

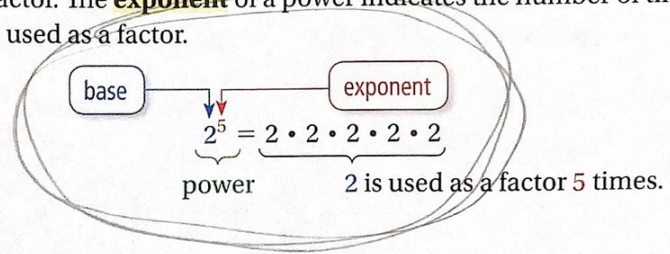
1.1 Lesson

*calculator y^x button
below OFF button*

Key Vocabulary

power, p. 5
base, p. 5
exponent, p. 5

A **power** is a product of repeated factors. The **base** of a power is the repeated factor. The **exponent** of a power indicates the number of times the base is used as a factor.



Example 1 Writing Expressions Using Exponents

Write each product using exponents.

a. $7 \cdot 7 \cdot 7$

Because 7 is used as a factor 3 times, its exponent is 3.

▶ So, $7 \cdot 7 \cdot 7 = 7^3$.

b. $3 \cdot 3 \cdot 5 \cdot 5 \cdot 5 \cdot 5$

Because 3 is used as a factor 2 times, its exponent is 2. Because 5 is used as a factor 4 times, its exponent is 4.

▶ So, $3 \cdot 3 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 3^2 \cdot 5^4$.

does not have the same base so leave them separately

Try It

Write the product using exponents.

1. $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$

4^5

answer should have exponents

2. $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

$2^3 \cdot 3^5$

Example 2 Evaluating Expressions

Evaluate each expression.

a. 5^3

$5^3 = 5 \cdot 5 \cdot 5$

The base is 5.

$= 125$

Write as repeated multiplication.

Simplify.

b. -2^4

$-2^4 = -(2 \cdot 2 \cdot 2 \cdot 2)$

The base is 2.

$= -16$

Write as repeated multiplication.

Simplify.

no parentheses with negative, answer is negative

Anything to the zero power equals the number
 $5^0 = 1$

Try It

Evaluate the expression.

actually find the answer

3. 12^2

$12 \cdot 12 = 144$

4. 2^6

64

5. -5^4

-625

6. -4^3

-64



Example 3 Using Order of Operations

Evaluate each expression.

a. $3 + 2 \cdot 3^4 = 3 + 2 \cdot 81$
 $= 3 + 162$
 $= 165$

b. $3^3 - 8^2 \div 2 = 27 - 64 \div 2$
 $= 27 - 32$
 $= -5$

c. $-3 \cdot (-10^2 + 70) = -3 \cdot (-100 + 70)$
 $= -3 \cdot (-30)$
 $= 90$

Evaluate the power.

Multiply.

Add.

Evaluate the powers.

Divide.

Subtract.

Evaluate the power.

Perform operation in parentheses.

Multiply.

Extra Examples

1. $2 - 4 \cdot 5^2$
 $2 - 4 \cdot 25$
 $2 - 100$
 -98

2. $-2 \cdot (32 - 6^2)$
 $-2 \cdot (32 - 36)$
 $-2 \cdot -4$
 8

3
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REFLECT ON YOUR METHOD

Can you use the Distributive Property to evaluate the expression in part (c)? Explain.

Try It

Evaluate the expression.

7. $9 - 2^5 \cdot 0.5$

$9 - 32 \cdot 0.5$
 $9 - 16$
 -7

8. $3^3 \div 9 + 18$

$27 \div 9 + 18$
 $3 + 18$
 21

9. $(7 \cdot 4 - 4^3) \div 6$

$(28 - 64) \div 6$
 $-36 \div 6$
 -6



In-Class Practice

1

I don't understand yet.

2

I can do it with help.

3

I can do it on my own.

4

I can teach someone else.

WRITING EXPRESSIONS USING EXPONENTS Write the product using exponents.

10. $9 \cdot 9 \cdot 9$

9^3

11. $8 \cdot 8 \cdot 8 \cdot 8 \cdot 8$

8^5

12. $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3$

$2^3 \cdot 3^3$

13. $5 \cdot 5 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$

$5^2 \cdot 7^5$

EVALUATING EXPRESSIONS Evaluate the expression.

14. 11^2

$= 121$

15. 8^3

$= 512$

16. -6^3

$= -216$

17. -2^5

$= -32$

USING ORDER OF OPERATIONS Evaluate the expression.

18. $-24 \div 2^2$

$-24 \div 4$
 $= -6$

19. $(3^3 - 6 \cdot 8) \div 7$

$(27 - 6 \cdot 8) \div 7$
 $27 - 48 \div 7$
 $-21 \div 7$
 $= -3$

4
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20. **WHICH ONE DOESN'T BELONG?** Which expression does *not* belong with the other three? Explain your reasoning.

$4^3 = 64$

$3^4 = 81$

$8^2 = 64$

$2^6 = 64$

All of the other expressions equal 64 but 3 to the 4th power equals 81.

