Name_____

Honors Geometry **Ch 8 Notes Packet**

Sec 8.1: Geometric Mean

After this section you will have completed the following Common Core State Standard(s):

- **G.SRT.4: Prove theorems about triangles.**
- **G.SRT.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures**.

And will be improving your skills in the following Mathematical Practice(s):

7. Look for and make use of structure

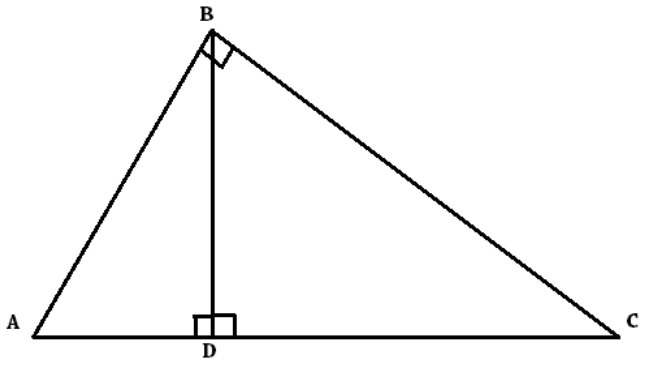
3. Construct viable arguments and critique the reasoning of others

Specifically, you should be able to:

- **Find the geometric mean of 2 numbers**
- **Solve problems involving relationships between parts of right triangles and the altitude to hypotenuse**

Geometric Mean: If x is the geometric mean between a and b, then _____ which means _____

Thm 8.1: The altitude of a right Δ divides the Δ into two Δ's that are _____ to the original Δ and to _____.



Redraw triangles in the same orientation:

$\Delta ABC \sim \Delta$_____ $\sim \Delta$_____

Right Triangle Geometric Mean Thms: For both theorems, the altitude drawn to the hypotenuse of a right triangle separates the triangle into 2 segments.

Sketch below:

Thm 8.2: The length of the altitude of the right Δ is the geometric mean between the _____ _____.

Thm 8.3: The length of a leg of a right Δ is the geometric mean between the length of the _____ and the segment of the hypotenuse _____ to that leg.

Examples:

Sec 8.2: Pythagorean Theorem and Converse

After this section you will have completed the following Common Core State Standard(s):

- **G.SRT.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.**
- **G.MG.3: Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).★**

And will be improving your skills in the following Mathematical Practice(s):

1. Make sense of problems and persevere in solving them
4. Model with mathematics

Specifically, you should be able to:

- **Use Pythagorean Theorem and apply it to solving real-life situations**
- **Use the Converse of the Pythagorean Theorem and apply it to solving real-life situations**
- **Prove the Pythagorean Theorem**

Thm 8.4: Pythagorean Theorem

Sketch:

If a Δ is _____, then_____

_____

Symbolic equation for sketch →

A _____is a set of 3 _____ #'s a, b, and c, where _____.

List 3 or 4+ sets:

Thm 8.5: Converse of the Pythagorean Theorem

If the sum of the squares of the _____ sides of a Δ is equal to the square of the _____ side, then the Δ is a _____ Δ.

Pythagorean Inequality Theorems

Thm 8.6: If the sum of the squares of the **longest side** of a Δ is _____ the sum of the squares of the _____ sides, then the Δ is a _____ Δ.

Thm 8.7: If the sum of the squares of the **longest side** of a Δ is _____ the sum of the squares of the _____ sides, then the Δ is a _____ Δ.

Summary Pythagorean Equations and Inequalites Sketch below:

If ☐, then the Δ is _____.

If ☐, then the Δ is _____.

If ☐, then the Δ is _____.

Examples

Sec 8.3: Special Right Triangles

After this section you will have completed the following Common Core State Standard(s):

- **G.SRT.6: Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.**

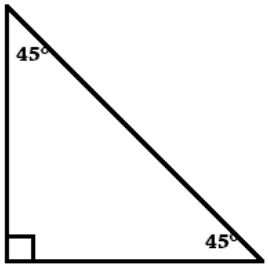
And will be improving your skills in the following Mathematical Practice(s):

1. Make sense of problems and persevere in solving them

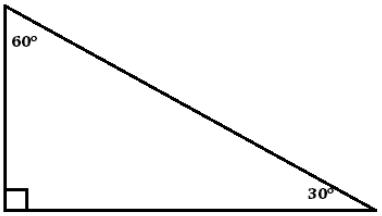
7. Look for and make use of structure

Specifically, you should be able to:

- **Use properties and equations for 45^o-45^o-90^o Δs**
- **Use properties and equations for 30^o-60^o-90^o Δs**



Thm 8.8: In a _____ Δ, the legs, ℓ, are _____and the hypotenuse, h, is _____ times the length of a leg.



