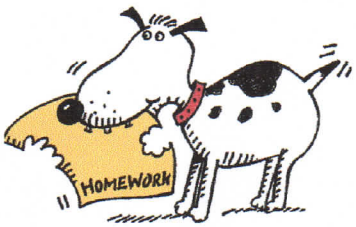
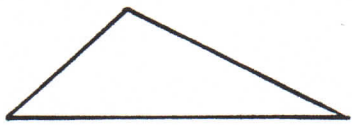
HOMEWORK TAKE-UP

p. 291 #4b, c, e, 5a, b, 6 - 9, 11



UNIT #5: Trigonometry
Sine Law - Ambiguous Case

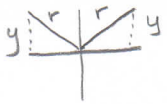
Learning Goal:
I will learn how to solve triangles using Sine that may involve one, two, or no solutions.



Obtuse.

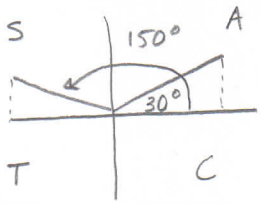
Lesson: Sine Law - Ambiguous Case

Recall $\sin\theta = \frac{y}{r}$



Since $\sin\theta$ is positive for both acute (between 0° and 90°) and obtuse (between 90° and 180°), there are two angles that yield the same answer for $\sin\theta$. Remember the CAST rule!

Example: $\sin 30° = 0.5$
$\sin 150° = 0.5$



Sine Law - Ambiguous Case continued...

When we solve for any angle using the sine law, we must consider two possible solutions, one acute and one obtuse. Common sense will often allow us to determine which answer is appropriate.

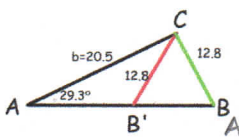
For example:
- interior angles must add to 180°
- longer sides correspond to larger angles

With SSA case, it is possible to encounter three situations:
(a) no solution - a triangle cannot be formed from the data
(b) one solution - a single triangle is possible
(c) two solutions - two valid triangles can be formed

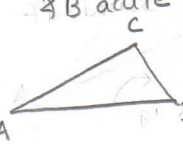
Lesson: Sin Law - Ambiguous Case

Example 1: Find Angle B
Given: Angle A = 29.3°
a = 12.8
b = 20.5

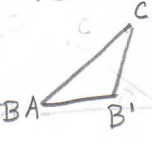
There are <u>two ways</u> to draw the diagram:



∠B acute



∠B obtuse.



First solution: (Quad 1 solution)

Find ∠B

$\frac{\sin 29.3°}{12.8} = \frac{\sin B}{20.5}$

$20.5 \sin 29.3° = \sin B$
12.8

$0.7837 = \sin B$

positive ∴ two solutions

$\angle B = 51.6°$

$\angle A = 29.3°$

$\angle C = 180° - 51.6° - 29.3°$

$\angle C = 99.1°$

2nd solution (Quad 2 solution)

Find ∠B'

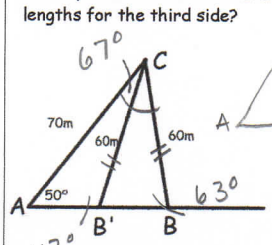
$\angle B' = 180° - 51.6° = 128.4°$

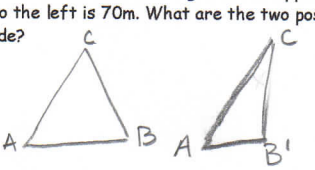
$\angle A = 29.3°$

$\angle C = 180° - 128.4° - 29.3°$

$\angle C = 22.3°$

Example 2:
A surveyor is mapping a triangular field. From corner A, he sights 2 angles B and C. Angle A = 50°. He knows the length of the opposite side is 60m, while the side to the left is 70m. What are the two possible lengths for the third side?





1st Solution

$\frac{\sin B}{70} = \frac{\sin 50°}{60}$

$\sin B = 0.8937$

$\angle B = 63°$

$\angle C = 180° - 50° - 63°$

$\angle C = 67°$

$\frac{c}{\sin 67°} = \frac{60}{\sin 50°}$

$c = 72\ m$

2nd Solution

$B' = 180° - 63°$

$\angle B' = 117°$

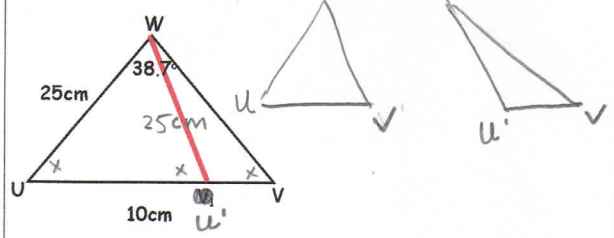
$\angle C = 180° - 117° - 50°$

$\angle C = 13°$

$\frac{c}{\sin 13°} = \frac{60}{\sin 50°}$

$c \doteq 18\ m$

Example 3:
Determine all the angles in Δ UVW, where ∠W = 38.7°, w = 10cm, and v = 25cm.



1st Solution

$\frac{\sin V}{25} = \frac{\sin 38.7°}{10}$

$\sin V = 1.5631$

$\angle V$ = Error!

∴ not possible.

Remember $\sin\theta = \frac{o}{h}$. If $\sin\theta = 1.5631$, this would mean o is greater than hypotenuse which is not possible.
↑ opposite

UNIT 5: Trigonometry

Sine Law - Ambiguous Case

Learning Goal:

I will learn how to solve triangles using Sine that may involve one, two, or no solutions.

Success Criteria:

To be successful, I must be able to...

- Recognize there may be zero, one, or two solutions in SSA (Side-Angle-Side) cases
- Calculate all possible solutions using Sine and using the sum of interior angles = 180°

Practice Work

p. 308 #1a, b, d, e, f, 2a, b, c, 7a, 8, 9
p. 310 #11, 12, 13, 15

Test Review: p. 316 #1 - 11