Objective: Square and Square Roots

**Definitions**
1. perfect square - ____________________________________________________________________________
   __________________________________________________________
2. square root - ______________________________________________________________________________
   __________________________________________________________
3. principal square root - _______________________________________________________________________
4. radicand - __________________________________________________________________________________

**VIC #1**
The opposite of square root is _________________. The opposite of square is _________________.

\[ \sqrt{36} = 6 \quad \rightarrow \quad 6^2 = 36 \]
\[ 10^2 = 100 \quad \rightarrow \quad \sqrt{100} = 10 \]

**VIC #2**
Every positive number has two square roots, one ________________ and one ________________.

\[ \sqrt{16} = 4 \text{ since } 4 \cdot 4 = 16 \]
\[ \sqrt{16} = -4 \text{ since } -4 \cdot -4 = 16 \]
\[ \sqrt{16} = \pm 4 \]

**Perfect Squares** (Why are they called perfect squares?)

1\(^2\) = __________   2\(^2\) = __________   3\(^2\) = __________

4\(^2\) = __________   5\(^2\) = __________   6\(^2\) = __________

7\(^2\) = __________   8\(^2\) = __________   9\(^2\) = __________

10\(^2\) = __________   11\(^2\) = __________   12\(^2\) = __________

13\(^2\) = __________   14\(^2\) = __________   15\(^2\) = __________

20\(^2\) = __________   25\(^2\) = __________

\( \left( \frac{1}{4} \right)^2 = \quad \left( \frac{2}{3} \right)^2 = \quad 0.6^2 = \)________
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VIC #3
What about negative numbers? What is the square root of \(-16\)?

Can you find the square root of a negative number? Why or why not?

VIC #4
You can find the square root of fractions and decimals.

Examples:

1. \(\sqrt{\frac{1}{4}} = \)  
2. \(\sqrt{\frac{36}{49}} = \)

3. \(\sqrt{0.16} = \)
4. \(\sqrt{1.44} = \)

VIC #5
Sometimes, square roots are not whole numbers. In those situations, you will need to decide what two integers each square root falls between and then estimate the value.

Examples:

1. \(\sqrt{22} = \) _______ What two integers does \(\sqrt{22}\) fall between?

   What is the approximate value of \(\sqrt{22}\)?

2. \(\sqrt{65} = \) _______ What two integers does \(\sqrt{65}\) fall between?

   What is the approximate value of \(\sqrt{65}\)?
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3. \( \sqrt{114} = \) _________ What two integers does \( \sqrt{114} \) fall between?

What is the approximate value of \( \sqrt{114} \)?

Practice:
Find the square root of each number. Round to the tenths place if necessary.

1. \( \sqrt{169} = \) _________
2. \( \sqrt{53} = \) _________

3. \( \sqrt{0.81} = \) _________
4. \( \sqrt{\frac{4}{49}} = \) _________

Tell what two integers each square root falls between.

5. \( \sqrt{84} = \) _____________
6. \( \sqrt{125} = \) _____________

Solve.
7. The area of a square classroom is 144 ft\(^2\). How long is one side of the classroom?

8. The area of a square garden is 81 ft\(^2\). What is the perimeter of the garden?

9. Aviators can calculate the distance to the horizon in miles by multiplying 1.23 times the square root of the altitude in feet. If a plane is at an altitude of 40,000 ft, what is the distance to the horizon?

10. The formula used to determine the speed of a car before the brakes are applied is \( s = \sqrt{20d} \), where \( s \) equals the speed of the car in miles per hour, and \( d \) equals the braking distance. The braking distance for a car was 40 feet. What was the approximate speed of the car before the brakes were applied?