

Square Roots of Rational Numbers

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9:36 AM

Mathematics 9 Rational Numbers Square Roots of Rational Numbers

- A. Which one doesn't belong and why?

9	16
25	43

Non-perfect square.

All the numbers are perfect squares except 43.

$$9 = 3 \times 3$$

$$16 = 4 \times 4$$

$$25 = 5 \times 5$$

- B. Definitions

Square Root: any non-negative number that can be expressed in the form \sqrt{x} .

Perfect Square: any number that can be expressed as the product of two equal whole number factors. $1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144\dots$

Non-Perfect Square: any number that cannot be expressed as the product of two equal whole number factors.

- C. Solving Square Root Problems

1. Find the square root of the following numbers.

$$\begin{aligned} a) \quad & \sqrt{16} \\ & \sqrt{4 \times 4} \\ & = \boxed{4} \end{aligned}$$

$$\begin{aligned} b) \quad & \sqrt{49} \\ & \sqrt{7 \times 7} \\ & = \boxed{7} \end{aligned}$$

$$\begin{aligned} c) \quad & \sqrt{144} \\ & \sqrt{12 \times 12} \\ & = \boxed{12} \end{aligned}$$

2. Use a decimal to estimate the value of the following.

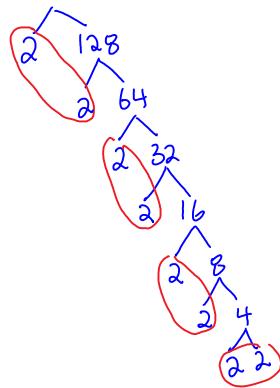
$$\begin{aligned} a) \quad & \sqrt{26} \\ & 25 - 36 \\ & \boxed{5.1} \end{aligned}$$

$$\begin{aligned} b) \quad & \sqrt{105} \\ & 100 - 121 \\ & \boxed{10.2} \end{aligned}$$

$$\begin{aligned} c) \quad & \sqrt{42} \\ & 36 - 49 \\ & \boxed{6.5} \end{aligned}$$

3. Use Prime Factorization to determine the square roots of the following numbers.

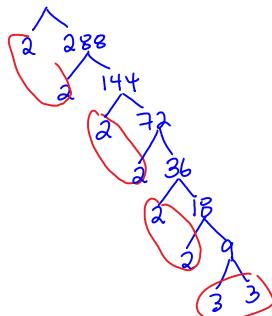
a) $\sqrt{256}$



$$= 2 \times 2 \times 2 \times 2$$

$$= \boxed{16}$$

b) $\sqrt{576}$



$$= 2 \times 2 \times 2 \times 3$$

$$= \boxed{24}$$

4. Determine if the following numbers are perfect squares. If it is a perfect square, write the product as an expression of two equal factors.

a) 84

Not a perfect square

b) $\frac{25}{49}$

$$= \boxed{\frac{5}{7} \times \frac{5}{7}}$$

c) 0.4

$$\frac{4}{10}$$

Not a perfect square

5. Solve the following square roots.

a) $\sqrt{-6 + 2 \times 35}$

$$\sqrt{-6 + 70}$$

$$\sqrt{64}$$

$$= \boxed{8}$$

b) $\sqrt{\frac{5}{9} - \frac{1}{9}}$

$$\sqrt{\frac{4}{9}}$$

$$= \boxed{\frac{2}{3}}$$

6. A square has an area of $2\frac{1}{4} \text{ cm}^2$. Calculate the length of each side.

$$2\frac{1}{4} \rightarrow \frac{9}{4}$$

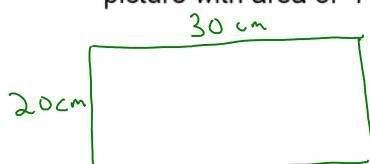
$$A = s^2$$

$$\frac{9}{4} = s^2$$

$$s = \sqrt{\frac{9}{4}}$$

$$s = \frac{3}{2} \text{ cm}$$

7. A rectangular frame has dimensions 20 cm by 30 cm . Can you mount a square picture with area of 784 cm^2 inside the frame? Explain?



