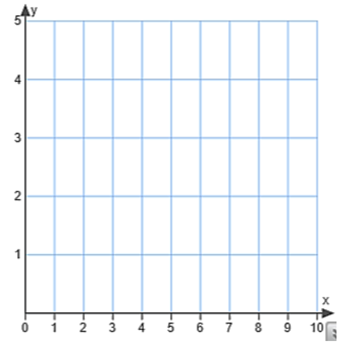
Honors 1 Name: ____________________________________

10.1 – Square Root Functions

Lead – In: To get an idea what the graph of $y = \sqrt{x}$ looks like we will start by making a table.

x				
y				



$y = \sqrt{x}$ is called the ______________________________

Examples: Sketch a graph of each function. Compare it to the parent function $y = \sqrt{x}$, state the domain & range.

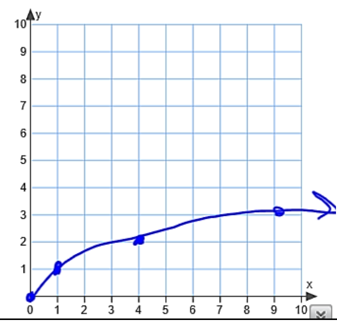
$y = 3\sqrt{x}$

x				
y				

Conclusion:

Domain:

Range:



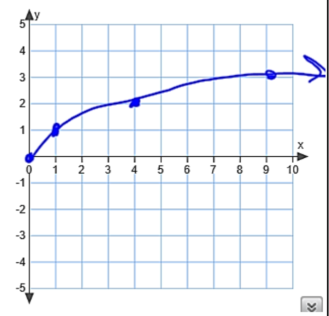
$y = -0.5\sqrt{x}$

x				
y				

Conclusion:

Domain:

Range:



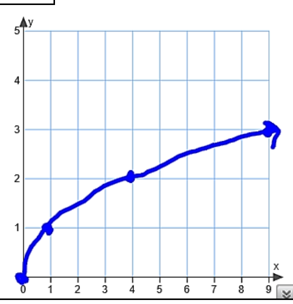
$y = \sqrt{x} + 2$

x				
y				

Conclusion:

Domain:

Range:



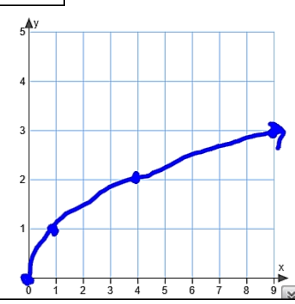
$y = \sqrt{x - 4}$

x				
y				

Conclusion:

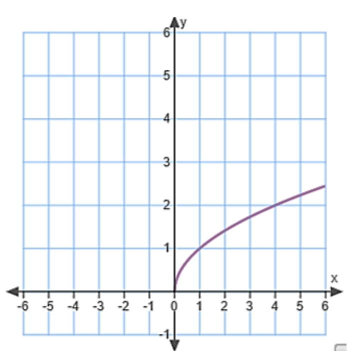
Domain:

Range:



Example: Make the table and graph for $y = 2\sqrt{x + 3} - 1$.

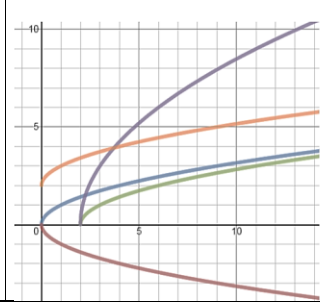
x				
y				



Example: Match the equations below to the equation on the graph. Note, $y = \sqrt{x}$ is on there to start.

$y = -\sqrt{x}$ $y = 3\sqrt{x - 2}$

$y = \sqrt{x} - 2$ $y = \sqrt{x} + 2$



10.2/10.3 – Simplify Radical Expressions

To simplify radical expressions means to simplify so there are no perfect squares or fractions left in the root or a root as a denominator.

Example: Simplify.

$\sqrt{50}$	$\sqrt{24}$	$\sqrt{27x^3y^4z^5}$

Example: Multiplying and dividing radical expressions

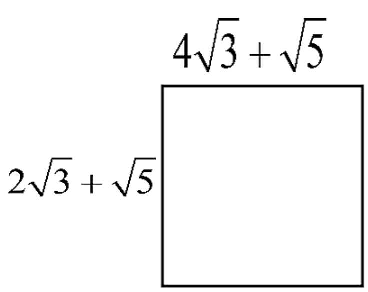
$\sqrt{15} \times \sqrt{6}$	$\sqrt{2xy} \cdot \sqrt{12x^2y}$	$2\sqrt{6} \cdot 5\sqrt{3}$

$\frac{\sqrt{48}}{\sqrt{6}}$	$\frac{\sqrt{12x^5y^3}}{\sqrt{3xy^2}}$

Example: Add or subtract radical expressions. THINK LIKE TERMS!

