

Unit 1 – Square Roots and Surface Area**Section 1.1 – Square Roots and Perfect Squares****Review: Changing Decimals to Fractions**

To change a decimal to a fraction, we move the decimal to the right, and put the number over a power of 10.

For example, let's look at 0.6.

To get rid of the decimal we would move it one place to the right. Because we move the decimal one place to the right, we add one zero on the bottom.

Therefore, $0.6 = \frac{6}{10}$

Try the following:

a) 0.08 $\xrightarrow{\text{move 2 spaces}}$

$$0.08 = \frac{8}{100} = \frac{2}{25}$$

b) 0.25 (move 2 spaces)

$$\frac{25}{100} = \frac{1}{4}$$

c) 0.379 (move 3 spaces)

$$\frac{379}{1000}$$

Recall, a perfect square is the result of a whole number multiplied by itself. For example, 16 is a perfect square since $4 \times 4 = 16$.

To determine if a decimal is a perfect square, we can change it into a fraction, or remember this rule:

Rule: If the decimal has an even number of decimal places and consists of a perfect square, the decimal number is a perfect square.

For example,

- a) 0.49 has an even number of decimal places (two numbers after the decimal) [fc://@fc.nlesd.ca,%2318870007/Mailbox/004b262b-011feef7](http://fc.nlesd.ca,%2318870007/Mailbox/004b262b-011feef7) and 49 is a perfect square, therefore 0.49 is also a perfect square.
- b) 0.00016 is **NOT** a perfect square. Even though 16 is a perfect square it has an odd number of decimal places (three numbers after the decimal).

Some fractions can also be perfect squares. *In order for a fraction to be a perfect square, both the numerator and denominator have to be perfect squares.*

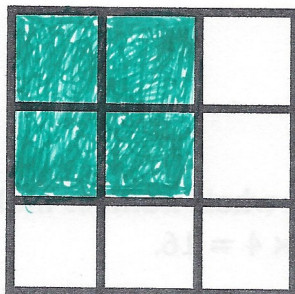
Let's consider the following situations.

- a) Is $\frac{4}{9}$ a perfect square?

yes! • 4 is a perfect square because $4 = 2 \times 2$
 • 9 is a perfect square because $9 = 3 \times 3$
 • Since both numerator and denominator are perfect squares, $\frac{4}{9}$ is a perfect square

We can also show this by drawing a diagram using squares.

4 out of 9



See how a perfect square is formed

Notice that: 16 is a perfect square and $\frac{4}{9}$ is a perfect square

b) Is $16\frac{4}{9}$ a perfect square?

$$16\frac{4}{9} = 16.\bar{4} = \frac{148}{9}$$

- 148 is not a perfect square
- 9 is a perfect square
- Since both numerator and denominator are not perfect squares, $16\frac{4}{9}$ is Not a perfect square

c) Is $\frac{8}{50}$ a perfect square?

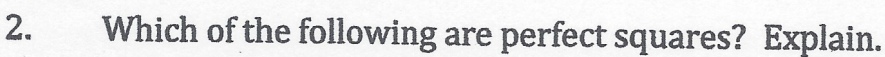
- $\frac{8}{50}$ is not a perfect square upon first inspection, but, first, we must simplify
- $\frac{8}{50} \div 2 = \frac{4}{25} \rightarrow 4 = 2 \times 2$ (Perfect square)
 $\rightarrow 25 = 5 \times 5$ (Perfect square)

Since $\frac{4}{25}$ is a perfect square, $\frac{8}{50}$ is a perfect square

You can also check to see if a number is a perfect square in your calculator. If the square root terminates (ends) it is a perfect square.

Decimal	Value of Square Root	Type of Decimal	Is it a perfect square?
1.69	1.3	Terminating	Yes!
3.5	1.87082869...	non-terminating	No
70.5	8.3964278118...	non-terminating	No
5.76	2.4	Terminating	Yes!
0.25	0.5	Terminating	Yes!
2.5	1.5811388300...	non-terminating	No

1. Use a diagram to determine the value of $\sqrt{\frac{9}{25}}$. $\sqrt{\frac{9}{25}} = \frac{\sqrt{9}}{\sqrt{25}} = \frac{3}{5}$



- 7 is not a p.s.
• $\frac{7}{36}$ can not be simplified

- $\frac{5}{16}$ can not be simplified
- 5 is not a perfect square

- 441 is not a P.S.

- $\frac{324}{441} = \text{non terminating decimal}$

$$\sqrt{\frac{12}{48}} = \sqrt{\frac{1}{4}} = \frac{1}{2}$$

$\frac{12}{48}$ Simplified is $\frac{1}{4}$

$$\sqrt{\frac{12}{48}} = \sqrt{\frac{1}{4}} = \frac{1}{2}$$
$$\frac{50}{200} = \frac{5}{20}$$

simplified
is
 $\frac{1}{4}$

4. Which of the following are perfect squares?

a) 1.96

$$1.96 = \frac{196}{100}$$

Since

$$196 = 14 \times 14 \text{ (Perfect Square)}$$

$$100 = 10 \times 10$$

1.96 = Perfect Square

b) 0.9

$$0.9 = \frac{9}{10}$$

9 is a P.S.

10 is not a P.S.

Then

0.9 is not a Perfect Square

c) 0.036

$$0.036 = \frac{36}{1000}$$

36 is a P.S.

1000 is not a P.S.

Then

0.036 is not a Perfect Square

5. Calculate the number whose square root is:

a) 0.6

$$\sqrt{?} = 0.6$$

then

$$? = 0.6 \times 0.6$$

or

$$? = (0.6)^2 = 0.36$$

$$\therefore \sqrt{0.36} = 0.6$$

0.36

b) 0.04

$$\sqrt{?} = 0.04$$

then

$$? = 0.04 \times 0.04$$

$$? = (0.04)^2 =$$

$$0.0016$$

$$\sqrt{0.0016} = 0.04$$

0.0016

c) 1.4

$$\sqrt{?} = 1.4$$

then

$$? = (1.4) \times (1.4)$$

$$? = (1.4)^2 =$$

$$1.96$$

$$\sqrt{1.96} = 1.4$$

1.96

d) $\frac{13}{5}$

$$\sqrt{?} = \frac{13}{5}$$

then

$$? = \frac{13 \times 13}{5 \times 5} = \frac{(13)^2}{(5)^2}$$

$$= \frac{169}{25}$$

$$\sqrt{\frac{169}{25}} = \frac{13}{5}$$

$\frac{169}{25}$