Approximating Square Roots of Numbers you don't know.

1. Identify perfect squares above and below that number and take their square roots
2. The square root of that number is between the square root of those 2 perfect squares
3. Take the midpoint of those 2 perfect squares and square that number
4. If that number is not close enough, take the midpoint of that number and the larger perfect square.

Approximate the $\sqrt{7}$

$The\ \sqrt{7}$ is between the $\sqrt{4}$ and the $\sqrt{9}$

$\sqrt{4}$ = 2
$\sqrt{7}$ → ∴ is between 2 and 3, try 2.5
$\sqrt{9} = 3$

2.5 x 2.5 = 6.25, that less than 7, try about halfway between 2.5 and 3; 2.7

2.7 x 2.7 = 7.29 so the answer is approximately a little less than 2.7

Approximate the $\sqrt{3}$

The $\sqrt{3}$ is between the $\sqrt{1}$ and the $\sqrt{4}$

$\sqrt{1}$ = 1
$\sqrt{3}$ = → is between 1 and 2, try 1.5
$\sqrt{4}$ = 2

1.5 x 1.5 = 2.25, that's less than 3, try about halfway between 1.5 and 2, try 1.7

1.7 x 1.7 = 2.89, so the answer is approximately a little more that 1.7

Approximate the $\sqrt{52}$

The $\sqrt{52}$ is between the $\sqrt{49}$ and the $\sqrt{64}$

$\sqrt{49} = 7$
$\sqrt{52}$ = → is between 7 and 8, try 7.5
$\sqrt{64 = 8}$

7.5 x 7.5 = 56.25, that's greater than 52, try halfway between 7.5 and 7, try 7.2

7.2 x 7.2 = 51.89, so the answer is a little more than 7.2

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The $\sqrt{7}$ is between the $\sqrt{4}$ and the $\sqrt{9}$

$\sqrt{4} = 2$ and the $\sqrt{9} = 3$

$\sqrt{7} \rightarrow \therefore$ is between 2 and 3, try 2.5

2.5 x 2.5 = 6.25, that less than 7, try about halfway between 2.5 and 3; 2.7

2.7 x 2.7 = 7.29 so the answer is approximately a little less than 2.7

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The $\sqrt{3}$ is between the $\sqrt{1}$ and the $\sqrt{4}$

$\sqrt{1} = 1$

$\sqrt{3} = \rightarrow$ is between 1 and 2, try 1.5

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1.5 x 1.5 = 2.25, that's less than 3, try about halfway between 1.5 and 2, try 1.7

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7.2 x 7.2 = 51.89, so the answer is a little more than 7.2

Approximate the following

$\sqrt{20}$	$\sqrt{28}$	$\sqrt{60}$
$\sqrt{24}$	$\sqrt{90}$	$\sqrt{52}$
$\sqrt{45}$	$\sqrt{62}$	$\sqrt{115}$

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Example: Approximate $\sqrt{12}$

$3^2 = 9$ and $4^2 = 16$, so the $\sqrt{12}$ is between 3 and 4, try 3.5

$3.5^2 = 12.25$, that's a good approximation, a little too large – but acceptable

Try $3.4^2 = 11.56$, that's also good, a little to small – but acceptable

So a better answer (approximation) might be halfway between 3.4 and 3.5

So try 3.45^2 = that's 11.9, a better approximation.

Your teacher should tell you how many places they want these carries out

Approximate the following:

$\sqrt{10}$	$\sqrt{34}$	$\sqrt{60}$
$\sqrt{50}$	$\sqrt{15}$	$\sqrt{95}$
$\sqrt{102}$	$\sqrt{45}$	$\sqrt{11}$
$\sqrt{18}$	$\sqrt{27}$	$\sqrt{39}$