Foundations 11

Class notes: Chapter 4

4.1

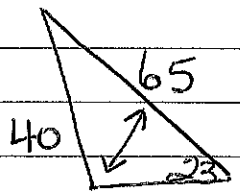
Oblique triangle - a triangle that does not contain a 90° angle

$\sin\measuredangle = \sin(180° - \measuredangle)$
$\cos\measuredangle = -\cos(180° - \measuredangle)$
$\tan\measuredangle = -\tan(180° - \measuredangle)$

4.2 acute triange - all angles in the triangle are less than 90°
obtuse triange - one angle in the triangle is larger than 90°

key * the longest side will be across from the largest (obtuse) angle

Sin Law



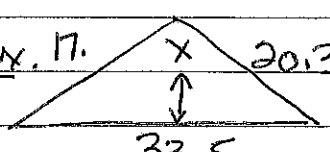
find $\measuredangle A$

$$\frac{40}{\sin 23} = \frac{65}{\sin x} \Rightarrow \frac{65 \times \sin 23}{40} = \sin x$$

$\sin x = 0.6349$
$x = 39.4$ * but this is not an obtuse angle
$\therefore 180 - 39.4 = 140.6°$

Cos Law

ex. 17.



$c^2 = b^2 + b^2 - 2ab\cos C$
$33.5^2 = 17^2 + 20.3^2 - 2(17)(20.3)\cos C$
$1122.25 = 289 + 412.09 - 690.2\cos C$
$421.16 = -690.2\cos C$
$421.16 \div -690.2 = \cos C$
$-0.610 = \cos C \quad C = 128°$

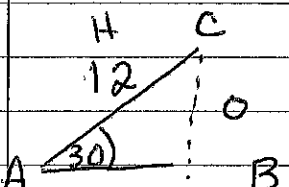
4.3 Determining # of triangles Possible – the Ambiguous Case of the Sine Law

Ambiguous Case of the Sine law
→ because $\sin\measuredangle = \sin(180° - \measuredangle)$
→ you can form 2 triangles (1 obtuse & 1 acute) using the same information

(SSA) How to determine the # of triangles possible

① find the height
- if opposite side is less than height
  no triangles are possible
- if opposite side is equal the height
  one triangle (a right triangle) is possible
- if opposite side is greater than height go to ②

NO triangles possible



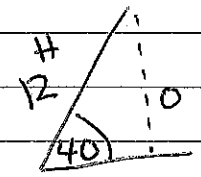
$\sin 30 = \frac{x}{12}$ → given $a = 4$

$(\sin 30) \times 12 = x$

$x = 6$

* Since the side is less than the height – ∅ triangle

one triangle possible



given → $a = 7.7$

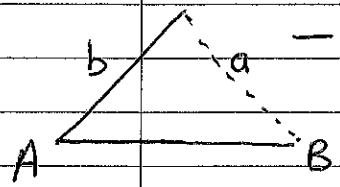
$\sin 40 = \frac{x}{12}$

$(\sin 40) \times 12 = x$

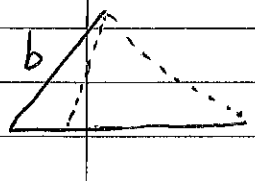
$x = 7.7$

* Since the side equals the height – 1 triangle

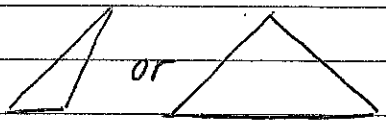
② if opposite side is greater than height



– 1 triangle if $a > b$



– 2 triangles if $a < b$



acute or obtuse

(4.4) Note: when given word problems

- use a protactor and a ruler to guide your drawing
- look for right triangles (SOHCAHTOA)
- look for Side-Side-Angle to use the SINE LAW
- use COSINE LAW, when needed

* after you calculate your answer look back at the drawing & see if it makes sense; if not apply the $\sin\theta = \sin(180-\theta)$ rule.

③ If $\angle A$ is obtuse and $a > b$ then one triangle is possible