Algebra 1: *Hutschenreuter* **Name** _____
Chapter 12 Note Packet

12.1 "Functions Involving Square Roots"

The Square Root Function- y = $\sqrt{x}$

Domain (x-values)- all non-negative numbers
Range (y-values)- All non-negative numbers

Other forms of square root functions: y = $a\sqrt{x}$ y = $\sqrt{x} \pm k$ y = $\sqrt{x \pm h}$

*You cannot take the square root of _____ numbers.
Therefore the value under the square root has to be **greater than or equal to 0**.

Find the domain of the function.

Ex 1: y = $3\sqrt{x}$ Ex 2: y = $\sqrt{x} + 5$ Ex 3: $y = \sqrt{x+4}$

Ex 4: $y = \sqrt{6x-2}$ Ex 5: y = $\sqrt{\frac{3}{2}x}$ Ex 6: y = $\frac{\sqrt{4x-7}}{8}$

Evaluate the function for the given value of x. Round your answer to the nearest tenth.

Ex 7: y = $3\sqrt{x}$; 16 Ex 8: y = $\sqrt{x} + 5$; 49 Ex 9: $y = \sqrt{x+4}$; 21

Ex 10: $y = \sqrt{6x-2}$; 6 Ex 11: y = $\sqrt{\frac{3}{2}x}$; 6 Ex 12: y = $\frac{\sqrt{4x-7}}{8}$; 8

12.2 (DAY 1) "Operations with Radical Expressions"

Adding and Subtracting Radical Expressions

To add or subtract radicals is like combining like terms.

For example x + 3x = ____ is similar to $\sqrt{x}+3\sqrt{x}$ = _____

The radical has to be exactly the same to combine terms.

Ex1: $\sqrt{2}-5\sqrt{2}$ Ex2: $4\sqrt{5}+3\sqrt{5}-5$ Ex3: $\sqrt{4}+\sqrt{12}$

Ex4: $\sqrt{72}-\sqrt{18}+\sqrt{4}$ Ex5: $\sqrt{24}-\sqrt{96}+\sqrt{6}$ Ex6: $7\sqrt{2x}+\sqrt{2y}-4\sqrt{2xy}$

Product Property of Radicals

$\sqrt{a}\cdot\sqrt{b}=\sqrt{ab}$ Ex7: $\sqrt{2}\cdot\sqrt{8}$ = _____ = _____

Multiplying Radical Expressions

1) Use the distributive property or FOIL method
2) Use the product rule
3) Simplify the radical if possible

Ex8: $\sqrt{3}\left(4+\sqrt{6}\right)$ Ex9: $\sqrt{6}\left(7\sqrt{3}+6\right)$ Ex10: $\left(1+\sqrt{13}\right)\left(1-\sqrt{13}\right)$

Ex11: $\left(\sqrt{3}+5\right)^2$ Ex12: $\left(a+\sqrt{b}\right)\left(\sqrt{2}-a\right)$ Ex13: $\left(\sqrt{x}+4\right)^2$

12.2 (DAY 2) "Dividing & Rationalizing Radical Expressions"

*Remember a radical expression is simplified when there are no radicals in the denominator

What you have done in the past… simplify $\frac{\sqrt{5}}{\sqrt{9}} =$ ____

Now you need to simplify by rationalizing the denominator.

Ex1: $\frac{2}{\sqrt{5}}$ Ex2: $\frac{6}{\sqrt{3}}$ Ex3: $\frac{5}{\sqrt{75}}$

Conjugates

Given $a+\sqrt{b}$, the conjugate is $a-\sqrt{b}$

When a binomial containing a radical is in the denominator you have to multiply is by its conjugate to simplify the expression.

Ex4: $\frac{2}{3-\sqrt{5}}$ Ex5: $\frac{-5}{\sqrt{3}-2}$ Ex6: $\frac{2}{7-\sqrt{x}}$

Simplify the radical expressions.

