

Warm Up
Grade 8



1) Find the missing number (Show your work)

$14^{\boxed{4}} = 38\,416$

$14^1 = 14$
$14^2 = 196$
$14^3 = 2744$
$14^4 = 38416$

2) Find the missing number

$\square^6 = 15625$

$\underline{5}^{\,6} = 15\,625$

$1^6 = 1$
$2^6 = 64$
$3^6 = 729$
$4^6 = 4096$
$5^6 = 15625$

3) Place a <,> or = in the blank between (Show your work)

a) $5^7 \underline{>} 4^8$

5^7 ↓ 78 125 Bigger

4^8 ↓ 65536

b) $3^3 \underline{>} 5^2$

3^3 ↓ 27 Bigger

5^2 ↓ 25

Power / Expoential form 5^3

Expanded $5 \times 5 \times 5$

Standard 125

Homework Solutions

1. Identify the base of each power.
   a) 6^3 6 b) 2^7 2 c) $(-5)^4$ -5 d) 7^0 7

2. Use repeated multiplication to show why 3^5 is not the same as 5^3.

$3^5 = 3 \times 3 \times 3 \times 3 \times 3$
$= 243$

$5^3 = 5 \times 5 \times 5$
$= 125$

. Complete this table.

Power	Base	Exponent	Repeated Multiplication	Standard Form
4^4	4	4	4x4x4x4	256
10^3	10	3	10x10x10	1000
14^2	14	2	14x14	196
1^5	1	5	1 × 1 × 1 × 1 × 1	1
9^6	9	6	9x9x9x9x9x9	531 441
5^7	5	7	5x5x5x5x5x5	78 125

4. Write each product as a power, then evaluate (standard form).
   a) 6×6 $6^2 = 36$ b) $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^7 = 2187$
   c) $10 \times 10 \times 10 \times 10 = 10^4 = 10\,000$ d) $8 \times 8 \times 8 = 8^3 = 512$

5. Find the missing exponent. (Show work)
   a) $7^{\square} = 16\,807$ b) $2^{\square} = 32$ c) $2^{\square} = 128$ d) $3^{\square} = 81$ e) $9^{\square} = 81$

a) 7x7= 49
7x 7x 7 = 343
7x7x7x7 =2401
7x7x7x7x7 = 16807

b) 2 x 2 = 4
2 x2 x2 = 8
2 x2 x2 x2 = 16
2 x 2 x 2 x2 x 2 = 32

c) 2 x 2 = 4
2 x2 x2 = 8
2 x2 x2 x2 = 16
2 x 2 x 2 x2 x 2 = 32
2 x 2 x 2 x2 x 2x 2 = 64
2 x 2 x 2 x2 x 2x 2x2 = 128

d) 3 x 3 = 9
3 x 3 x 3 = 27
3x3x3 = 81

e)9x9=81

6. Find the missing base.
   a) $_4_^3 = 64$ b) $_7_^2 = 49$ c) $_1_^5 = 1$ d) $_9_^3 = 729$

7. Evaluate each of the following. What do you notice?
   a) 10^2 b) 10^3 c) 10^5 d) 10^6
   100 1000 100 000 1 000 000
   The exponent on the 10 is the number of zeros that appear in standard form

8. Place a <, > or = in the box. (Show your calculations)
   a) $2^7 \square 6^3$ b) $4^3 \square 2^6$ c) $9^3 \square 3^5$ d) $7^3 \square 6^5$
   128 216 64 64 729 243 343 7776

Quiz Time

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What do we notice?





$3^1 = 3$

$10^1 = 10$

$12^1 = 12$

$17^1 = 17$

$27^1 = 27$

$99^1 = 99$

$10^0 = 1$

$2^0 = 1$

$81^0 = 1$

$21^0 = 1$

$13^0 = 1$

$5^0 = 1$

$5^3 = 125$ ÷5

$5^2 = 25$ ÷5

$5^1 = 5$ ÷5

$5^0 = 1$ ÷5

$5^{-1} = 0.2$ $\frac{1}{5}$

$5^{-2} =$ $\frac{1}{5^2} = \frac{1}{25}$

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Exponents

Whenever you have an exponent of 2, it is said to be squared. 3^2 might be read as 3 squared.

