Warm Up
Grade 8

Oct. 30, 2018

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

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

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

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

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

$78125 > 65536$

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

$27 > 25$

Quiz Time

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	5x5x5x5x5x5x5	78 125

4. Write each product as a power, then evaluate (standard form).
   a) 6×6 $6^2 = 36$ b) $3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6 = 729$
   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) $7^5 = 16\,807$ b) $2^5 = 32$ c) $2^7 = 128$ d) $3^4 = 81$ e) $9^2 = 81$

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) $2^7 < 6^3$ b) $4^3 = 2^6$ c) $9^3 > 3^5$ d) $7^3 < 6^5$
128 216 64 64 729 243 343 7776

What do we notice?

$3^1 = 3$

$10^1 = 10$

$12^1 = 12$

$17^1 = 17$

$27^1 = 27$

$99^1 = 99$

$x^1 = x$

$10^0 = 1$

$2^0 = 1$

$81^0 = 1$

$21^0 = 1$

$13^0 = 1$

$5^0 = 1$

$x^0 = 1$

$3^4 = 81$ ÷ 3

$3^3 = 27$ ÷ 3

$3^2 = 9$ ÷ 3

$3^1 = 3$ ÷ 3

$3^0 = 1$

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.

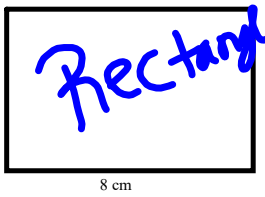
examples: $26^0 = 1$ $147^0 = 1$ $945^0 = 1$

$(756)^0 = 1$

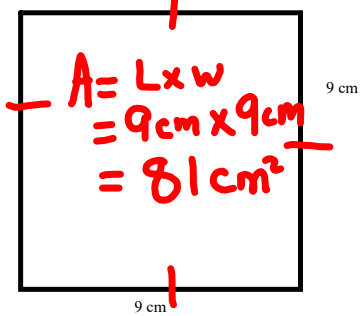
Squares and Perfect Squares

Ex. 1)

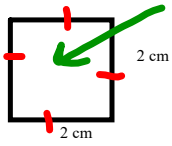
What is the area of each below?
Are they squares? Why or why not?



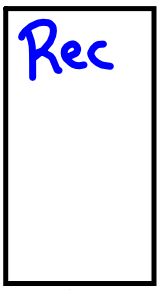
Rectangle
A = L x w
= 5cm x 8cm
= 40cm²



Square
A = L x w
= 9cm x 9cm
= 81cm²



Square
Area = L x w
= 2cm x 2cm
= 4cm²



Rec
A_{Re} = L x w
= 8cm x 4cm
= 32cm²

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

(a) 18 cm²

L x w
1 x 18
2 x 9
3 x 6
side x side
All Rectangles

(b) 25 cm²

Squar
1 x 25
5 x 5
side x side
same
so a Square

(c) 100 cm²

Squar
1 x 100
2 x 50
4 x 25
5 x 20
10 x 10

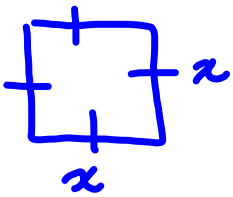
(d) 60 cm²

Rect
1 x 60
2 x 30
3 x 20
4 x 15
6 x 10

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 cm² forms a square because 25 = 5 x 5