Thm 8.9: In a _____ Δ, the hypotenuse, h, is _____ times the length of the short leg, s, and the long leg, ℓ, is _____times the length of the short leg.

Examples:

Sec 8.4: Trigonometry

After this section you will have completed the following Common Core State Standard(s):

- **G.SRT.6: Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.**

And will be improving your skills in the following Mathematical Practice(s):

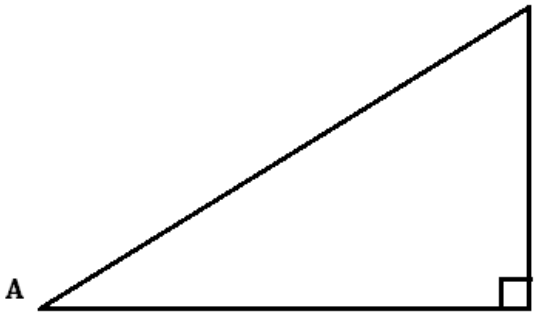
1. Make sense of problems and persevere in solving them

5. Use appropriate tools strategically

Specifically, you should be able to:

- **Find trigonometric ratios using right triangles.**
- **Use inverses of trigonometric ratios to find angle measures in right triangles.**
- **Solve right triangles using trigonometric ratios and their inverses.**

In a right triangle we give special names to the ratios of the different side lengths.



$\sin A = \sin \theta =$

$\cos A = \cos \theta =$

$\tan A = \tan \theta =$

S	**C**	**T**
O	**A**	**O**
H	**H**	**A**

To solve for the missing acute angles in a right triangle, we use the inverse trig functions:

If $\sin \theta = x$, then _____ = measure of angle θ

If $\cos \theta = x$, then _____ = measure of angle θ

If $\tan \theta = x$, then _____ = measure of angle θ

Remember: put your calculator in correct mode – degrees vs. radians!!!

Trigonometric Identities: (do you remember these?)

$\frac{\sin \theta}{\cos \theta} =$ $\sin^2\theta + \cos^2\theta =$

Examples:

Sec 8.5: Angles of Elevation and Depression

After this section you will have completed the following Common Core State Standard(s):

- **G.SRT.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.**

And will be improving your skills in the following Mathematical Practice(s):

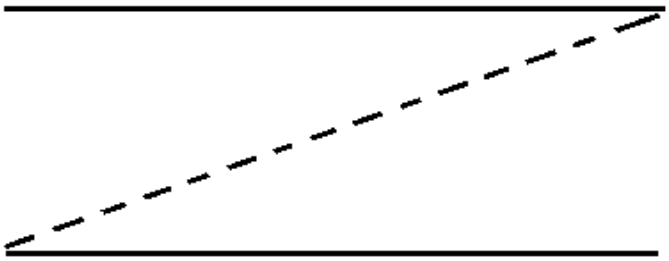
4. Model with mathematics

1. Make sense of problems and persevere in solving them

Specifically, you should be able to:

- **Solve problems involving angles of elevation and depression**
- **Use angles of elevation and depression to find the distance between 2 objects**

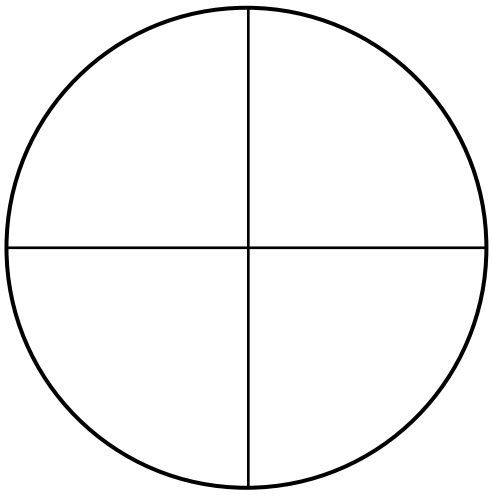
Label diagram:



UNIT CIRCLE:(Review, not in book)

The _____is simply a circle with a radius of ____that can be used to find _____values of sine, cosine, and tangent for angles that are multiples of _____ or _____.

On the unit circle:
X-values are the _____ values
Y-values are the _____ values
so tangent = _____ = _____



Angles start on the positive _____
and go counter clock-wise if they're _____,
and clock-wise if they're _____.

