

Estimating Square Roots



$\sqrt{17} \approx 4$

Perfect Square: a number whose principle square root is a whole number

The following is a list of perfect squares that should be memorized.

<i>Number Squared</i>	=	<i>Perfect Square</i>
	=	0
	=	1
	=	4
	=	9
	=	16
	=	25
	=	36
	=	49
	=	64
	=	81
	=	100
	=	121
	=	144
	=	169
	=	196
	=	225

If you are finding the square root of a whole number that is **not a perfect square**, you will have to **estimate to the nearest whole number**.

1)

Square Root	=	Exact Answer	Answer to the nearest whole number
$\sqrt{4}$	=	2	
$\sqrt{5}$	=	2.230678798...	
$\sqrt{6}$	=	2.449489743...	
$\sqrt{7}$	=	2.645751311...	
$\sqrt{8}$	=	2.828427125...	
$\sqrt{9}$	=	3	

To find the square root of a non-perfect square to the nearest whole number, use the square root of the nearest perfect square.

2)

Square Root	Closest perfect squares above and below	Closest perfect square	Final Answer
$\sqrt{5}$			$\sqrt{5} \approx$
$\sqrt{7}$			$\sqrt{7} \approx$
$\sqrt{10}$			$\sqrt{10} \approx$
$\sqrt{17}$			$\sqrt{17} \approx$
$\sqrt{35}$			$\sqrt{35} \approx$
$\sqrt{79}$			$\sqrt{79} \approx$

3) Estimate the following square roots to the nearest whole number without using a calculator.

$$\sqrt{15}$$

$$\sqrt{23}$$

$$\sqrt{105}$$

$$\sqrt{13}$$

$$\sqrt{50}$$

$$\sqrt{23.5}$$

$$\sqrt{38.4}$$

$$\sqrt{170}$$

$$\sqrt{130}$$

$$\sqrt{3}$$

$$\sqrt{32}$$

$$\sqrt{8.7}$$

4) Estimate the following solutions to the nearest integer.

$$d^2 = 55$$

$$e^2 = 32$$

$$67 = f^2$$

$$g^2 = 3.2$$

$$m^2 = -25$$

$$100 = p^2$$

5) Order the following numbers from least to greatest:

$$\sqrt{91}, 7, 5, \sqrt{38}$$

Perfect Cube: a number whose cube root is a whole number

The following is a list of perfect cubes that should be memorized.

<i>Number Cubed</i>	=	<i>Perfect Square</i>
	=	0
	=	1
	=	8
	=	27
	=	64
	=	125
	=	216
	=	343
	=	512
	=	729
	=	1,000

To find the cube root of a non-perfect cube to the nearest whole number, use the cube root of the nearest perfect cube.

6) Estimate the following square roots to the nearest integer without using a calculator.

$$\sqrt[3]{51}$$

$$\sqrt[3]{14}$$

$$\sqrt[3]{-200}$$

$$\sqrt[3]{145}$$

$$\sqrt[3]{95}$$

$$\sqrt[3]{-29}$$

7) Estimate the following roots to the nearest integer without using a calculator.

$\sqrt{5}$

$\sqrt{18}$

$\sqrt{10}$

$\sqrt{34}$

$\sqrt{55}$

$\sqrt{80}$

$\sqrt[3]{510}$

$\sqrt[3]{-999}$

$\sqrt[3]{119}$

$\sqrt{77}$

$\sqrt{171}$

$\sqrt{230}$

$\sqrt{147}$

$\sqrt{194}$

$\sqrt{290\frac{3}{7}}$

$\sqrt{440}$

$\sqrt{578}$

$\sqrt{730}$

$\sqrt[3]{780}$

$\sqrt[3]{1,370}$

$\sqrt[3]{947}$

$\sqrt{17.8}$

$\sqrt{11.5}$

$\sqrt{37.7}$