Square



Area of square = $b \times h$

$= x \cdot x$

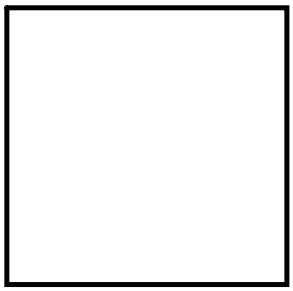
$= x^2$

Squares and Perfect Squares

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

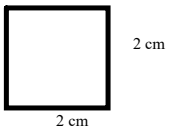
A= L x W
=8x5
= 40cm^2

Not a square,
sides are not equal



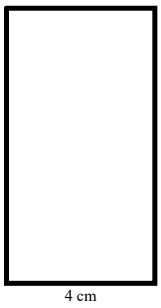
A= Lx W
=9x9
=81om^2

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

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

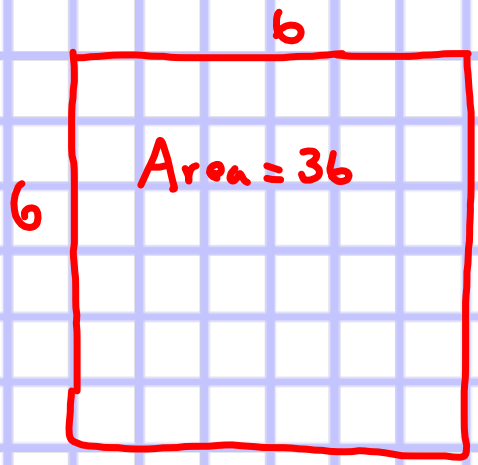
or Perfect Square

use graph paper

Example 4:

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

6 x 6



Solution:

Draw a square with area 36 square units

Side length = 6 units

Then, 36 = 6 x 6 = 6^2

Words: Thirty-six is 36 squared

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.

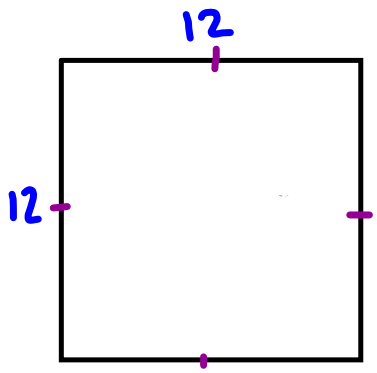
Side length	L x W		Perfect Square (Area)
1	1 x 1	=	1
2	2 x 2	=	4
3	3 x 3	=	9
4	4 x 4	=	16
5	5 x 5	=	25
6	6 x 6	=	36
7	7 x 7	=	49
8	8 x 8	=	64
9	9 x 9	=	81
10	10 x 10	=	100
11	11 x 11	=	121
12	12 x 12	=	144
13	13 x 13	=	169
	14 x 14	=	196
	15 x 15	=	225

Perfect Squares

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

Ex. 5) A square has area of 144 cm^2. Find the perimeter of the square.

(Always include a diagram...doesn't have to be on graph paper if it doesn't ask for graph paper....so sketch)



$144 = 12 \times 12$

side side

Perimeter = side + side + side + side

$= 12cm + 12cm + 12cm + 12cm$

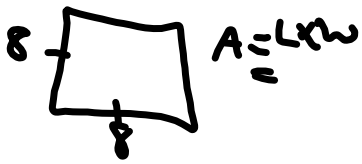
$= 48cm$

Class/Homework

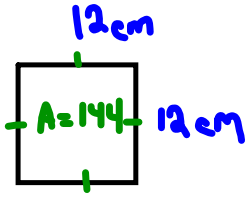
Page 8

(# 4, #5) ~~#6(don't use tiles sketch rectangles),~~
#9(Use graph paper),(if you don't have graph paper write out factors)
#10(c, d JUST sketch),
#11,
#12a

5) Side = 8



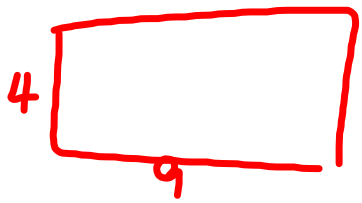
10b)



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

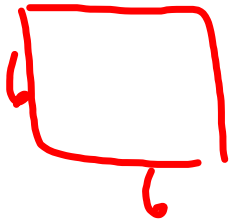
6) 36 square units

4x9



2x18

6x6



Attachments

WS 2.3 Powers (Sept. 6 Homework).pdf

WS 2.3 Powers Soultions pdf.pdf