# Warm Up

Grade 8

Friday

Nov. 2, 2014

1) Find the missing number (Show your work)

$14^{\square} = 38\,416$

$14^1 = 14$
$14^2 = 196$
$14^3 = 2744$
$14^4 = 38\,416$

2) Find the missing number

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

$1^6$
$2^6$
$3^6$
$4^6$
$5^6$

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

a) $5^7$ $\geq$ $4^8$

$5^7$ ↓ 78128

$4^8$ ↓ calculator 65 536

b) $3^3$ $>$ $5^2$

$3^3$ ↓ 27

$5^2$ ↓ 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) $6 \times 6$ $6^2 = 36$ 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) $7^{\square} = 16\,807$ 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) $\_\_^3 = 64$ b) $\_\_^2 = 49$ c) $\_\_^5 = 1$ d) $\_\_^3 = 729$

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

What do we notice?

$3^1 = 3$

$10^1 = 10$

$12^1 = 12$

$17^1 = 17$

$27^1 = 27$

$99^1 = 99$

$10^0 = 1$

$2^0 = 1$

$81^0 = 1$

$21^0 = 1$

$13^0 = 1$

$5^0 = 1$

# 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: $26^0 = 1$ $147^0 = 1$ $945^0 = 1$**

Study

$5^0 = 1$ ÷5 work back (÷5)

$5^1 = 5$ ×5

$5^2 = 25$ ×5

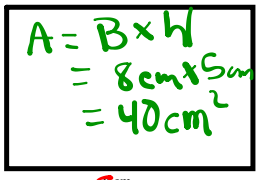
$5^3 = 125$

$5^4 =$

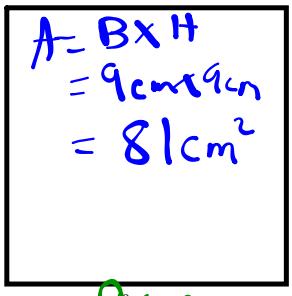
Squares and Perfect Squares

Ex. 1)

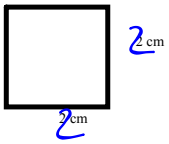
What is the area of each below?
Are they squares? Why or why not?




Not a 5cm square (sides are not equal)

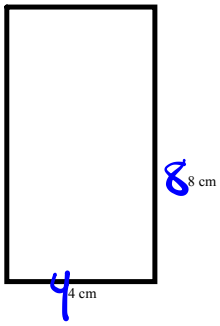



Yes this is a square. 9cm sides are all equal




A = 2 x 2
= 4cm²

Yes

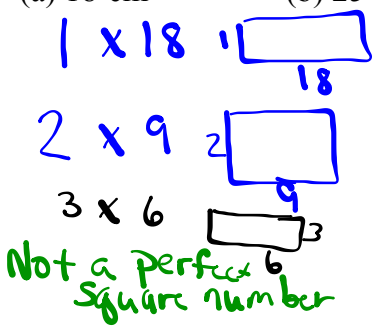



A = L x W
= 8cm x 4cm
= 32cm²

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

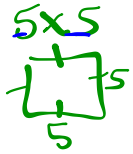
Yes perfect square

(a) 18 cm² (b) 25 cm² (c) 100 cm² (d) 60 cm²




Not a perfect square number

1 x 25 rect




1 x 100 R
2 x 50 R
4 x 25 R
5 x 20 R
10 x 10 (S)

Yes

B x H
1 x 60
2 x 30
3 x 20
4 x 15
5 x 12
6 x 10

How do you know if a given area will make a square? Base = height or they share a common factor (Repeat factor)

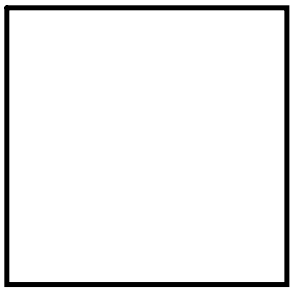
You will form a square if 2 of the factors are the same, for example an area of 25 cm² forms a square because 25 = 5 x 5

Squares and Perfect Squares

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

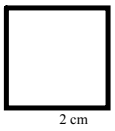

A= L x W
=8x5
= 40cm²

Not a square,
sides are not equal



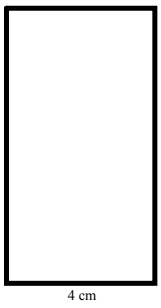

A= Lx W
=9x9
=81om²

Square, all sides are equal




A= L x W
= 2cm x 2cm
= 4 cm²

Square all sides equal




A = L x W
= 8cm x 4cm
= 32 cm²

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

Study

"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

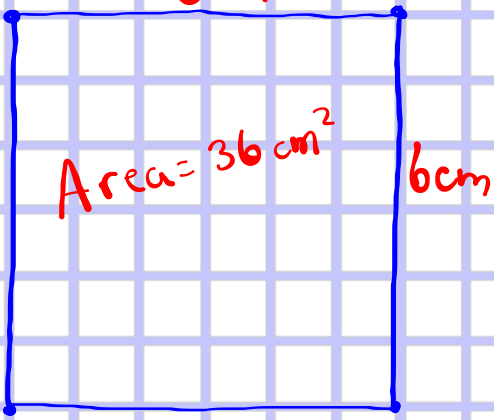
use graph paper

Example 4:

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

$6^2 = 36$

1 x 36
2 x 18
3 x 12
4 x 9
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 ~~perfect~~ squared

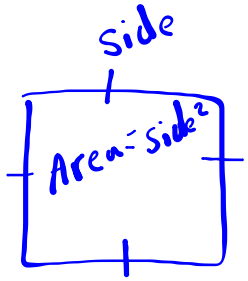
# NOTES:

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.

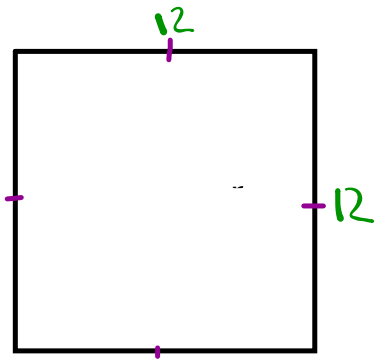
| Side length | L x W | | Perfect Square (Area) | |
|---|---|---|---|---|
| 1 | 1 x 1 | = | 1 | $1^2$ |
| 2 | 2 x 2 | = | 4 | $2^2$ |
| 3 | 3 x 3 | = | 9 | $3^2$ |
| 4 | 4 x 4 | = | 16 | $4^2$ |
| 5 | 5 x 5 | = | 25 | $5^2$ |
| 6 | 6 x 6 | = | 36 | . |
| | 7 x 7 | = | 49 | . |
| | 8 x 8 | = | 64 | . |
| | 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 | 15 x 15 | = | 225 * | $15^2$ |

Perfect Squares



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)




Side = 12

Area = $12^2$
= 144

Perimeter = side + side + side + side
= 12 cm + 12 cm + 12 cm + 12 cm
= 48 cm

## Attachments

WS 2.3 Powers (Sept. 6 Homework).pdf

WS 2.3 Powers Soultions pdf.pdf