

Week 11 SI Answers:

1. a.

$$A = 116^\circ$$

$$B = 30^\circ$$

$$C = 35^\circ$$

$$a = ?$$

$$b = ?$$

$$c = 70$$

$$\frac{a}{\sin(115)} = \frac{70}{\sin(35)} \Rightarrow a = \frac{70}{\sin(35)} \cdot \sin(115)$$

$$a = 112.6$$

$$\frac{b}{\sin(30)} = \frac{70}{\sin(35)} \Rightarrow b = \frac{70}{\sin(35)} \cdot \sin(30)$$

$$b = 61$$

$$b. A =$$

$$a = ?$$

$$\Rightarrow \frac{\sin(30)}{67} = \frac{\sin(C)}{73}$$

$$\sin(C) = .5448$$

$$\sin^{-1}(.5448) = C$$

$$C = 33.01^\circ$$

$$C_2 = 146.99^\circ$$

$$\Rightarrow \text{Using } C_1$$

$$A + 30^\circ + 33.01^\circ = 180^\circ$$

$$A = 116.99^\circ$$

$$\frac{a}{\sin(116.99^\circ)} = \frac{67}{\sin(30^\circ)}$$

$$a = \frac{67}{\sin(30^\circ)} \cdot \sin(116.99^\circ)$$

$$a = 119.41$$

$$\Rightarrow \text{Using } C_2$$

$$A + 30^\circ + 146.99^\circ = 180^\circ$$

$$A = 3.01^\circ$$

$$\frac{a}{\sin(3.01^\circ)} = \frac{67}{\sin(30^\circ)}$$

$$a = \frac{67}{\sin(30^\circ)} \cdot \sin(3.01^\circ)$$

$$a = 7.04$$

$$\therefore C = 33^\circ, A = 117^\circ, a = 119.4$$

or

$$C = 147^\circ, A = 3^\circ, a = 7$$

2.

a.

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

$$b = \sqrt{a^2 + c^2 - 2ac \cos B}$$

$$b = \sqrt{16^2 + 61^2 - 2(16)(61) \cos(117)}$$

$$b = 69.74$$

Next, find angle A or C

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b}$$

$$\sin(A) = \frac{\sin(B) a}{b}$$

$$A = \sin^{-1}\left(\frac{16 \sin(117)}{69.74}\right) = 11.796^\circ$$

$$A + B + C = 180^\circ$$

$$11.796 + 117^\circ + C = 180$$

$$C = 51.204^\circ$$

b.

$$a = 59$$

$$b = 70$$

$$c = 38$$

$$A = 57.44^\circ$$

$$B = 89.68^\circ$$

$$C = 32.87^\circ$$

• First, find an angle, usually the largest one

$$\Rightarrow b^2 = a^2 + c^2 - 2ac \cos(B)$$

$$\frac{a^2 - b^2 + c^2}{2ac} = \cos B$$

$$B = \cos^{-1}\left(\frac{59^2 + 38^2 - 70^2}{2 \cdot 59 \cdot 38}\right) = 89.68^\circ$$

$$\Rightarrow \frac{\sin(A)}{a} = \frac{\sin(B)}{b}$$

$$\sin(A) = \frac{\sin(B) a}{b}$$

$$A = \sin^{-1}\left(\frac{\sin(89.68^\circ) \cdot 59}{70}\right) = 57.44^\circ$$

$$A + B + C = 180^\circ$$

$$57.44^\circ + 89.68^\circ + C = 180^\circ$$

$$C = 32.87^\circ$$

C.

$$A = ? \quad a = 10 \quad b^2 = a^2 + c^2 - 2ac \cos(B)$$

$$B = 34^\circ \quad b = ? \quad b = \sqrt{10^2 + 40^2 - 2(10)(40)\cos(34^\circ)}$$

$$c = ? \quad c = 40 \quad b = 32.1489$$

$$\Rightarrow \frac{\sin(A)}{a} = \frac{\sin(B)}{b}$$

$$\frac{\sin(A)}{10} = \frac{\sin(34^\circ)}{32.1489}$$

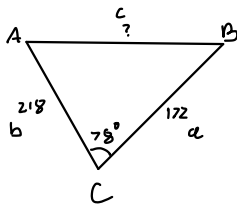
$$A = \sin^{-1}\left(\frac{10\sin(34^\circ)}{32.1489}\right) = 10.001^\circ$$

$$A + B + C = 180^\circ$$

$$10^\circ + 34^\circ + C = 180^\circ$$

$$C = 136^\circ$$

3 a.

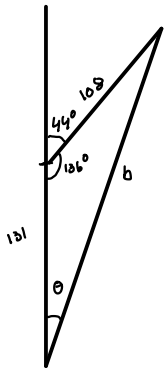


$$c^2 = a^2 + b^2 - 2ab \cos(C)$$

$$c = \sqrt{172^2 + 218^2 - 2(172)(218)\cos(78^\circ)}$$

$$c = 248 \text{ meters}$$

b.



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

$$b = \sqrt{108^2 + 131^2 - 2(108)(131)\cos(136^\circ)}$$

$$b = 221.76$$

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b}$$

$$A = \sin^{-1}\left(\frac{108\sin(136^\circ)}{221.76}\right) = 14.77^\circ$$

or

$$A = 180^\circ - \sin^{-1}\left(\frac{108\sin(136^\circ)}{221.76}\right) = 160.23^\circ$$

Not possible, so must be

$$14.77^\circ$$

C.



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

$$a = \sqrt{110^2 + 101^2 - 2(110)(101)\cos(34^\circ)}$$

$$a = 62.3$$