$3x - 4x + 7x =$ $3\sqrt{2} - 4\sqrt{2} + 7\sqrt{2} =$	$9x - 2y + 3x - 5y =$ $8\sqrt{2} - \sqrt{3} + 2\sqrt{2} - 6\sqrt{3} =$
$\sqrt{45} + \sqrt{20} =$	$2\sqrt{18} - 2\sqrt{32} + \sqrt{72} =$

Example: Challenge yourself by finding the area of the rectangle.



10.4 – Solve Radical Equations

Old Knowledge	New Knowledge
$2x^2 - 25 = 7$	$2\sqrt{x} - 8 = 0$

Steps for solving a radical equation:

1)

2)

Check your answer!

Example: Solve for x.

$4\sqrt{x-7} + 12 = 28$	$\sqrt{1-2x} = 1 + x$
$\sqrt{7-2x} = \sqrt{9-x}$	

Example: The following was proposed by Srinivasa Ramanujan, 1887-1920.

They are called nested radicals.

$$? = \sqrt{2 + \sqrt{2 + \sqrt{2 + \sqrt{2 + \cdots}}}}$$

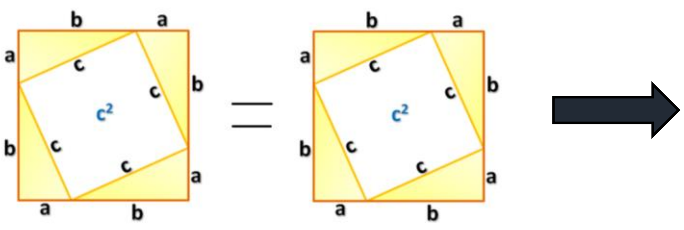
10.5 – Pythagorean Theorem and Its Converse

Hypotenuse:

Legs:

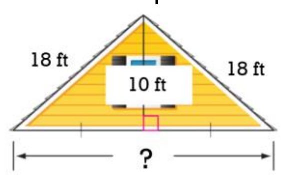
Pythagorean Theorem: *For any* ***right triangle****:*

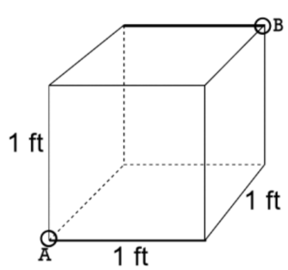
Proof of the Pythagorean Theorem



Area of big square   Area of inside pieces

Examples

A ramp has a horizontal distance of 24 feet and a vertical rise of 2 feet. What is the length of the ramp?	What is the span of the roof shown? 

What is the length of the shortest path an insect could fly to get from point A to point B? 

Converse of the Pythagorean Theorem: The converse (reverse statement) of the Pythagorean Theorem is also true, that is, if a triangle obeys the equation $a^2 + b^2 = c^2$, then that triangle is ___________________________________.

Example: Determine whether the triangle with the given side lengths is a right triangle (that is, are these a Pythagorean Triple?).

$a = 8, b = 9, c = 12$	$a = 7, b = 24, c = 25$

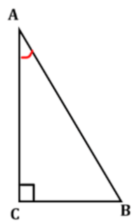
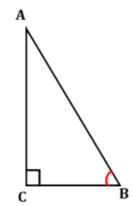
10.6 Day 1 – Setting Up and Solving with Trigonometric Ratios

Introduction to Trigonometry: The main idea behind trigonometry is finding the ratio of two sides of a right triangle. There are 3 sides to any triangle, and they are labeled with respect to the angle we are observing from.

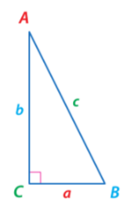
Hypotenuse:

Adjacent:

Opposite:

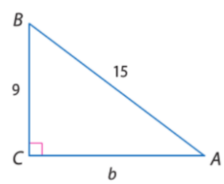
With respect to Angle A, label the 3 sides.	With respect to Angle B, label the 3 sides.
	

