Geometry B Live Lesson Class

U3L6 – Right Triangles and Trigonometry Unit Review

Agenda

1. Review topics and problems from Unit 3, in preparation for the unit test.

2. Use the 2-column note system to take better notes in math class. Bring your math notebook and pen or pencil to each math LiveLesson class.

2-Column Notes Template

1. Announcements/To Do's	1. Write down important details.
2. School-Wide Learner Outcomes	2. What are you going to work on this week?
3. LL Objectives	
4. Vocabulary words	4. Definitions (fill in as we go)
5. Problems	5. Steps to solving problems
6. Summary (End of class)	6. 1 or 2 sentences about the LL class.

Reminders and To – Do's

Information	What to do
1. Complete 1 math lesson per day.	1. Go to your Planner in Connexus to find the math lesson for the day
2. Check your WebMail every day	2. Go to Connexus to find WebMail
3. Be prepared to spend 4 - 6 hours per day on schoolwork.	3. Complete lessons for the day from your Planner. Do not get behind on lessons.
4. Remind your Learning Coach to take daily attendance	4. Have your Learning Coach log into Connexus daily.

Reminders and To – Do's

Information	What to do
5. Go to the Message Board first for information about our math class.	
6. Contact Mr. Elizondo for math questions. Remember: You need at least 2 phone calls with Mr. Elizondo per semester.	6. Call (559) 549 - 3244 and leave a voicemail if call is not answered. Make an appointment at: https://elizondo.youcanbook.me Send a WebMail

Unit 3 – California Common Core State Standards

- HSG-SRT.C.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
- HSG-SRT.C.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.
- HSG-SRT.C.7: Explain and use the relationship between the sine and cosine of complementary angles.
- HSG-SRT.C.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
- HSG-MG.A.1: Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

U3L6 – Objectives

Review lesson material associated with right triangles and trigonometry to prepare for the Unit 3 test.

Make sure to have a scientific calculator for this test. You can go to Desmos.com to find a web-based one to use.

U3L6 – Vocabulary Words

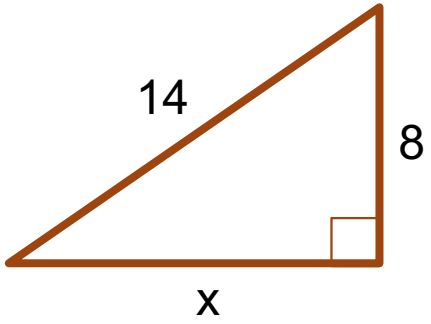
- angle of depression
- angle of elevation
- cosine
- Law of Cosines
- Law of Sines
- Pythagorean Triple
- sine
- tangent
- trigonometric ratios

U3L6 – Things to know for the Test

- Pythagorean Theorem
- Acute, obtuse, or right triangle?
- Special right triangles (45-45-90 and 30-60-90)
- Trigonometric ratios (sine, cosine, tangent)
  - Application in word problems
  - Inverse trig ratios
  - Angle of elevation and depression
- Law of sines and law of cosines
- How to use a calculator to find trigonometric ratios

U3L6 – Pythagorean Theorem

Find the missing length.



$$a^2 + b^2 = c^2$$

$$x^2 + 8^2 = 14^2$$

$$x^2 + 64 = 196$$

$$x^2 + 64 - 64 = 196 - 64$$

$$x^2 = 132$$

$$\sqrt{x^2} = \sqrt{132}$$

$$x = 2\sqrt{33} \; or \; 11.489$$

U3L6 – Acute, Obtuse or Right?

$a^2 + b^2 = c^2$ *Right*

$c^2 < a^2 + b^2$ *Acute*

$c^2 > a^2 + b^2$ *Obtuse*

A triangle has side lengths 12 cm, 15 cm, and 24 cm. Is the triangle acute, obtuse, or right?

$$12^2 + 15^2 \stackrel{?}{=} 24^2$$

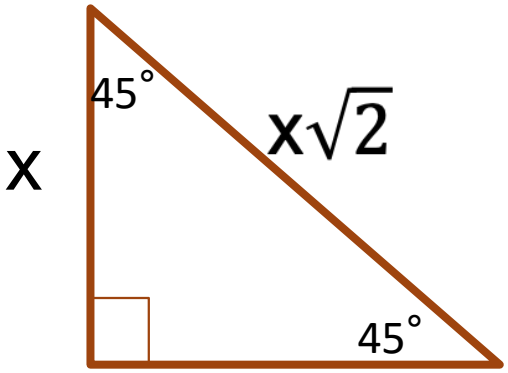
$$144 + 225 \stackrel{?}{=} 576$$

$$369 < 576$$

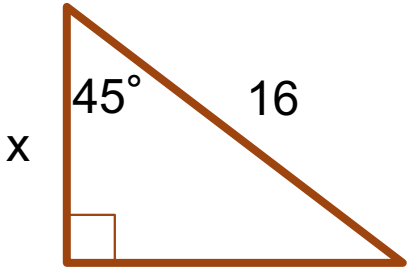
Obtuse

U3L6 – Special Right Triangles

- 45-45-90 Triangles



What is the perimeter of the triangle?



