1.2 Squares and Square Roots

Quick Review

At Home At School

- 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:
  1×36
  2×18
  3×12
  4×9
  6×6

  Write these factors in ascending order, starting at 1:

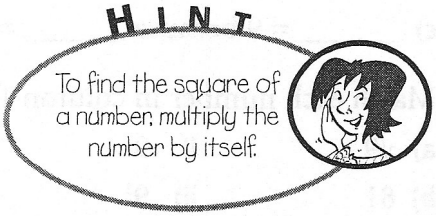
  1, 2, 3, 4, (6), 9, 12, 18, 36

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

Tip
A number with an even number of factors is not a square number.

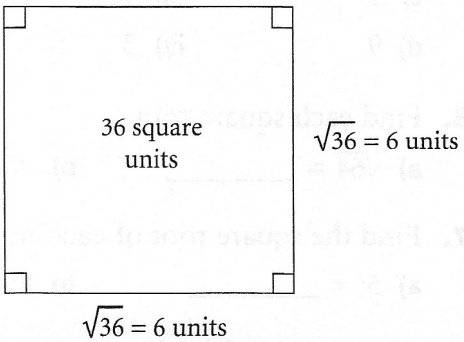
In the ordered list of factors, notice that 6 is the middle number, and that $6 \times 6 = 36$.
6 is called the **square root** of 36.
We write the square root of 36 as $\sqrt{36}$

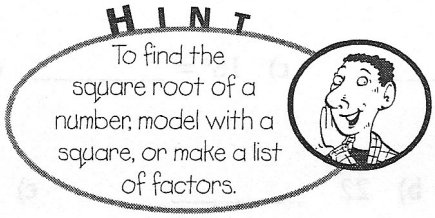
- Squaring and taking the square root are inverse operations.
  So, $\sqrt{36} = 6$ because $6^2 = 6 \times 6 = 36$.
  This means $\sqrt{6^2} = 6$



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

- The side length of the square is the square root of the area.





Practice

1. List the factors of each number in ascending order. Which numbers are square numbers? For each of the square numbers, find the square root.

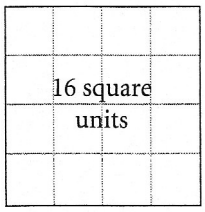
a) 196: _____ _____

b) 200: _____ _____

c) 441: _____ _____

2. For each square, state the square number and the square root.

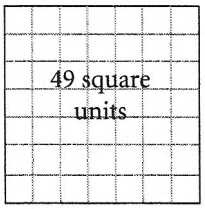
a)



square number _____

square root _____

b)



square number _____

square root _____

3. Complete the sentence for each square root. The first one has been done for you.

a) $\sqrt{25} = 5$ because $5^2 = 25$

b) $\sqrt{49}$ = _____ because _____ = _____

c) $\sqrt{100}$ = _____ because _____ = _____

d) $\sqrt{144}$ = _____ because _____ = _____

4. Complete each sentence. The first one has been done for you.

a) $\sqrt{16} = 4$ because $4^2 = 16$

b) _____ = 8 because 8^2 = _____

c) _____ = 9 because _____ = _____

d) _____ = 11 because _____ = _____

5. Match each number in column 1 to the number that is equal to it in column 2.

Column 1	Column 2
a) $\sqrt{9}$	**i)** 9
b) 81	**ii)** 9^2
c) 3^2	**iii)** $\sqrt{81}$
d) 9	**iv)** 3

6. Find each square root.

a) $\sqrt{64}$ = _____ **b)** $\sqrt{400}$ = _____ **c)** $\sqrt{225}$ = _____ **d)** $\sqrt{324}$ = _____

7. Find the square root of each number:

a) 5^2 = _____ **b)** 8^2 = _____ **c)** 16^2 = _____ **d)** 54^2 = _____

8. Find the number whose square root is

a) 17 _____ = _____ **b)** 22 _____ **c)** 30 _____