Ex7: $\frac{2x}{\sqrt{10}}$

Ex8: $\frac{9}{5-\sqrt{7}}$

Ex9: $\sqrt{3}+3\sqrt{2}-2\sqrt{3}$

Ex10: $\sqrt{5}\left(4\sqrt{3}-\sqrt{5}\right)$

Ex11: $\left(7+\sqrt{8}\right)^2$

Ex12: $\frac{6}{10+\sqrt{2}}$

12.3 "Solving Radical Equations"

Steps for solving radical equations:
1) Isolate the radical expression on one side of the equation
2) Put both sides in parentheses, then SQUARE both sides to cancel the square root
3) Simplify and solve for x…may require factoring!
4) Check for extraneous solutions by checking each solution in the original equation

Ex 1: $\sqrt{x}-8=0$

Ex 2: $\sqrt{6x}-13=23$

Ex 3: $10 = 4 + \sqrt{5x + 11}$

Ex 4: $x = \sqrt{4x + 45}$

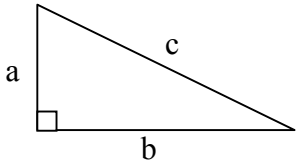
Ex 5: $\sqrt{x} + \frac{1}{3} = \frac{13}{3}$

Ex 6: $x = \sqrt{\frac{3}{2}x + \frac{5}{2}}$

12.5 "The Pythagorean Theorem"

Pythagorean Thm: If a triangle is a RIGHT triangle, then the sum of the squares of the lengths of the legs equals the square of the hypotenuse. $a^2 + b^2 = c^2$

Hypotenuse: always the side opposite the right angle, and the LONGEST SIDE
Legs: the two sides that meet at the right angle

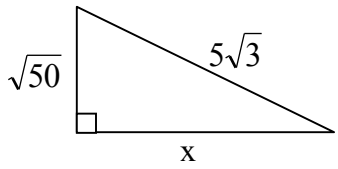


* We can use the Pythagorean Thm to find the lengths of missing sides of right triangles!

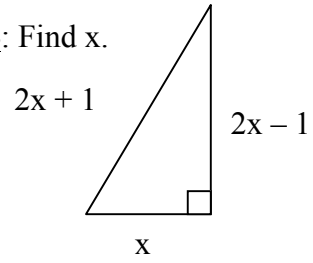
Ex 1: Given a = 1 and b = 3, find c.

Ex 2: Given a = 3 and c = 5, find b.

Ex 3: Find x.

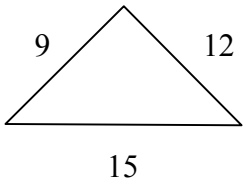


Ex 4: Find x.

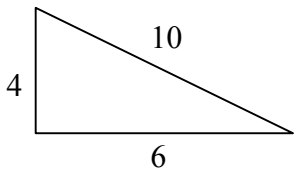


Determine if the following sides create a right triangle.

Ex 5:



Ex 6:



Ex 7: 15, 10, 5

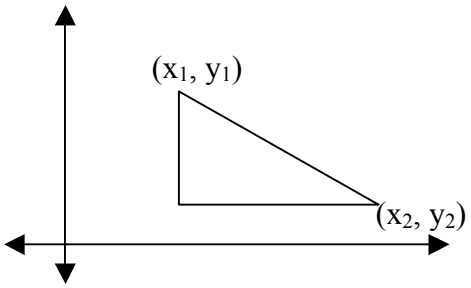
Ex 8: 15, 20, 25

12.6 "The distance and midpoint formula"

The Distance Formula

The distance between two points (x_1, y_1) and (x_2, y_2) can be found by:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



Ex 1: Find the distance between (-3,5) and (4,2):

The Midpoint Formula

The midpoint between (x_1,y_1) and (x_2,y_2) is the point: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Ex 2: Find the midpoint between (1,5) and (-2,7)

Ex 3: Find the midpoint and the distance between (5, 1) and (1, -5).
Round to the hundredths if necessary.