Name:_____

Square Roots

Square roots are directly related to squares. You remember what squaring a number means!

Ex.) $4^2 = 4 \times 4 = 16$
$7^2 = 7 \times 7 = 49$

You try.

1.) 3^2 = _____ = ____ 2.) 6^2 = _____ = _____ 3.) 9^2 = _____ = _____

Check your answers with your teacher when you are finished.

Finding the square root of a number is just going in the opposite direction.

Ex.) $\sqrt{16} = 4$
$\sqrt{49} = 7$

***Notice the square root symbol√
It's kind of like a division sign, but with a little tail in the front.

Let's look at this in a little more detail.

4 is the square root of 16 because $4 \times 4 = 16$. 4 is at the ROOT of the SQUARED number 16.

(16 comes from 4×4)

So, when you want to find the square root of a number, you are looking for a number that when multiplied by itself gives you the number under the square root.

Ex.) $\sqrt{25} = 5$ because $5 \times 5 = 25$
$\sqrt{100} = 10$ because $10 \times 10 = 100$

Your turn! Check your answers with you teacher when you are finished.

1.)$\sqrt{9}$ 2.)$\sqrt{81}$ 3.)$\sqrt{64}$ 4.)$\sqrt{121}$

Sometimes, square roots turn out nice and neat, like the examples you've seen so far. These are called perfect squares. Here is a list of them: (continued on the next page)

Perfect Square	Factors
1	1 * 1
4	2 * 2
9	3 * 3
16	4 * 4
25	5 * 5

36	6 * 6
49	7 * 7
64	8 * 8
81	9 * 9
100	10 * 10
121	11 * 11
144	12 * 12
169	13 * 13
196	14 * 14
225	15 * 15
256	16 * 16
289	17 * 17
324	18 * 18
361	19 * 19
400	20 * 20

Sometimes, they don't turn out that way, so we have to do a little more work!

Approximating Square Roots (to the nearest tenth)

Let's find $\sqrt{11}$

1. Make a list of whole numbers that are perfect squares:	0, 1, 4, 9, 16,…
2. Find the ones that are close to 11:	9 and 16 $9 < 11 < 16$ (11 is between 9 and 16)
3. Find the square root of each number:	$\sqrt{9} < \sqrt{11} < \sqrt{16}$
4. Evaluate the square roots:	$3 < \sqrt{11} < 4$

Now, we know that the answer we are looking for lies between 3 and 4.

Since 11 is closer to 9 than it is to 16 (11-9=2 / 16-11=5), we know that our answer will be closer to 3 than 4. Because of this, we should check a number that is closer to 3 than 4.

So, $\sqrt{11}$ is between 3.3 and 3.4. Since 10.89 is closer to 11 than 11.56 (11-10.89=.11/11.56-11=.56), 3.3 is the best approximation for $\sqrt{11}$.

$$\sqrt{11} \approx 3.3$$

Your turn!
Approximate the square root to the nearest whole number, then to the nearest tenth.

1.) $\sqrt{10}$ 2.) $\sqrt{22}$ 3.) $\sqrt{45}$ 4.) $\sqrt{115}$

Check your answers with your teacher when you are finished.