

Pg 320 Trigonometry Sec 7.3 pg 1 ne
Law of cosines Homework solutions

#19 Given:

$$\angle A = 41.4^\circ$$

$$b = 2.78$$

$$c = 3.92$$

Find

$$a = 2.6$$

$$\angle B = 45.0^\circ$$

$$\angle C =$$

a:

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

$$\Rightarrow a^2 = (2.78)^2 + (3.92)^2 - 2(2.78)(3.92) \cdot \cos(41.4^\circ)$$

$$= 6.7459...$$

$$\Rightarrow a = \sqrt{6.7459...} \approx 2.6$$

$\angle B$:

$$\frac{\sin(41.4^\circ)}{2.6} = \frac{\sin(B)}{2.78}$$

$$\Rightarrow 2.6 \sin(B) = 2.78 \sin(41.4^\circ)$$

$$\Rightarrow \sin(B) = \frac{2.78 \sin(41.4^\circ)}{2.6}$$

$$= .70709...$$

$$\Rightarrow \angle B = \sin^{-1}(.70709...) = 45.0^\circ$$

$\angle C$:

$$\angle C = 180 - 41.4 - 45.0$$

$$= 93.6^\circ$$

#21. Given: $\angle C = 45.6^\circ$

$$b = 8.94 \text{ m}$$

$$a = 7.23 \text{ m}$$

Find $c = 6.5$

$$\angle A = 55.1^\circ$$

$$\angle B = 79.3^\circ$$

NOTE: THESE VALUES DIFFER FROM THE TEXT RESULTS DUE TO ROUNDING DIFFERENCES

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

$$= (7.23)^2 + (8.94)^2 - 2(7.23)(8.94) \cos(45.6^\circ)$$

$$= 41.749...$$

$$\Rightarrow c = \sqrt{41.749...}$$

$$= 6.5$$

$$\angle A: \angle A = 180 - 79.3 - 45.6$$

$$= 55.1^\circ$$

$$\angle B: \frac{\sin(45.6^\circ)}{6.5} = \frac{\sin(B)}{8.94} \Rightarrow 6.5 \sin(B) = 8.94 \sin(45.6^\circ)$$

$$\Rightarrow \sin(B) = \frac{8.94 \sin(45.6^\circ)}{6.5} = .98267...$$

$$\Rightarrow B = \sin^{-1}(.98267...) = 79.3^\circ$$

#23

Given
 $a = 9.3$
 $b = 5.7$
 $c = 8.2$

Find:

$$\begin{aligned} \angle A &= 81.6^\circ \\ \angle B &= 37.7^\circ \\ \angle C &= 60.7^\circ \end{aligned}$$

* Find the Larger Angle first $\Rightarrow$ Angle A

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

$$\Rightarrow (9.3)^2 = (5.7)^2 + (8.2)^2 - 2(5.7)(8.2) \cos(A)$$

$$\Rightarrow -13.24 = -93.48 \cos(A)$$

$$\Rightarrow \cos(A) = \frac{-13.24}{-93.48} = .14163...$$

$$\Rightarrow \angle A = \cos^{-1}(.14163...) = 81.6^\circ$$

 $\angle C$

$$\frac{\sin(C)}{8.2} = \frac{\sin(81.6)}{9.3}$$

$$\Rightarrow \sin(C) = \frac{8.2 \sin(81.6)}{9.3}$$

$$= .87226...$$

$$\Rightarrow \angle C = \sin^{-1}(.87226...) = 60.7^\circ$$

 $\angle B$:

$$\begin{aligned} \angle B &= 180 - 81.6 - 60.7 \\ &= 37.7^\circ \end{aligned}$$

#25

Given

$a = 42.9$
 $b = 37.6$
 $c = 62.7$

Find

$$\begin{aligned} \angle A &= 42.0^\circ \\ \angle B &= 35.9^\circ \\ \angle C &= 102.1^\circ \end{aligned}$$

BIGGEST: $\angle C$:

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

$$(62.7)^2 = (42.9)^2 + (37.6)^2 - 2(42.9)(37.6) \cos(C)$$

$$\Rightarrow 677.12 = -3226.08 \cos(C)$$

$$\Rightarrow \cos(C) = \frac{677.12}{-3226.08} = .20988...$$

$$\begin{aligned} \angle C &= \cos^{-1}(.20988...) \\ &= 102.1^\circ \end{aligned}$$

 $\angle A$:

$$\frac{\sin(A)}{42.9} = \frac{\sin(102.1)}{62.7}$$

$$\Rightarrow \sin(A) = \frac{42.9 \sin(102.1)}{62.7}$$

$$= .66900...$$

$$\begin{aligned} \angle A &= \sin^{-1}(.66900...) \\ &= 42.0^\circ \end{aligned}$$

 $\angle B$:

$$\begin{aligned} \angle B &= 180 - 102.1 - 42.0 \\ &= 35.9^\circ \end{aligned}$$

27. Given Find

$a = 965$	$\angle A = 51.6^\circ$
$b = 876$	$\angle B = 43.9^\circ$
$c = 1240$	$\angle C = 84.5^\circ$

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BIGGEST FIRST:

$\angle C:$ $1240^2 = 965^2 + 876^2 - 2(965)(876)\cos(C)$

$\Rightarrow \frac{-161001}{-1690680} = \cos(C)$

$\Rightarrow \cos(C) = .09522...$
 $\Rightarrow \angle C = \cos^{-1}(.09522...) = 84.5^\circ \checkmark$

$\angle B:$ $\angle B = 180 - 84.5 - 51.6 = 43.9^\circ \checkmark$

$\angle A:$
 $\frac{\sin(84.5^\circ)}{1240} = \frac{\sin(A)}{976}$

$\Rightarrow \sin(A) = \frac{976 \cdot \sin(84.5^\circ)}{1240}$
 $= .78347...$

$\Rightarrow A = \sin^{-1}(.78347...) = 51.6^\circ \checkmark$

31. GIVEN:

$\angle B = 74.8^\circ$
 $a = 8.92$
 $c = 6.43$

Find

$b = 9.5$
$\angle A = 65.0^\circ$
$\angle C = 40.2^\circ$

$b:$ $b^2 = a^2 + c^2 - 2ac\cos(B)$
 $= (8.92)^2 + (6.43)^2 - 2(8.92)(6.43) \cdot \cos(74.8^\circ)$

$\Rightarrow b^2 = 90.835...$
 $\Rightarrow b = \sqrt{90.835...} \approx 9.5$

$\angle A:$ $\frac{\sin(A)}{8.92} = \frac{\sin(74.8^\circ)}{9.5}$
 $\Rightarrow \sin(A) = \frac{8.92 \cdot \sin(74.8^\circ)}{9.5}$
 $= .90609...$

$\Rightarrow A = \sin^{-1}(.90609...) \approx 65.0^\circ$

$\angle C:$
 $\angle C = 180 - 74.8 - 65.0 = 40.2^\circ$