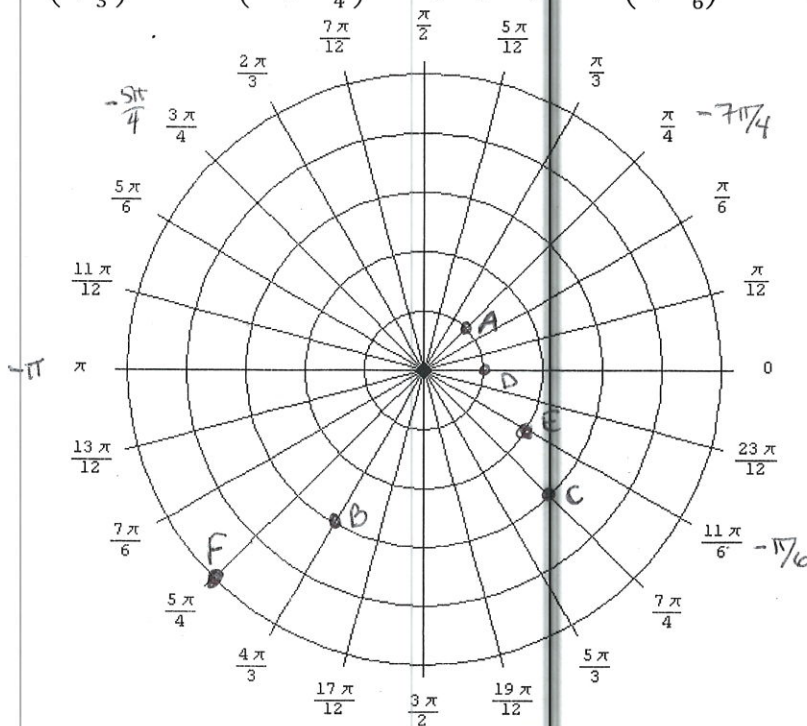


Instructions: Write your work up neatly and attach to this page. Record your final answers (only) directly on this page if they are short; if too long indicate which page of the work the answer is on and mark it clearly. Use exact values unless specifically asked to round.

- Solve each triangle below. If using the law of sines, verify how many triangles are possible. If there are two possible triangles, find BOTH. Round to the nearest tenth.

a. $A = 44^\circ, B = 25^\circ, a = 12$	g. $B = 85^\circ, C = 15^\circ, b = 40$
b. $A = 65^\circ, B = 65^\circ, c = 6$	h. $a = 30, b = 20, A = 50^\circ$
c. $a = 42.1, b = 37, A = 112^\circ$	i. $a = 10, b = 30, A = 150^\circ$
d. $a = 7, b = 28, A = 12^\circ$	j. $a = 9.3, b = 41, A = 18^\circ$
e. $a = 5, b = 7, C = 42^\circ$	k. $a = 7, c = 3, B = 90^\circ$
f. $a = 63, b = 22, c = 50$	l. $a = 5, b = 7, c = 10$
- Two fire-lookout stations are 10 miles apart, with station B directly east of station A. Both stations spot a fire. The bearing from station A is N25°E and from station B it's N56°W. How far from each station is the fire (to the nearest tenth of a mile)?
- You are on a fishing boat that leaves its pier and heads east. After traveling 30 miles, there is a report warning of rough seas directly south. The captain turns the boat and follows a bearing of S45°W for 12 miles. How far are you from the boat's pier? What bearing could the board have originally taken to arrive at this point?
- Convert the points below into rectangular coordinates, and plot the points below on the graph. Label each.

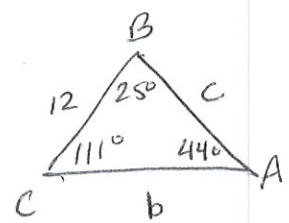
- a. $(1, \frac{\pi}{4})$ b. $(3, \frac{4\pi}{3})$ c. $(-3, -\frac{5\pi}{4})$ d. $(-1, -\pi)$ e. $(2, -\frac{\pi}{6})$ f. $(-5, -\frac{7\pi}{4})$



MTH
166 Homework #9 Key

①

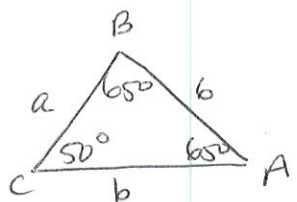
1.a. $A=44^\circ, B=25^\circ, a=12$



$$\frac{12}{\sin 44^\circ} = \frac{b}{\sin 25^\circ} \Rightarrow b = 7.3$$

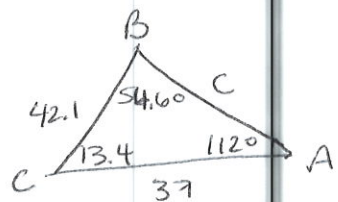
$$\frac{12}{\sin 44^\circ} = \frac{c}{\sin 111^\circ} \Rightarrow c = 16.1$$

