5.5 Day 2

Tuesday, February 12, 2019 2:48 PM

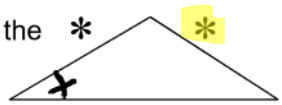
Precalculus Honors **Name**_____
5.5 Law of Sines Day 2

ASA or AAS

1. Find the 3rd angle, using the Δ-180 Thm.
2. Find the remaining sides, using the Law of Sines.

SSA – The Ambiguous Case

1. Draw your Δ so that the given angle is in the bottom left corner and the adjacent side is to its left, NOT on the bottom of the triangle. (see diagram to right)



2. If the **opposite side ≥ adjacent side**, there is only **ONE** Δ.
   Follow steps A-C below

3. If **opposite side < adjacent side**, FIRST determine the **height** of the Δ :

Height = adjacent side •sine of the given angle

Case 1: Opposite side < height → **NO** Δ
Case 2: Opposite side = height → **ONE** Δ (it is a right Δ)
Follow steps A-C below or use SOH-CAH-TOA
Case 3: Height < Opposite side < Adjacent side → **TWO Δ's**
Follow steps A-F below

Steps for solving the first (acute) Δ:
A) Find the angle across from the adjacent side using the Law of Sines.
B) Find the 3rd < using the Δ-180 Thm.
C) Find the third side using the Law of Sines.

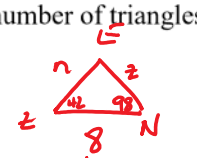
Steps for solving the second (obtuse) Δ:
D) Find the angle across from the adjacent side by using the supplement of the angle in step A above.
E) Find the 3rd < using the Δ-180Thm.
F) Find the 3rd side using the Law of Sines.

REMEMBER: NEVER FIND THE LARGEST <
USING THE LAW OF SINES!!!!

1. Use the given information to determine the number of triangles possible.

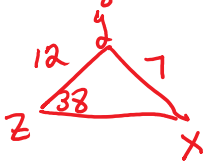
a. $\triangle ZEN$ $m\angle Z = 42^\circ$ $m\angle N = 98^\circ$ *and* $e = 8$

a. 1 Δ



b. $\triangle XYZ$ $m\angle Z = 38^\circ$ $z = 7$ *and* $x = 12$

b. 0 Δ



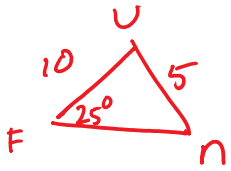
$h \approx 7.388$

c. $\triangle MNO$ $m = 2$ $n = 3$ $0 = 5$

c. 0 Δ

d. $\triangle FUN$ $m\angle F = 25^\circ$ $f = 5$ *and* $n = 10$

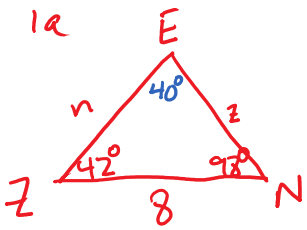
d. 2 Δs



$10 \sin 25 \approx 4.226$

2. Solve the triangle(s) from 1a and 1d.

1a



$$\frac{\sin 40}{8} = \frac{\sin 98}{n}$$

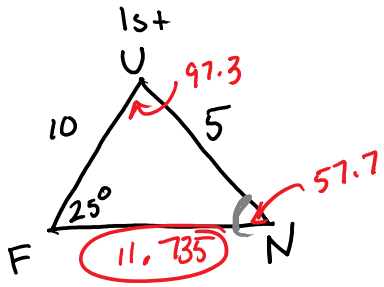
$$n = \frac{8 \sin 98}{\sin 40}$$

$n \approx 12.325$

$$\frac{\sin 40}{8} = \frac{\sin 42}{z}$$

$z \approx 8.328$

1st



$$\frac{\sin 25^\circ}{5} = \frac{\sin N}{10}$$

$$\frac{10 \sin 25}{5} = \sin N$$

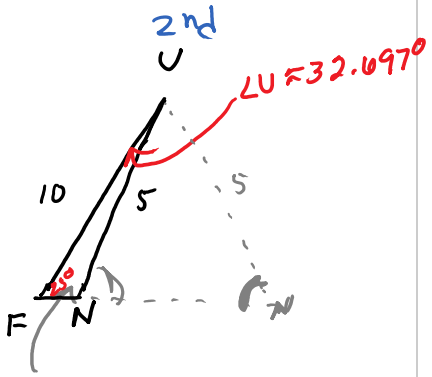
$$\angle N = \sin^{-1}\left(\frac{10 \sin 25}{5}\right) \approx 57.70$$

$\angle U = 180 - 25 - 57.70$

$= 97.3^\circ$

$$\frac{\sin 25}{5} = \frac{\sin 97.3}{u}$$

2nd

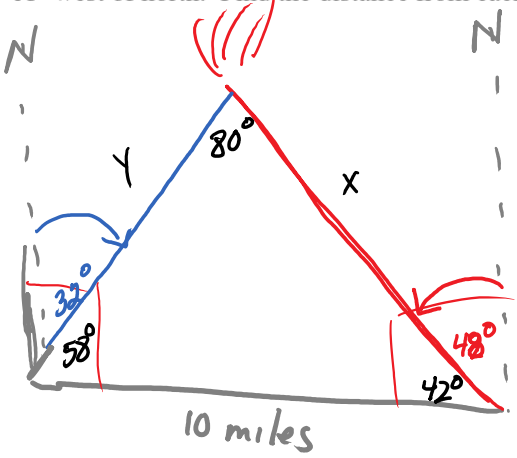


$N = 180 - 57.70 \approx 122.303$

$u = 6.391$

Application problems:

Forest Ranger Chris Johnson at ranger station A sights a fire in the direction 32° east of north. Ranger Rick Thorpe at ranger station B, 10 miles due east of A, sights the same fire on a line 48° west of north. Find the distance from each ranger station to the fire.



$\frac{\sin 80}{10} = \frac{\sin 58}{x}$

$x \approx 8.611$ miles

$y \approx 6.795$ miles

A road slopes 10° above the horizontal, and a vertical telephone pole stands beside the road. The angle of elevation of the Sun is 62°, and the pole casts a 14.5 ft shadow downhill along the road, Find the height of the telephone pole.