Perfect Squares and Non-Perfect Squares

A perfect square has a square root equal to a whole number, such as, $\sqrt{25} = 5$. The number 26 is not a perfect square because $\sqrt{26} \approx 2.24$. The following table shows perfect squares and square roots.

Squares of Whole Numbers	Results of Squares. Known as Perfect Squares	Square Roots of Perfect Squares	Results of Square Roots
0^2	0	$\sqrt{0}$	0
1^2	1	$\sqrt{1}$	1
2^2	4	$\sqrt{4}$	2
3^2	9	$\sqrt{9}$	3
4^2	16	$\sqrt{16}$	4
5^2	25	$\sqrt{25}$	5
6^2	36	$\sqrt{36}$	6
7^2	49	$\sqrt{49}$	7
8^2	64	$\sqrt{64}$	8
9^2	81	$\sqrt{81}$	9
10^2	100	$\sqrt{100}$	10
11^2	121	$\sqrt{121}$	11
12^2	144	$\sqrt{144}$	12
13^2	169	$\sqrt{169}$	13
14^2	196	$\sqrt{196}$	14
15^2	225	$\sqrt{225}$	15

Steps to Simplify Square Root of a Non-Perfect Square

1. Write out problem.
2. Factor number under the $\sqrt{\ }$ to have two factors, the largest perfect square and one other factor. Make sure you find the **largest perfect square factor.** Example $\sqrt{32}$ is not a perfect square but can be written as $\sqrt{16 \cdot 2}$. Notice we did not pick 4 times 8 because 16 is the largest perfect square factor of 32.
3. Put a $\sqrt{\ }$ over 1st factor and a $\sqrt{\ }$ over 2nd factor.
4. Simplify first $\sqrt{\ }$ and put result in front of other $\sqrt{\ }$ that is not a perfect square.

Examples:

$$\sqrt{32} = \sqrt{16 \cdot 2}$$
$$= \sqrt{16}\sqrt{2}$$
$$= 4\sqrt{2}$$

$$\sqrt{94} = \sqrt{49 \cdot 2}$$
$$= \sqrt{49}\sqrt{2}$$
$$= 7\sqrt{2}$$

$$\sqrt{500} = \sqrt{100 \cdot 5}$$
$$= \sqrt{100}\sqrt{5}$$
$$= 10\sqrt{5}$$