$$x\sqrt{2} = 16$$

$$\frac{x\sqrt{2}}{\sqrt{2}} = \frac{16}{\sqrt{2}}$$

$$x = \frac{16}{\sqrt{2}}$$

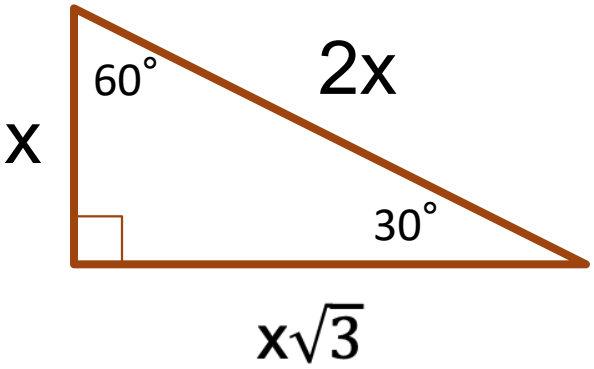
$$x = \frac{16 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}}$$

$$x = \frac{16 \cdot \sqrt{2}}{2}$$

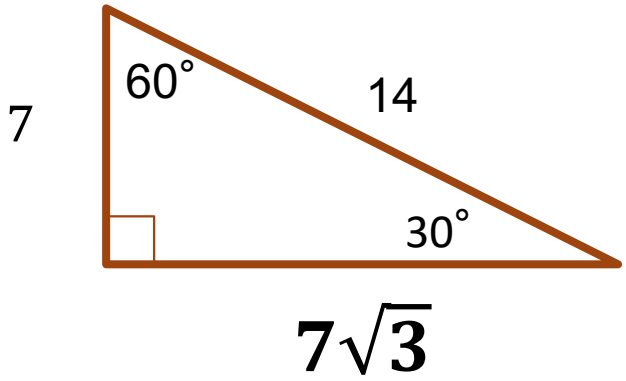
$$\boldsymbol{x = 8\sqrt{2}}$$

U3L6 – Special Right Triangles

- 30-60-90 Triangles



Find the length of the longer leg.



$2x = 14$

$x = 7$

U3L6 – Trigonometric Ratios

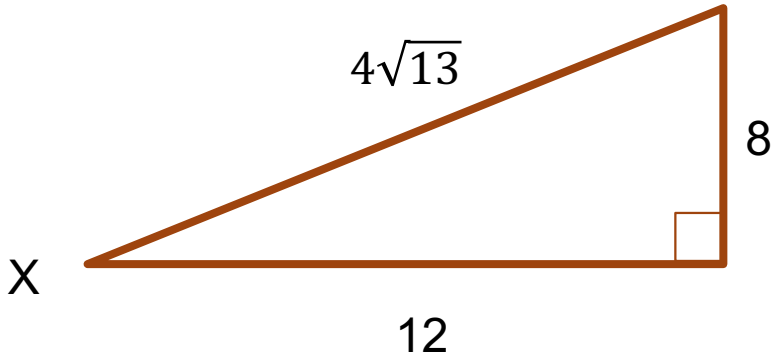
$$\sin x = \frac{opposite}{hypotenuse}$$

$$\cos x = \frac{adjacent}{hypotenuse}$$

$$\tan x = \frac{opposite}{adjacent}$$

$$SOH\ CAH\ TOA$$

Find the ratios of sin x, cos x, and tan x.



$$\sin x = \frac{8}{4\sqrt{13}} = \frac{8\sqrt{13}}{4 \cdot 13} = \frac{2\sqrt{13}}{13}$$

$$\cos x = \frac{12}{4\sqrt{13}} = \frac{12\sqrt{13}}{4 \cdot 13} = \frac{3\sqrt{13}}{13}$$

$$\tan x = \frac{8}{12} = \frac{2}{3}$$

U3L6 – Trigonometric Ratios

Use sin, cos or tan to find sides of a triangle.