$$A = s^2$$

$$784 = s^2$$

$$s = \sqrt{784}$$

$$\begin{array}{r} \sqrt{784} \\ 2 \overline{)784} \\ 2 \quad 392 \\ 2 \overline{)392} \\ 2 \quad 196 \\ 2 \overline{)196} \\ 2 \quad 98 \\ 2 \overline{)98} \\ 2 \quad 49 \\ 2 \overline{)49} \\ 2 \quad 7 \\ 2 \overline{)7} \\ 2 \quad 7 \\ 2 \overline{)7} \\ 0 \end{array}$$

$$= 2 \times 2 \times 7$$

$$= \underline{\underline{28 \text{ cm}}}$$

The square picture will not fit the rectangular frame,

8. One can of paint can cover 4 m^2 . How many cans of paint would you need to paint a square ceiling with sides 5 m ?

$$A = s^2$$

$$A = (5)^2$$

$$A = \underline{\underline{25 \text{ m}^2}}$$

$$\frac{25}{4} = 6\frac{1}{4}$$

$$\boxed{7 \text{ cans of paint}}$$

Assignment : Square Roots of Rational Numbers Assignment

Name: _____

Square Roots of Rational Numbers

1. Simplify the following rational numbers.

a) $\sqrt{49}$

b) $\sqrt{\frac{4}{25}}$

c) $\sqrt{\frac{16}{64}}$

d) $\sqrt{\frac{144}{81}}$

2. Solve the following square roots.

a) $\sqrt{12+13}$

b) $\sqrt{2 \times (35-3)}$

c) $\sqrt{\frac{2}{25} + \frac{7}{25}}$

d) $\sqrt{\frac{3}{8} \div \frac{8}{12}}$

3. Determine whether each rational number is a perfect square. If it is a perfect square, write the product as an expression of two equal rational factors.

a) 0.9 YES NO _____

b) 0.25 YES NO _____

b) 1.44 YES NO _____

d) 1.6 YES NO _____

e) $2\frac{7}{9}$ YES NO _____

f) $4\frac{1}{4}$ YES NO _____

4. Use a decimal to estimate the value of the following.

a) $\sqrt{26}$

b) $\sqrt{93}$

b) $\sqrt{63}$

d) $\sqrt{6.3}$

5. Use Prime Factorization to find the Square Root of the following numbers.

a) $\sqrt{324}$

b) $\sqrt{900}$

6. James wants to buy a rug for his living room. In a store he finds a square rug with an area of $9\ m^2$.

a) How many rugs are needed to cover a square area of $225\ m^2$?

b) If the room has a square area of 16 square metres and the rug is placed in the middle of the room, how much space is between each side of the rug and the wall?

7. The Smiths want to put a fence around their square garden, which has an area of $784\ m^2$.

a) How long is each side of the garden?

b) If one side of the garden borders the house and doesn't need fencing, how much fencing is needed to go around the rest of the garden?

Answers

- | | |
|---|---|
| 1. a) 7 | b) $\frac{2}{5}$ |
| c) $\frac{1}{2}$ | d) $\frac{4}{3}$ |
| 2. a) 5 | b) 8 |
| c) $\frac{3}{5}$ | d) $\frac{3}{4}$ |
| 3. a) NO | b) YES $\frac{1}{2} \times \frac{1}{2}$ |
| c) YES $\frac{6}{5} \times \frac{6}{5}$ | d) NO |
| e) YES $\frac{5}{3} \times \frac{5}{3}$ | f) NO |
| 4. a) 5.1 | b) 9.6 |
| c) 7.9 | d) 2.5 |
| 5. a) $2 \times 3 \times 3 = 18$ | b) $2 \times 3 \times 5 = 30$ |
| 6. a) 25 rugs | b) 1 m |
| 7. a) 28 m | b) 84 m |