KeyConcept Trigonometric Ratios

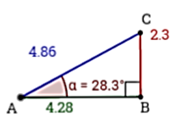
Words	Symbols	Model
sine of $\angle A = \frac{\text{leg opposite } \angle A}{\text{hypotenuse}}$	$\sin A =$	
cosine of $\angle A = \frac{\text{leg adjacent to } \angle A}{\text{hypotenuse}}$	$\cos A =$	
tangent of $\angle A = \frac{\text{leg opposite } \angle A}{\text{Leg adjacent to } \angle A}$	$\tan A =$	

SOH – CAH – TOA

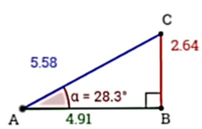
Example: For the following triangle, solve for b and find the values of the 3 trig ratios for Angle A.



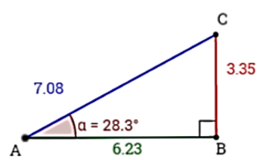
Introduction to the Sine Ratio as a Value – Compute the sine ratio for the following 3 triangles.



$\frac{opp}{hyp} =$



$\frac{opp}{hyp} =$



$\frac{opp}{hyp} =$

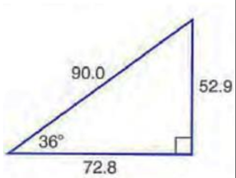
This ratio is always the same because we haven't changed the reference angle. Therefore, we would say

sin(28.3) = __________.

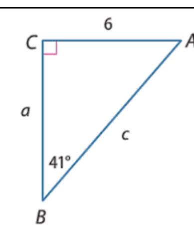
CHECK ON YOUR CALCULATOR TOO!

Examples

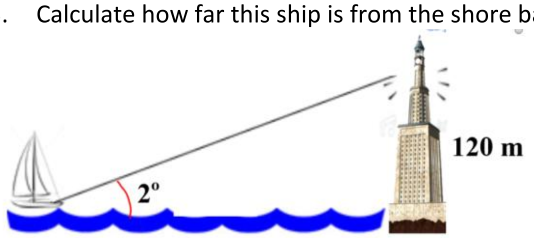
1. Use the triangle to find sin(36) and check with your calculator.



2. Use trig ratios to solve for the missing sides of the right triangle. Round sides to the nearest tenth when needed.



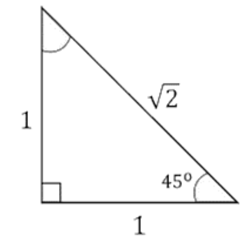
3. Calculate how far this ship is from the shore based on the following measurement and known height of the lighthouse.



10.6 Day 2 – Solve Using Inverse Trig Functions

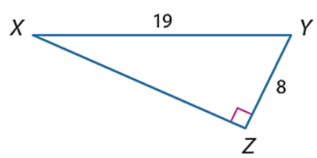
Recall Inverse Functions: Recall earlier in the year we had an equation that took the number of cricket chirps in a minute as the input and output the temperature. Interpret what the following would mean then:

$f(c) = t$	$f(48) = 52$
$f^{-1}(\ \ ) =$	$f^{-1}(60) = 80$

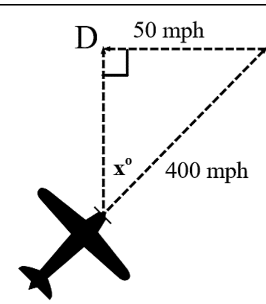
Trig Functions	**Inverse Trig Functions**	**Example**: $\sin(45) =$ $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right) =$ 

Examples:

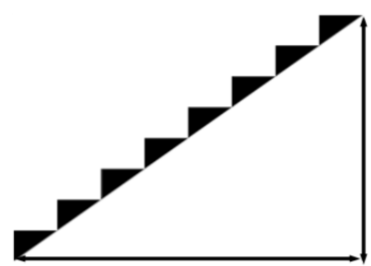
Find the measure of Angles Y and X to the nearest tenth.



What direction should the plane fly so that the wind from the east will push it directly towards destination (D)?



Most building codes say stairs should not be steeper than 42° for residential. Find the angle of the stairs if the total run is 10 feet and the total rise is 8 feet 8 inches.



*******Time Permitting*******

Using Trigonometry to Measure the Size of the World in Ancient Times

*You will watch video for this after quiz tomorrow. We will then solve later.

Al-Biruni a pioneering Muslim scientist figured out a truly remarkable and ingenious method to calculate the radius of the earth (and subsequently its circumference etc.). This was very simple yet accurate requiring just four measurements in all to be taken and then applying a trigonometric equation to arrive at the solution. What Biruni figured out with unprecedented accuracy and precision in the 10th century was not known to the west until 16th century.