Use $\sin^{-1}$, $\cos^{-1}$, or $\tan^{-1}$ to find angles of a triangle

Find the missing value to the nearest hundredth.

$$\cos x = \frac{4}{17}$$

$$x = cos^{-1}\frac{4}{17}$$

$$x = cos^{-1}\,0.235294$$

$$\boldsymbol{x = 76.39°}$$

$$tan\,x = \frac{11}{15}$$

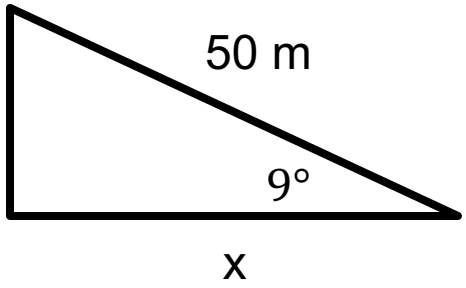
$$x = tan^{-1}\frac{11}{15}$$

$$x = tan^{-1}\,0.733333$$

$$\boldsymbol{x = 36.25°}$$

U3L6 – Trigonometric Ratios

Allen hikes 50 meters up a hill that makes a 9° with the horizontal. To the nearest tenth of a meter, what horizontal distance has he covered?



$$\cos x = \frac{adjacent}{hypotenuse}$$

$$\cos 9° = \frac{x}{50}$$

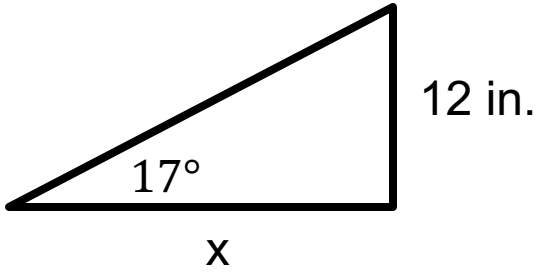
$$x = 50 \cdot Cos\ 9°$$

$$x = 50 \cdot 0.9876883$$

$$\boldsymbol{x = 49.38\ m}$$

U3L6 – Trigonometric Ratios

A skateboarding ramp is 12 in. high and rises at an angle of 17°. How long is the base of the ramp? Round to the nearest inch.



$$\tan x = \frac{opposite}{adjacent}$$

$$\tan 17° = \frac{12}{x}$$

$$x \cdot \tan 17° = 12$$

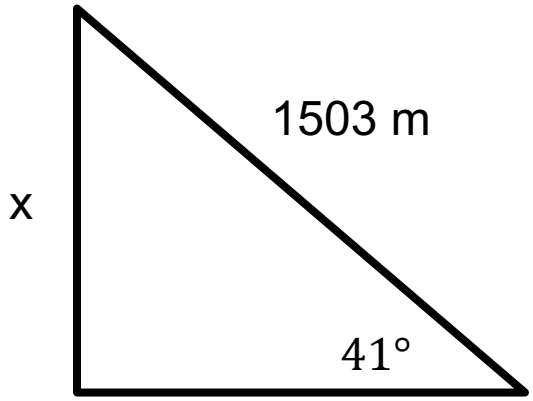
$$x = \frac{12}{\tan 17°}$$

$$x = \frac{12}{0.30573} = 39.25$$

$$\boldsymbol{x = 39\ inches}$$

U3L6 – Trigonometric Ratios

A meteorologist measures the angle of elevation of a weather balloon as 41°. A radio signal from the balloon indicates that it is 1503 m from his location. To the nearest meter, how high above the ground is the balloon?.