b. $A=65^\circ, B=65^\circ, c=6$



$$\frac{6}{\sin(50^\circ)} = \frac{a}{\sin(65^\circ)} \Rightarrow a = b = 7.1$$

c. $a=42.1, b=37, A=112^\circ$

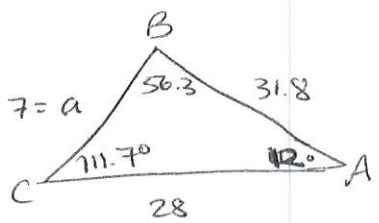


$$\frac{\sin 112^\circ}{42.1} = \frac{\sin B}{37}$$

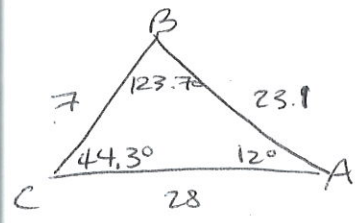
$$\sin B = .81486 \Rightarrow B = 34.6^\circ$$

$$\frac{\sin 112^\circ}{42.1} = \frac{\sin 13.4^\circ}{c} \Rightarrow c = 10.5$$

d. $a=7, b=28, A=12^\circ$



$$\frac{\sin 12^\circ}{7} = \frac{\sin B}{28}$$



$$\sin B = .8316 \Rightarrow B = 56.3^\circ$$

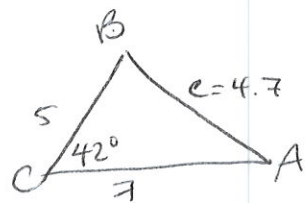
$$B = 123.7^\circ$$

$$C = 111.7^\circ$$

$$c = 23.1$$

$$\frac{7}{\sin 12^\circ} = \frac{c}{\sin 111.7^\circ} \Rightarrow c = 31.3$$

e. $a=5, b=7, C=42^\circ$



$$c^2 = 7^2 + 5^2 - 2(5)(7)\cos 42^\circ$$

$$\cos B = \frac{7^2 - 5^2 - 4.7^2}{-2(5)(4.7)}$$

$$B = 92.3^\circ$$

$$c^2 = 21.98$$

$$\cos A = \frac{5^2 - 7^2 - 4.7^2}{-2(7)(4.7)}$$

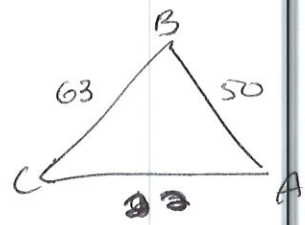
$$c = 4.69 \Rightarrow 4.7$$

$$A = 45.7^\circ$$

f. $a=63, b=22, c=50$

$$\cos C = \frac{50^2 - 63^2 - 22^2}{-2 \cdot 63 \cdot 22}$$

$C = 45.2^\circ$



$$\cos B = \frac{22^2 - 63^2 - 50^2}{-2(63)(50)}$$

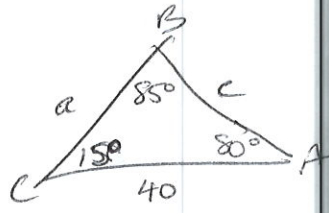
$B = 18.2^\circ$

$A = 116.6^\circ$

g. $B=85^\circ, C=15^\circ, b=40$

$$\frac{a}{\sin 80^\circ} = \frac{40}{\sin 85^\circ} \quad a = 39.5$$

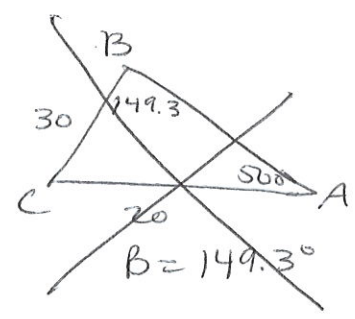
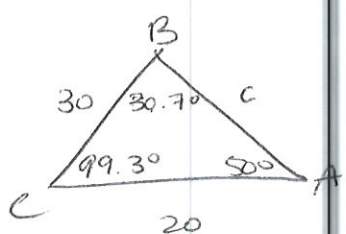
$$\frac{c}{\sin 15^\circ} = \frac{40}{\sin 85^\circ} \quad c = 10.4$$



h. $a=30, b=20, A=50^\circ$

$$\frac{\sin 50^\circ}{30} = \frac{\sin B}{20}$$

$\sin B = .5107 \Rightarrow B = 30.7^\circ$



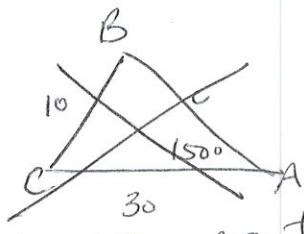
$$\frac{\sin 50^\circ}{30} = \frac{\sin 99.3^\circ}{c}$$