When using the unit circle for inverse trig functions there are often _____ possible answers.

_____ angles have the same sine values.
_____ angles have the same cosine values.
Adding _____to an angle will result in one with the same tangent value.

Examples:

Sec 8.6: The Law of Sines and Law of Cosines

After this section you will have completed the following Common Core State Standard(s):

- **G.SRT.9: (+) Derive the formula *A* = 1/2 *ab* sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.**
- **G.SRT.10: (+) Prove the Laws of Sines and Cosines and use them to solve problems.**

And will be improving your skills in the following Mathematical Practice(s):

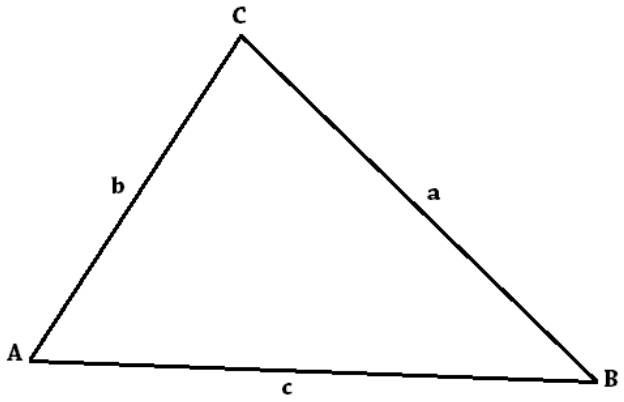
4. Model with mathematics

1. Make sense of problems and persevere in solving them

Specifically, you should be able to:

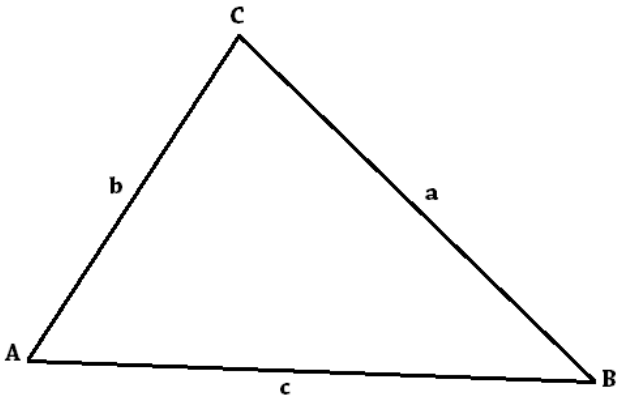
- **Use the Law of Sines to solve triangle problems**
- **Use the Law of Cosines to solve triangle problems**
- **Use trigonometry to find the area of a triangle**

The Law of Sines: For _____ ΔABC,



When using the Law of Sines to solve for angles there may be ____ possible answers. (Just like when using the unit circle to solve for inverse sine.) Make sure to check if the _____ of the angle could also work.

The Law of Cosines: For _____ ΔABC,



Examples:

Sec 8.7: Vectors

After this section you will have completed the following Common Core State Standard(s):

- **G.GPE.6: Find the point on a directed line segment between two given points that partitions the segment in a given ratio**

And will be improving your skills in the following Mathematical Practice(s):

4. Model with mathematics

1. Make sense of problems and persevere in solving them

Specifically, you should be able to:

- **Perform vector operations geometrically**
- **Perform vector operations in the coordinate plane**
- **Solve problems using vectors**

A _____ in math is an object with a numerical _____ and a _____ that can be expressed as the angle it forms with the horizontal or the degrees east or west of the north-south line.

Vectors are usually represented by _____. The _____ points in the _____ of the vector, and the _____ of the arrow is the distance from its _____ point to its _____ point.

Vectors in _____ position have their initial points at the origin. Describing a vector with any initial point requires using _____ form.

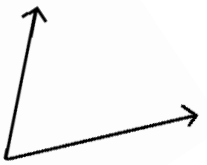
$\vec{v}$ =

$|\vec{v}|$ =

To add vectors geometrically, you can use one of 2 methods:

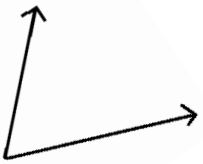
Parallelogram method:

1.
2.



Triangle method:

1.
2.



To add/subtract vectors in component form you simply add/subtract their components. The sum of two vectors is called the _____vector.

If a vector goes from point (x_1 , y_1) to (x_2, y_2) then its component form is
< >, and the angle it makes with the x-axis is

Examples: