

1.3 Perfect Squares and Cubes

All positive numbers have two square roots: one positive and one negative. The positive is called the principle square root and is denoted by the symbol $\sqrt{\quad}$.

~~**You cannot take the square root of a negative number.~~

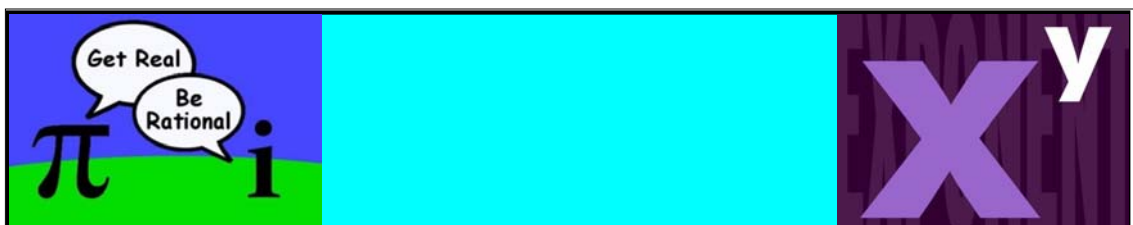
$$(-)(-) = + \quad (+)(+) = +$$

The square roots of a perfect square are rational numbers.

ex. the square roots of 16 are 4 and -4 but $\sqrt{16} = 4$

The square roots of non-perfect squares are irrational numbers.

ex. the square roots of 17 are $\sqrt{17}$ and $-\sqrt{17}$.



Cube Roots

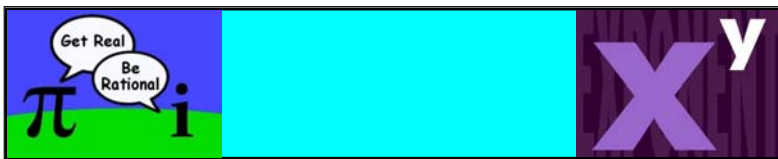
All numbers (+ or -) have one cube root, denoted by the symbol $\sqrt[3]{\quad}$.

The cube root of a perfect cube is a rational number.

ex. The cube root of 1000 is 10 ex. $\sqrt[3]{1000} = 10$

The cube root of -27 is -3. ex. $\sqrt[3]{-27} = -3$


The cube root of a non-perfect cube is irrational.




You will be using the Perfect Square/Perfect Cube chart in the classroom, but on the final exam you will need to make your own. Try to do the following in your head:

* think repeated multiplication

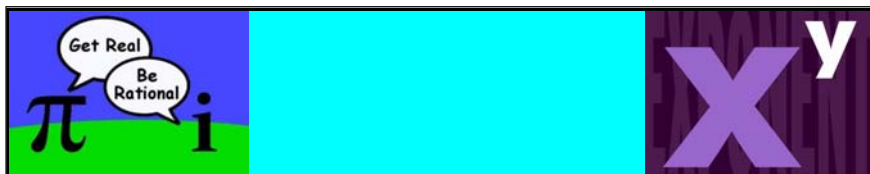
<u>Perfect Squares</u>	<u>Perfect Cubes</u>
$1^2 = 1$	$1^3 = 1$
$2^2 = 4$	$2^3 = 8$
$3^2 = 9$	$3^3 = 27$
$4^2 = 16$	$4^3 = 64$
$5^2 = 25$	$5^3 = 125$
$6^2 = 36$	$6^3 = 216$
$7^2 = 49$	$7^3 = 343$
$8^2 = 64$	$8^3 = 512$
$9^2 = 81$	$9^3 = 729$
$10^2 = 100$	$10^3 = 1000$
$11^2 = 121$	
$12^2 = 144$	
$13^2 = 169$	
$14^2 = 196$	
$15^2 = 225$	



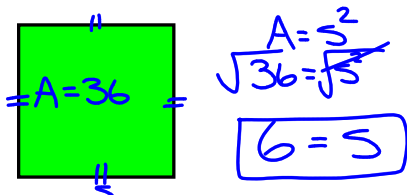
Sometimes you will need to use larger powers. The nice thing about exponents is the larger they get, the shorter your list needs to be. Try these:

 "to the power of"

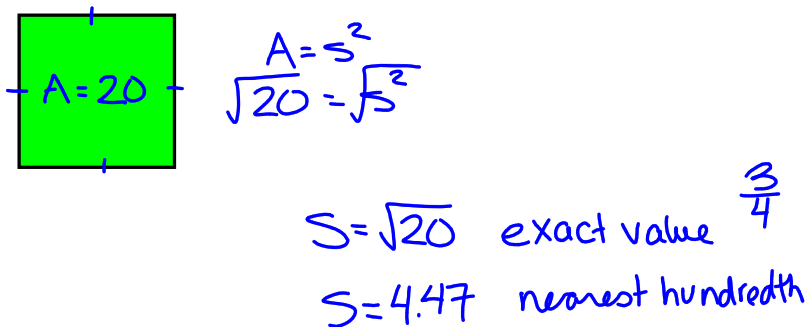
<u>Powers of Four</u>	<u>Powers of Five</u>
$1^4 = 1$	$1^5 = 1$
$2^4 = 16$	$2^5 = 32$
$3^4 = 81$	$3^5 = 243$
$4^4 = 256$	
$5^4 = 625$	



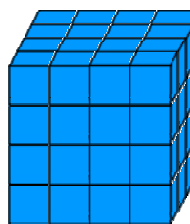
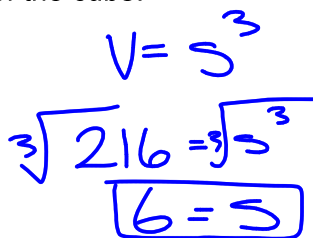
The area of a square is 36 units². What is the side length of the square?



Determine the side length of a square if the area is 20 units².



A cube is made up of 216 blocks. Determine the side length of the cube.



The volume of a cube is 100 units cubed. Determine the side length of the cube.

