

1.2

Squares and Square Roots

Quick Review

- When a number is multiplied by itself, the result is a square number.
For example, 9 is a square number because $3 \times 3 = 9$.
- A number is a square number if it has an *odd* number of factors.
For example, to check if 36 is a square number, first create a list of the factors of 36 in pairs as shown:

$$\begin{aligned}1 &\times 36 \\2 &\times 18 \\3 &\times 12 \\4 &\times 9 \\6 &\times 6\end{aligned}$$

Write these factors in ascending order, starting at 1:

$$1, 2, 3, 4, (6), 9, 12, 18, 36$$

There are nine factors of 36. This is an odd number, so 36 is a square number.

In the ordered list of factors, notice that 6 is the middle number, and that $6 \times 6 = 36$.
6 is called the **square root** of 36.

We write the square root of 36 as $\sqrt{36}$

- Squaring and taking the square root are inverse operations.

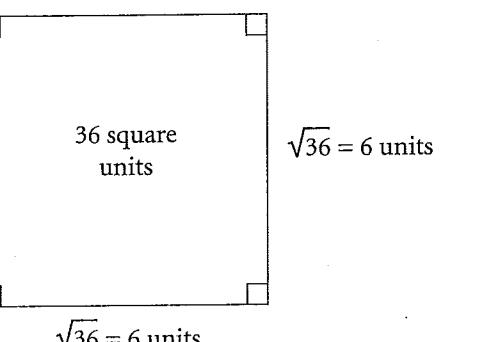
So, $\sqrt{36} = 6$ because $6^2 = 6 \times 6 = 36$.

This means $\sqrt{6^2} = 6$

- You can find a square root using a diagram of a square. The area is the square number.
- The side length of the square is the square root of the area.

HINT
To find the square root of a number; model with a square, or make a list of factors.

HINT
To find the square of a number; multiply the number by itself.



1.2 Squares and Square Roots

Name _____

PW to textbook: Schoolrocks

Factors: a factor is a # that divides exactly into another #

Ex: List the factors of 10: 1, 2, 5, 10

$$\begin{array}{l} \cancel{1} \times 10 \\ \cancel{2} \times 5 \\ \cancel{5} \end{array}$$

$$\begin{array}{l} 10 \div 1 = 10 \checkmark \\ 10 \div 2 = 5 \checkmark \\ 10 \div 3 = \cancel{0} \\ 10 \div 4 = \cancel{0} \end{array}$$

* Start at $1 \times \square$; when u get to a # that is already on your list - u can stop! Because u have all the factors.

Square Roots: the inverse(opposite) of squaring

$$\sqrt{\cancel{8} \times 8} = 8$$

$$\begin{array}{r} \sqrt{8 \cdot 8} = 8 \\ \sqrt{64} = 8 \end{array}$$

Ex: Is 49 a square #? (perfect square)

Ex: List the Factors: 1, 7, 49

$$\begin{array}{l} \cancel{1} \times 49 \\ \cancel{7} \times 7 \\ \cdot \end{array}$$

$$\begin{array}{l} \sqrt{49} = 7 \\ 49 \div 1 = 49 \\ \div 2 = \cancel{0} \\ \div 3 = \cancel{0} \end{array}$$

Square #'s have an odd (1, 3, 5, 7) # of factors

49 has ③ factors \therefore (therefore) it is a

□ # or perfect square \because (because) it has an odd # of factors

③

Ex 1 : Is 136 a perfect \square ?

1) List the factors: 1, 2, 4, 8, 17, 34, 68, 136

$$\begin{array}{l} 1 \times 136 \\ 2 \times 68 \\ 4 \times 34 \\ 8 \times 17 \end{array}$$

(8) Factors
 \therefore (therefore) NOT
a \square #

$$\begin{array}{r} 136 \div 1 \\ \quad \quad \quad \checkmark \\ \quad \quad \quad \checkmark \\ \quad \quad \quad \checkmark \end{array}$$

1.2 HW: 6, 7, 12, 13 Memorize 1st 20 perfect squares

Ex 2 : What is the $\sqrt{}$ (square root) of 225?

1) List the factors : 1, 3, 5, 9, 15, 25, 45, 75, 225

$$\begin{array}{l} 1 \times 225 \\ 3 \times 75 \\ 5 \times 45 \\ 9 \times 25 \\ \hline 15 \times 15 \end{array}$$

(9) Factors

* Two of the same factors multiplied together give you the $\sqrt{}$

$$\sqrt{225} = 15$$

$$\sqrt{15 \cdot 15} = 15$$

$$15^2 = 225$$

$$\sqrt{225} = 15$$

Ex 3 Find the $\sqrt{}$ of 3^2

$$3^2 = 3 \cdot 3$$
$$\begin{array}{r} \sqrt{3^2} = \sqrt{3 \cdot 3} \\ \quad \quad \quad = \sqrt{9} \end{array} = 3$$

SAME

[ascending: going up]

[descending: going down]