

Grade 6 Math Powers and Exponents

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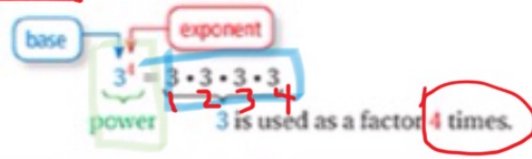


1.2 Lesson

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Key Vocabulary
power, p. 12
base, p. 12
exponent, p. 12
perfect square, p. 13

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.



More later on these two!

Power	Words
3^2	Three <u>squared</u> , or three to the <u>second</u>
3^3	Three <u>cubed</u> , or three to the <u>third</u>
3^4	Three to the <u>fourth</u>

EXAMPLE 1 Writing Expressions as Powers

Math Practice 5

Write each product as a power.
a. $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$

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EXAMPLE 1 Writing Expressions as Powers

Math Practice 5

Choose Tools
Why are calculators more efficient when finding the values of expressions involving exponents?

Write each product as a power.

a. $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$

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

So, $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^5$.

b. $12 \times 12 \times 12$

Because 12 is used as a factor 3 times, its exponent is 3.

So, $12 \times 12 \times 12 = 12^3$.

1. Write the base number
2. Count and write number of factors.

On Your Own

Write the product as a power.

1. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 = 6^6$

2. $15 \times 15 \times 15 \times 15 = 15^4$

Now You're Ready
Exercises 4–12

EXAMPLE 2 Finding Values of Powers

Find the value of each power.

a. 7^2

$7^2 = 7 \cdot 7$

$= 49$

Write as repeated multiplication.

Simplify.

b. 5^3

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

$= 125$

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EXAMPLE 2 Finding Values of Powers

Find the value of each power.

a. 7^2

$7^2 = 7 \cdot 7$

$= 49$

Write as repeated multiplication.

Simplify.

b. 5^3

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

$= 125$

← 2 factors

← 3 factors

25 · 5

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The square of a whole number is a **perfect square**. $n^2 = n \cdot n$

EXAMPLE 3 Identifying Perfect Squares

Determine whether each number is a perfect square.

a. 64 $\rightarrow 8 \cdot 8 = 64$ ← Number times itself!
 Because $8^2 = 64$, 64 is a perfect square.

b. 20
 No whole number squared equals 20. So, 20 is not a perfect square.
 There is no number you can multiply times itself to get 20!

On Your Own
 Find the value of the power.

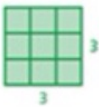
3. $6^3 = 216$ 4. $9^2 = 81$ 5. $3^4 = 81$ 6. $18^2 = 324$
 $= 36 \cdot 6 = 216$ $= 9 \cdot 9 = 81$ $= 18 \cdot 18 = 324$

Determine whether the number is a perfect square.

7. 25 = 5×5 8. 2 no 9. 99 no 10. 100 = 10×10

Remember
 The area of a figure is the amount of surface it covers. Area is measured in square units.

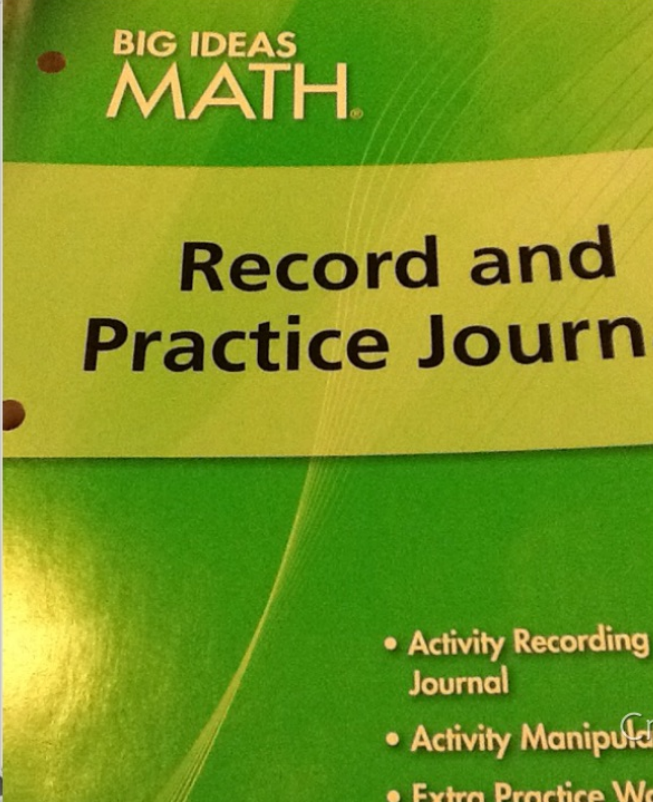
The area of a square is equal to its side length squared. **Literally!**



Area = $3^2 = 9$ square units

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EXAMPLE 4 Real-Life Application



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Record and Practice Journal

- Activity Recording Journal
- Activity Manipulatives
- Extra Practice Worksheets

Copy and Complete for HW Credit


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1. $5 \times 5 \times 5$
 $= 5^3$

2. 13×13
 $= 13^2$

3. on your own

4-6 on your own

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7. 4^4
 $= 4 \cdot 4 \cdot 4 \cdot 4$
 $= 16 \cdot 16$
 $= 256$

316
$\times 16$
<hr/>
196
+160
<hr/>
256

$16 \times 16 = 256$

8. $9^3 = 9 \cdot 9 \cdot 9$
 $= 81 \cdot 9$

9. 24^2
 $=$

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10. 47 NO
 $6 \cdot 6 = 36$
 $7 \cdot 7 = 49$

11. On your own

12. On your own

13. Extra Credit

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