UNIT 10: SQUARE ROOT FUNCTIONS AND GEOMETRY

Part A: Video Tutorial Section

Videos 1 and 2:

https://www.youtube.com/watch?v=VM3iMj0BwLE **(How to Find a Domain of a Square Root Function)**

https://www.youtube.com/watch?v=VM3iMj0BwLE **(More Examples of Finding a Domain of a Square Root Function)**

Videos 3 and 4:

https://www.youtube.com/watch?v=YGVnKmq3ap4 (**Graphing Square Root Functions)**

https://www.youtube.com/watch?v=p1eyLtfIVDw **(More Examples of Graphing Square Root Functions)**

Videos 5 and 6:

https://www.youtube.com/watch?v=2xoy1i0bVZo (**Simplifying a Radical Expression)**

https://www.youtube.com/watch?v=Llrngdh3Rrg (**Simplifying a Radical Expression with Variables)**

Videos 7:

https://www.youtube.com/watch?v=3036CuDqV-0 https://www.youtube.com/watch?v=ShWuSJSRCSI **(Simplifying a Radical Expression Using Graphic Calculator)**

Videos 8 and 9:

https://www.youtube.com/watch?v=rrgUwZnM1bM **(Solving Square Root Equations)**

https://www.youtube.com/watch?v=55G8037gsKY **(More Examples of Solving Square Root Equations)**

Video 10 and 11:

https://www.youtube.com/watch?v=Z0zTchGq-qI (**Solving Square Root Equations With Square Roots on Both Sides)**

https://www.youtube.com/watch?v=IGhn2o6MWxg **(More Examples of Solving Square Root Equations With Square Roots on Both Sides)**

Videos 12 and 13:

https://www.youtube.com/watch?v=AA6RfgP-AHU (**The Pythagorean Theorem)**

https://www.youtube.com/watch?v=nMhJLn5ives (**More Examples of The Pythagorean Theorem)**

Part B : Vocabulary, Hints and Explanations

Radicand
The number under the $\sqrt{\ }$ (radical) symbol. That is, a number which is having its square root taken (or cube root, 4th root, 5th root, nth root, etc.). For example, 3 is the radicand in $\sqrt{3}$.

A square root function is a function that contains a square root with the independent variable in the radicand (see definition). The most basic square root function is y = (insert square root sign) of x

Finding the Domain of a Square Root Function

Recall – domain is the x-value of the function (equation)

The radicand (number inside the square root sign) cannot be negative. The value must be equal to or greater than 0.

Example: Find the domain of y = 3 square root of x-5

x - 5 cannot be a negative number

$x - 5 \geq 0$

$x \geq 5$

The domain Is all real numbers greater than or equal to 5

Rationalizing the Denominator

In Unit 6 students learned to simplify radical expressions. Recall that a radical expression in simpliest form:

- No radicands have perfect square factors
- No radicands contain fractions
- No radicals appear in the denominator of a fraction

Rationalizing the Denominator – when the radicand in a denominator is not a perfect square, multiply the fraction by an appropriate form of 1 to eliminate the radical form in the denominator.

Example: the square root of 1/3 where both the numerator and the denominator are in the square root sign

Multiply by the square root of 3 over the square root of 3

The fraction then becomes the square root of 3 over the square root of 9

Simplify to the square root of 3 over 3

Square Root Equation

In a square root equation, the variable is in the radicand (number inside the square root sign).

A student will solve much in the same fashion as he solved for x in a multi-step equation in Unit 1.

The student will isolate the square root, the square both sides of the equation.

Example: square root of x + 5 = 13

square root of x = 8 subtract 5 from both sides to isolate the x

(square root of x)^2 = 8^2

x = 64

Solving an equation with square roots on both side - Square both sides!

Extraneous Solution – a solution that will not work in the original equation

Example: x = (square root of x + 6)

$x^2 = x + 6$

$x^2 - x - 6 = 0$

$(x - 3)(x + 2) = 0$

x = 3 or x = -2

-2 will not work in the original equation and is considered an extraneous solution.

Pythagorean Theorem

Most of us are familiar with: $a^2 + b^2 = c^2$

But which side of a right triangle is a or b or c!!

The legs of a right triangle are the two sides that form the right angle. They are a and b in the equation!

The hypotenuse is the side opposite the right angle. That is the c in the equation.

Hint: Form a right angle with your arms and say $a^2 + b^2$ to help the student visualize the sides of the right triangle. You may also want the student to do this movement to reinforce the concept.

Students can use the Pythagorean Theorem to find the length of one of the legs, the length of the hypotenuse, or to determine if a triangle is a right triangle.

Find the length of a leg:

Example: Given a side of a right triangle is 3.5, the hypotenuse is 6.5

$3.5^2 + b^2 = 6.5^2$

$12.25 + b^2 = 42.24$

$b^2 = 30$

b= the square root of 30 (approximately 5.5)

Find the length of the hypotenuse:

Example: Given the two legs are 15 and 8

$15^2 + 18^2 = c^2$

$225 + 64 = c^2$

$289 = c^2$

$17 = c$

Converse of the Pythagorean Theorem

A student can prove that a triangle is a right triangle IF $a^2 + b^2 = c^2$

Example: Given the legs of a triangle to be 7 and 24, with a third side being 25

$7^2 + 24^2 = 25^2$

$49 + 576 = 625$

$625 = 625$