Name:_____ Date:_____

Square Roots
Algebra (Grade 8)

When you multiply a number by itself, you square the number.

Symbol for squaring is the exponent 2.

$4^2 = 4 \cdot 4$

$= 16$

4 squared is 16.

Examples of **Perfect Squares**				
$1^2 = 1$	$4^2 = 16$	$7^2 = 49$	$10^2 = 100$	$13^2 = 169$
$2^2 = 4$	$5^2 = 25$	$8^2 = 64$	$11^2 = 121$	$14^2 = 196$
$3^2 = 9$	$6^2 = 36$	$9^2 = 81$	$12^2 = 144$	$15^2 = 225$

To "undo" this, take the *square root* of the number.

Symbol for square root is a *radical sign*, $\sqrt{\ }$.

$\sqrt{16} = \sqrt{4^2} = 4$ The square root of 16 is 4.

Examples of **Square Roots**				
$\sqrt{1} = 1$	$\sqrt{16} = 4$	$\sqrt{49} = 7$	$\sqrt{100} = 10$	$\sqrt{169} = 13$
$\sqrt{4} = 2$	$\sqrt{25} = 5$	$\sqrt{64} = 8$	$\sqrt{121} = 11$	$\sqrt{196} = 14$
$\sqrt{9} = 3$	$\sqrt{36} = 6$	$\sqrt{81} = 9$	$\sqrt{144} = 12$	$\sqrt{225} = 15$

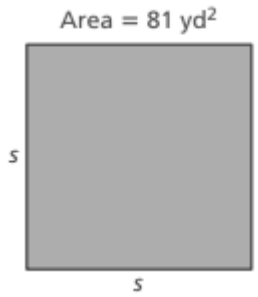
You should become familiar with recognizing **perfect squares** without a calculator. Sometimes you will need your calculator to compute square roots.

The symbol $\sqrt{\ }$ is called a **radical sign**. It is used to represent a square root. The number under the radical sign is called the **radicand**.

Exercise #1: Find the square root. **Do not use a calculator.**

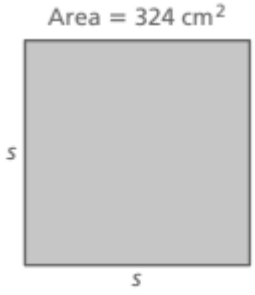
a. $\sqrt{81}$ b. $\sqrt{16}$ c. $\sqrt{400}$ d. $\sqrt{\frac{9}{49}}$ e. $\sqrt{\frac{1}{4}}$ f. $\sqrt{0}$

Exercise #2: For each of the following **squares** the **area** is given. Find **the length of a side** and the **perimeter**.



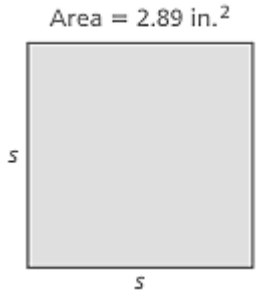
Side =

Perimeter =



Side =

Perimeter =

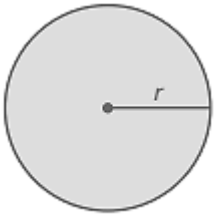


Side =

Perimeter =

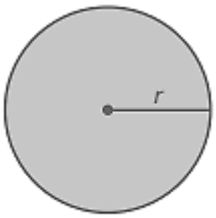
Exercise #3: The area of a circle is computed using the formula $A = \pi r^2$. *r* is the radius of the circle. Find the **radius** of each circle pictured.

a.



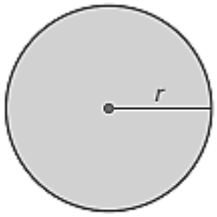
Area = 36π in.^{2}

b.



Area = $\frac{9}{16}\pi$ m^2

c.



Area = π yd^2

Exercise #4: Use the **square root button** on your calculator to find each square root to the ***nearest 10th.***

a. $\sqrt{8}$ b. $\sqrt{40}$ c. $\sqrt{51}$ d. $\sqrt{2}$ e. $\sqrt{\frac{1}{4}}$ f. $\sqrt{0}$

g. $\sqrt{500}$ h. $\sqrt{\pi}$ i. $\sqrt{10}$ j. $\sqrt{\frac{1}{3}}$ k. $\sqrt{\frac{2}{5}}$ l. $\sqrt{\frac{1}{2}}$

Square roots can be **negative** if a **negative is outside the radical.** A square root can also be **positive or negative**.

Positive Square Root, $\sqrt{\ }$	Negative Square Root, $-\sqrt{\ }$	Both Square Roots, $\pm\sqrt{\ }$
$\sqrt{16} = 4$	$-\sqrt{16} = -4$	$\pm\sqrt{16} = \pm 4$

A **square root** of a number is a number that, when multiplied by itself, equals the given number. Every positive number has a positive *and* a negative square root. A **perfect square** is a number with integers as its square roots.

Exercise #5: Compute 5^2 and $(-5)^2$. What does this tell us about $\sqrt{25}$? What does our calculator do for $\sqrt{25}$?

Exercise #6:

Find the two square roots of the number.

1. 36
2. 100
3. 121

Find the square root(s).

4. $-\sqrt{1}$
5. $\pm\sqrt{\frac{4}{25}}$
6. $\sqrt{12.25}$

Exercise #7: Practice by evaluating each expression.

$5\sqrt{36} + 7 =$

$\frac{1}{4} + \sqrt{\frac{18}{2}} =$

$(\sqrt{81})^2 - 5$

$12 - 3\sqrt{25}$

$\sqrt{\frac{28}{7}} + 2.4$