

FUN WITH SQUARES

SQUARE -- multiplying a number by itself

this can be written as $3^2 = 3 \times 3 = 9$

SQUARE ROOTS -- can be described as follows:

- what number multiplied by itself equals 9
- what number squared equals 9
- what number equals the square root of 9

the square root of 9 is written as $\sqrt{9}$

or $\sqrt{9} = 3$

Fun way to square numbers ending in 5

(helps with Long Multiplication)

*** an easy one**

$$\begin{array}{r} 5 \\ * 5 \\ \hline 25 \end{array} \quad 5^2 = 25$$

$$\begin{array}{r} 3 * 25 \\ = 6 * 25 \\ \hline 625 \end{array}$$

we know that $5^2 = 25$

* multiply the numbers to the left of the 5 (in this case, 2) by the next consecutive whole number (in this case 3).

* put that product (in this case 6) to the left of the 25 and you have your answer.

difference of two squares

$$(x^2 - y^2) = (x + y)(x - y)$$

take the square of any number and subtract from it the square of any other number

this will equal the product of $x + y$ and $x - y$

FOR EXAMPLE:

LET $x = 3$ and let $y = 2$

$$(3 * 3) - (2 * 2) = (3 + 2)(3 - 2)$$

$$9 - 4 = 5 * 1 = 5$$

THIS IS MOST USEFUL WHEN YOU WANT TO FIND SQUARES IN YOUR HEAD

$$13^2 \quad 13^2 - 3^2 = (13 + 3)(13 - 3)$$

$$16 * 10$$

$$13^2 - 9 = 160$$

$$+ 9 = 160 + 9$$

$$13^2 = 169$$

add 9 to both
sides of the
equation to
solve for 13
squared

if you multiply any four consecutive numbers and add 1 it equals the square of the product of the first and last of the consecutive numbers plus 1

$$1 * 2 * 3 * 4 + 1 = (1 * 4 + 1)^2 = 5^2 = 25$$

try doing this with consecutive numbers 2, 3, 4, and 5

$$2 * 3 * 4 * 5 + 1 = (2 * 5 + 1)^2 = 11^2 = 121$$

CRAZY FACTS WITH SQUARES




divide any square by 8 and the remainder is 0, 1 or 4

not very useful, but it works



ANY NUMBER IS THE SUM OF 4 SQUARES OR LESS

$$14 = 3^2 + 2^2 + 1^2$$


$$1^2 = 1 ; 11^2 = 121 ; 111^2 = 12321$$

$$111,111,111^2 = 12,345,678,987,654,321$$



$$13^2 = 169 \quad 14^2 = 196 \quad 12^2 = 144$$
$$31^2 = 961 \quad 21^2 = 441$$



$$33^2 = 1089 ; 333^2 = 110889 ;$$
$$3,333^2 = 11108889 ; 33,333^2 = 1,110,888,889$$

Practice

Squares

(answers
on next
page)

$$1^2 =$$

$$2^2 =$$

$$3^2 =$$

$$4^2 =$$

$$5^2 =$$

$$6^2 =$$

.

$$7^2 =$$

$$8^2 =$$

$$9^2 =$$

$$10^2 =$$

$$11^2 =$$

$$12^2 =$$

$$13^2 =$$

$$14^2 =$$

$$15^2 =$$

$$16^2 =$$

$$17^2 =$$

$$18^2 =$$

$$19^2 =$$

$$20^2 =$$

Practice

Squares

$$1^2 = 1$$

$$2^2 = 4$$

$$3^2 = 9$$

$$4^2 = 16$$

$$5^2 = 25$$

$$6^2 = 36$$

.

$$7^2 = 49$$

$$8^2 = 64$$

$$9^2 = 81$$

$$10^2 = 100$$

$$11^2 = 121$$

$$12^2 = 144$$

$$13^2 = 169$$

$$14^2 = 196$$

$$15^2 = 225$$

$$16^2 = 256$$

$$17^2 = 289$$

$$18^2 = 324$$

$$19^2 = 361$$

$$20^2 = 400$$

Practice Square Roots (answers next page)

$$\sqrt{1} =$$

$$\sqrt{4} =$$

$$\sqrt{9} =$$

$$\sqrt{16} =$$

$$\sqrt{25} =$$

$$\sqrt{36} =$$

$$\sqrt{49} =$$

$$\sqrt{64} =$$

$$\sqrt{81} =$$

$$\sqrt{100} =$$

$$\sqrt{121} =$$

$$\sqrt{144} =$$

$$\sqrt{169} =$$

$$\sqrt{196} =$$

$$\sqrt{225} =$$

$$\sqrt{256} =$$

$$\sqrt{289} =$$

$$\sqrt{324} =$$

$$\sqrt{361} =$$

$$\sqrt{400} =$$

Practice Square Roots

$$\sqrt{1} = 1$$

$$\sqrt{49} = 7$$

$$\sqrt{196} = 14$$

$$\sqrt{4} = 2$$

$$\sqrt{64} = 8$$

$$\sqrt{225} = 15$$

$$\sqrt{9} = 3$$

$$\sqrt{81} = 9$$

$$\sqrt{256} = 16$$

$$\sqrt{16} = 4$$

$$\sqrt{100} = 10$$

$$\sqrt{289} = 17$$

$$\sqrt{25} = 5$$

$$\sqrt{121} = 11$$

$$\sqrt{324} = 18$$

$$\sqrt{36} = 6$$

$$\sqrt{144} = 12$$

$$\sqrt{361} = 19$$

$$\sqrt{169} = 13$$

$$\sqrt{400} = 20$$