NOVEMBER 5, 2015

UNIT 3: SQUARE ROOTS AND SURFACE AREA

SECTION 1.1: SQUARE ROOTS OF PERFECT SQUARES

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MATH 9

WHAT'S THE POINT OF TODAY'S LESSON?

We will continue working on the Math 9 Specific Curriculum Outcome (SCOs) "Numbers 4" and "Numbers 5" OR "N4" and "N5" which state:

N4: "Explain and apply the order of operations, including exponents, with and without technology."

N5: "Determine the square root of positive rational numbers that are perfect squares."

What does THAT mean???

For this unit, SCO N4 means that we will learn how to find the square root (the number that was multiplied by itself) of numbers both with and without a calculator.

SCO N5 means that we will learn several ways to find the square root (the number that was multiplied by itself) of whole numbers, fractions and decimal numbers.

THE FIRST 20 PERFECT SQUARES:

1^2	=	1 x 1	=	1	11^2	=	11 x 11	=	121
2^2	=	2 x 2	=	4	12^2	=	12 x 12	=	144
3^2	=	3 x 3	=	9	13^2	=	13 x 13	=	169
4^2	=	4 x 4	=	16	14^2	=	14 x 14	=	196
5^2	=	5 x 5	=	25	15^2	=	15 x 15	=	225
6^2	=	6 x 6	=	36	16^2	=	16 x 16	=	256
7^2	=	7 x 7	=	49	17^2	=	17 x 17	=	289
8^2	=	8 x 8	=	64	18^2	=	18 x 18	=	324
9^2	=	9 x 9	=	81	19^2	=	19 x 19	=	361
10^2	=	10 x 10	=	100	20^2	=	20 x 20	=	400

Squaring and taking the square root are opposite, or *inverse*, operations.

That is, $\sqrt{\frac{225}{100}} = \frac{15}{10}$ and $\sqrt{\frac{169}{100}} = \frac{13}{10}$.

We can rewrite these equations using decimals.

$$\sqrt{2.25} = 1.5 \text{ and } \sqrt{1.69} = 1.3$$

***NOTE: 1.5 and 1.3 are TERMINATING decimal numbers.**

HOMEWORK QUESTIONS???
(page 11, #4 TO #7)

Examples:

Calculate the number whose square root is:

a) $\sqrt{3} = 9$

$3^2 = 9$

b) $\sqrt{8}$

$8^2 = 64$

c) $\sqrt{\frac{3}{8}}$

$\left(\frac{3}{8}\right)^2 = \frac{9}{64}$

d) $\sqrt{3.24} = 1.8$

$(1.8)^2 = \left(1\frac{8}{10}\right)^2 = \left(\frac{18}{10}\right)^2 = \frac{324}{100} = 3.24$

The square roots of some fractions are repeating decimal numbers. For example, determine the side length of a square with an area of $\frac{1}{9}$ square units.

$$\sqrt{\frac{1}{9}} = \frac{1}{3}$$

$$= 0.\overline{3}$$

$$(0.\overline{3})^2$$

$$= \left(\frac{3}{9}\right)^2$$

$$= \left(\frac{1}{3}\right)^2$$

$$= \frac{1}{9}$$

A fraction in simplest form is a *perfect square* if it can be written as a product of two equal fractions.

Example: $\sqrt{\frac{2}{8}}$

$= \sqrt{\frac{1}{4}}$

$= \frac{1}{2}$

$\sqrt{0.25}$

$= 0.5$

1
4
9
16
25
36
49
64
⋮

When a decimal number can be written as a fraction that is a perfect square, then the decimal number is also a perfect square. Its square root is a terminating or repeating decimal number.

Examples: $\sqrt{0.36}$ YES

$= 0.6$

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

$= \frac{6}{10}$

$= 0.6$

$\sqrt{0.\overline{4}}$ YES

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

$= \frac{2}{3}$

$= 0.\overline{6}$

Examples:

Is each fraction a perfect square? Explain.

a) $\sqrt{\frac{8}{18}}$ YES

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

$= \frac{2}{3}$

b) $\sqrt{\frac{16}{5}}$ NO *

c) $\sqrt{\frac{2}{9}}$ * NO

Examples:

Is each decimal number a perfect square? Explain.

a) $\sqrt{6.25}$ YES

$= 2.5$

$= \sqrt{\frac{625}{100}}$

$= \frac{25}{10}$

$= 2.5$

b) $\sqrt{0.627}$ NO

$= \sqrt{\frac{627}{1000}}$

$10 \times 10 = 100$

$100 \times 100 = 10000$

= non-term./non-rep. dec. #

How can you tell if a decimal number is a perfect square?

A decimal number is a perfect square if it can be rewritten as a fraction that is a perfect square or if its square root on the calculator is a terminating or repeating decimal number.

How can you tell if a fraction is a perfect square?

A fraction is a perfect square if the numerator and the denominator of the fraction are perfect squares or, if in its simplest form, the numerator and denominator are perfect squares. Also, a fraction is a perfect square if its square root on the calculator is a terminating or repeating decimal number

CONCEPT REINFORCEMENT:

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