5$

19. $a^1 \cdot a^2$
 $a^{1+2} = a^3$

20. $(-y)^3 \cdot (-y)^2$
 $(-y)^{3+2} = (-y)^5$

21. $-z^3 \cdot z^9$
 $-z^{3+9} = -z^{12}$

22. $x^2 \cdot x^7$
 $x^{2+7} = x^9$

Evaluate each expression for the given value.

23. $4x^2$ for $x = 3$
 $4 \cdot 3^2$
 $4 \cdot 9$
 36

24. $(5b)^2$ for $b = 2$
 $(5 \cdot 2)^2$
 10^2
 100

25. $-6x^2$ for $x = 3$
 $-6(3)^2$
 $-6 \cdot 9$
 -54

26. $(-3g)^2$ for $g = 2$
 $(-3 \cdot 2)^2$
 $(-6)^2$
 36

Choose a calculator, paper and pencil, or mental math to evaluate each expression.

27. 3^5 _____

28. -2^4 _____

29. -10^3 _____

30. -8^3 _____

Choose A, B, C, or D.

31. In Westville, there is a house. In the house, there are 6 people. Each person in the house has 6 pets. Which of the following expressions represents the total number of people and pets? Explain your answer.

- A. 6^3 B. $3(6)$ C. 63 D. $6^2 + 6$