$c = 38.6$

i. $a=10, b=30, A=150^\circ$

$$\frac{\sin 150^\circ}{10} = \frac{\sin B}{30}$$

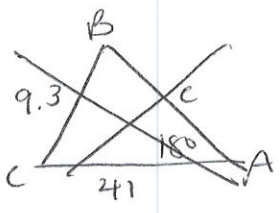
$\sin B = 1.5$ no triangle



j. $a=9.3, b=41, A=18^\circ$

$$\frac{\sin 18^\circ}{9.3} = \frac{\sin B}{41}$$

$\sin B = 1.36$

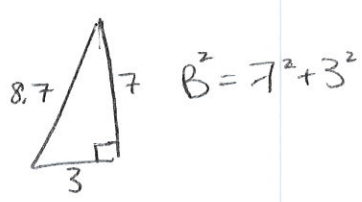


no triangle

k. $a=7, c=3, B=90^\circ$

$A = 53.6^\circ$

$C = 36.4^\circ$

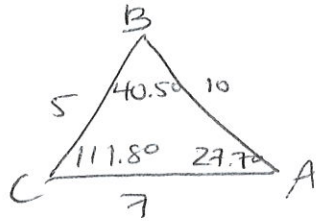


$$B^2 = 7^2 + 3^2$$

1d. $a=5, b=7, c=10$

$$\cos C = \frac{10^2 - 5^2 - 7^2}{-2(5)(7)}$$

$$C = 111.8^\circ$$

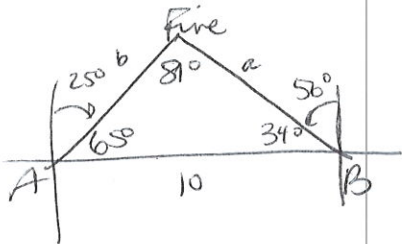


$$\cos B = \frac{7^2 - 5^2 - 10^2}{-2(5)(10)}$$

$$B = 40.5^\circ$$

$$A = 27.7^\circ$$

2.



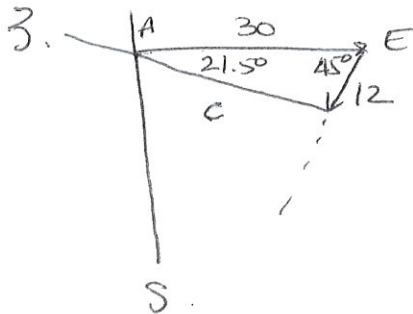
$$\frac{10}{\sin 81^\circ} = \frac{b}{\sin 34^\circ}$$

$$b = 5.7 \leftarrow \text{dist. to A}$$

$$\frac{10}{\sin 81^\circ} = \frac{a}{\sin 65^\circ}$$

$$a = 9.2 \leftarrow \text{dist to B}$$

Station A is closer



$$c^2 = 30^2 + 12^2 - 2(12)(30)\cos 45^\circ$$

$$c = 23.1$$

$$\cos A = \frac{12^2 - 30^2 - 23.1^2}{-2(30)(23.1)} \Rightarrow A = 21.5^\circ$$

S 68.5° E

4. a. $(1, \pi/4)$

$$x = 1 \cos \pi/4 = \frac{1}{\sqrt{2}}$$

$$\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$$

$$y = 1 \sin \pi/4 = \frac{1}{\sqrt{2}}$$

b. $(3, 4\pi/3)$

$$x = 3 \cos 4\pi/3 = -\frac{3}{2}$$

$$\left(-\frac{3}{2}, -\frac{3\sqrt{3}}{2}\right)$$

$$y = 3 \sin 4\pi/3 = -\frac{3\sqrt{3}}{2}$$

c. $(-3, -5\pi/4)$

$$x = -3 \cos(-5\pi/4) = \frac{3}{\sqrt{2}}$$

$$\left(\frac{3}{\sqrt{2}}, -\frac{3}{\sqrt{2}}\right)$$

$$y = -3 \sin(-5\pi/4) = -\frac{3}{\sqrt{2}}$$

d. $(-1, -\pi)$

$$x = -1 \cos(-\pi) = 1$$

$$(1, 0)$$

$$y = -1 \sin(-\pi) = 0$$

e. $(2, -\pi/6)$

$$x = 2 \cos(-\pi/6) = \sqrt{3}$$

$$(\sqrt{3}, -1)$$

$$y = 2 \sin(-\pi/6) = -1$$

f. $(-5, -7\pi/4)$

$$x = -5 \cos(-7\pi/4) = -\frac{5}{\sqrt{2}}$$

$$\left(-\frac{5}{\sqrt{2}}, \frac{5}{\sqrt{2}}\right)$$

$$y = -5 \sin(-7\pi/4) = \frac{5}{\sqrt{2}}$$