$$\sin x = \frac{opposite}{hypotenuse}$$

$$\sin 41° = \frac{x}{1503}$$

$$x = 1503 \cdot \sin 41°$$

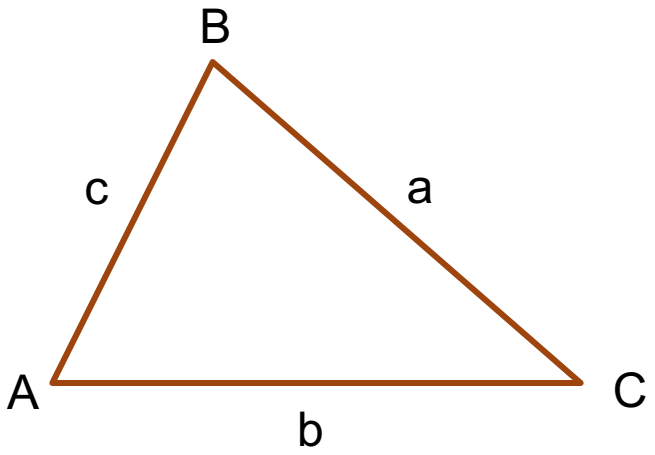
$$x = 1503 \cdot 0.656059$$

$$\boldsymbol{x = 986\ meters}$$

U3L6 – Law of Sines and Law of Cosines

- Law of Sines

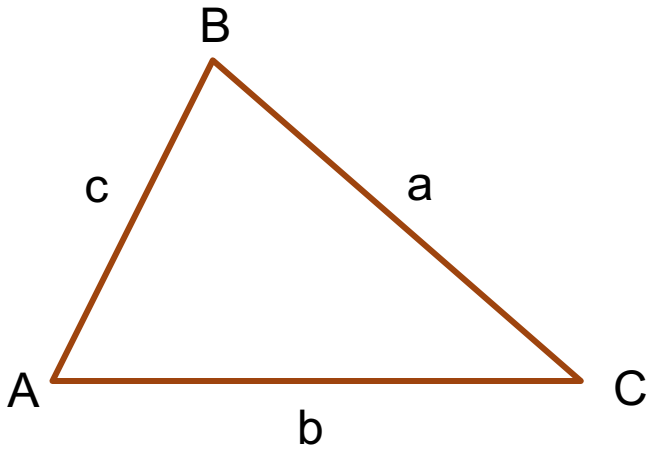
Use for non-right triangles



$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

- Law of Cosines

Use for non-right triangles



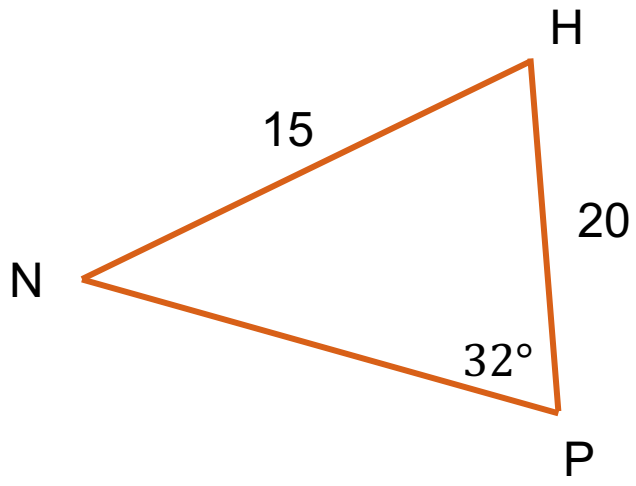
$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cdot \cos B$$

$$c^2 = a^2 + b^2 - 2ab \cdot \cos C$$

U3L6 – Law of Sines and Law of Cosines

In ΔHNP, HN = 15 inches, HP = 20 inches, and $m\angle P = 32°$. Find $m\angle N$. Round to the nearest tenth.



$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{\sin 32°}{15} = \frac{\sin \angle N}{20}$$

$$15 \cdot \sin \angle N = 20 \cdot \sin 32°$$

$$15 \cdot \sin \angle N = 20 \cdot 0.529919$$

$$15 \cdot \sin \angle N = 10.598385$$

$$\sin \angle N = \frac{10.598385}{15}$$

$$\sin \angle N = 0.706559$$

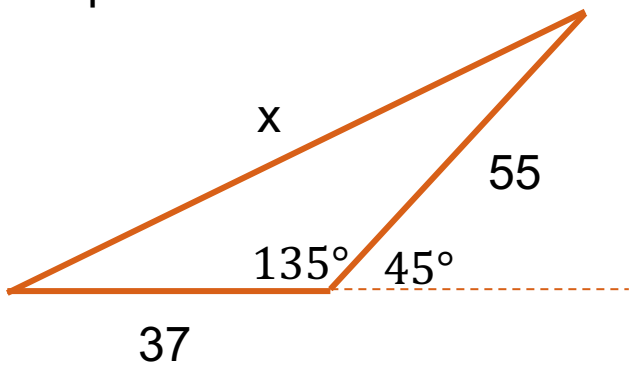
$$\angle N = sin^{-1}\, 0.706559$$

$$\angle N = 44.95563$$

$$\boldsymbol{\angle N = 45°}$$

U3L6 – Law of Sines and Law of Cosines

A car travels 37 miles east in the desert. Then it turns 45° north of east. It travels 55 miles on its new course. How far is the car from its initial position?



$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$x^2 = 37^2 + 55^2 - 2(37)(55) \cdot \cos 135°$$

$$x^2 = 1369 + 3025 - 4070 \cdot (-0.707106)$$

$$x^2 = 4394 + 2877.92142$$

$$x^2 = 7271.92142$$

$$\sqrt{x^2} = \sqrt{7271.92142}$$

$$\boldsymbol{x = 85.3\ miles}$$

Questions?

- Check the Message Board first
- Send a WebMail
- You can also make an appointment at https://elizondo.youcanbook.me
- You can also call me at (559) 549-3244. If I'm not available to answer your call, please leave a voicemail with your full name and phone number.