Whenever you have an exponent of 3, it is said to be cubed. 5^3 might be read as 5 cubed.

If the base is raised to the exponent 1, then the answer will always be the base itself.

examples: $15^1 = 15$ $24^1 = 24$ $6\,893^1 = 6\,893$

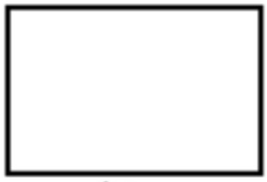
If the base is raised to the exponent 0, then the answer will always be 1.

examples: $26^0 = 1$ $147^0 = 1$ $945^0 = 1$

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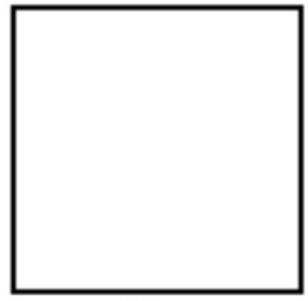
Squares and Perfect Squares

What is the area of each below?
Are they squares? Why or why not?



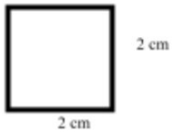
A= L x W
=8x5
= 40cm^2

Not a square,
sides are not equal



A= Lx W
=9x9
=81om^2

Square, all sides are equal



A= L x W
= 2cm x 2cm
= 4 cm^2

Square all sides equal



A = L x W
= 8cm x 4cm
= 32 cm^2

Not a square, sides are not equal

Ex 2) Can you form squares with the following areas?

(a) 18 cm^2 (b) 25 cm^2 (c) 100 cm^2 (d) 60 cm^2

a) No, there is no number you can multiply by itself to get 18

b) Yes, forms a square, 5 x 5=25

C) Yes because 10 x 10 =100

d) No, can not form a square, there is no number you multiply by itself to get 60

How do you know if a given area will make a square?

You will form a square if 2 of the factors are the same, for example an area of 25 cm^2 forms a square because 25 = 5 x 5

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Notes

"To Square a number" - Multiplying a number by itself

Example: "The square of 5" is 5 x 5 = 25

Thus

$5^2 = 25$

$5^2 = 5x5 = 25$

25 is a square number

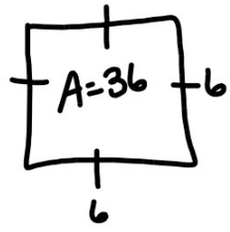
or Perfect Square

use graph paper

Example 4:

Show that 36 is a square number. Use a diagram, symbols and words.

1 x 36 Rec
2 x 18 Rec
3 x 12 Rec
4 x 9 Rec
6 x 6 square



Solution:

Draw a square with area 36 square units

Side length = ___ units

Then, 36 = ___ x ___ = $___^2$

Words: Thirty-six is _____ squared

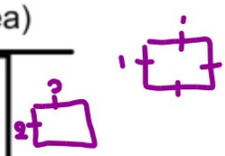
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NOTES:

How can you find all of the perfect squares of the numbers between 1 and 250?

Multiply the same numbers to get a perfect square.

Side length	L x W		Perfect Square (Area)
1	1 x 1	=	1
2	2 x 2	=	4
3	3 x 3	=	9
4	4 x 4	=	16
5	5 x 5	=	25
	6 x 6	=	36
	7 x 7	=	49
	8 x 8	=	64
	9 x 9	=	81
	10 x 10	=	100
	11 x 11	=	121
	12 x 12	=	144
	13 x 13	=	169
	14 x 14	=	196
	15 x 15	=	225



Perfect Squares	
1	4
9	16
25	36
49	64
81	100
121	144
169	196
225	

$A_{square} = L \times W$ where $L = W$

$= Side^2$

$Side or square = \sqrt{Area}$

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