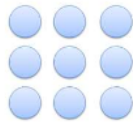


1.1 – Square Roots of Perfect Squares

A **perfect square** is a number that can be expressed as a product of two equal numbers. The whole number 9 is a perfect square since $9 = 3 \times 3$. Pictorially, we can arrange 9 objects in a square array:



Ex. 1: Write four whole number perfect squares between 1 and 100.

1, 4, 9, 16, 25, ...

Fractions can be perfect squares as well. Be sure to simplify the fraction before deciding whether it is or not.

Ex. 2: Is each fraction a perfect square?

(a) $\frac{16}{49}$ Yes

$$\sqrt{\frac{16}{49}} = \frac{4}{7}$$

(b) $\frac{25}{12}$ No
Not a perfect square

(c) $\frac{8}{18}$ simplify!

$$= \frac{4}{9}$$
$$\sqrt{\frac{4}{9}} = \frac{2}{3}$$

A decimal is a perfect square if you can write it as a fraction that is a perfect square.

Alternatively, you can use a calculator and find its square root – the square root will be a terminating or repeating decimal if the original decimal is a perfect square.

eg. 2.25 eg. 0.666666...

Ex. 3: Is each decimal a perfect square?

(a) 0.81

$$\sqrt{0.81} = 0.9 \rightarrow \text{terminating decimal}$$

So, 0.81 is a perfect square

(b) 0.025

$$\sqrt{0.025} = 0.158113883\dots$$

→ Not terminating
→ Not repeating
So, 0.025 is not a perfect square

(c) 2.25

$$\sqrt{2.25} = 1.5 \rightarrow \text{terminating decimal}$$

So, 2.25 is a perfect square

Recall that the **square root** of a number is the number which, when multiplied by itself, results in the given number. It also represents the side length of a square with the given area.

Ex. 4: Find the square root of each perfect square without using a calculator.

(a) $\sqrt{\frac{144}{49}}$

$$= \frac{12}{7}$$

(b) $\sqrt{0.36}$

$$= \sqrt{\frac{0.36 \times 100}{1 \times 100}}$$

$$= \sqrt{\frac{36}{100}}$$

$$= \frac{6}{10}$$

$$= 0.6$$

(c) $\sqrt{0.0049}$

$$= \sqrt{\frac{0.0049 \times 10000}{1 \times 10000}}$$

$$= \sqrt{\frac{49}{10000}}$$

$$= \frac{7}{100}$$

$$= 0.07$$

(d) $\sqrt{1.21}$

$$= \sqrt{\frac{1.21 \times 100}{1 \times 100}}$$

$$= \sqrt{\frac{121}{100}}$$

$$= \frac{11}{10}$$

$$= 1.1$$

Ex. 5: Find the number whose square root is:

(a) $\frac{3}{8}$

$$\frac{3}{8} \times \frac{3}{8}$$

check: $\sqrt{\frac{9}{64}}$

$$= \frac{3}{8} \checkmark$$

$$= \frac{9}{64}$$

(b) 1.5

$$1.5 \times 1.5$$

check: $\sqrt{2.25}$

$$= 1.5 \checkmark$$

$$= 2.25$$

Assignment: 1.1 Practice Worksheet