

Trigonometry Sec 7.1 pg 302
Law of Sines Homework solutions

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(13) given $c = 18m$
 $\angle A = 37^\circ$
 $\angle B = 48^\circ$

Find $\angle C = 95^\circ$
 $a = 10.9m$
 $b = 13.4m$

$\angle C:$ $\angle C + 37^\circ + 48^\circ = 180^\circ$
 $\Rightarrow \angle C = (180 - 37 - 48)^\circ$
 $= 95^\circ \checkmark$

$a = \frac{\sin(37^\circ)}{\sin(95^\circ)} = \frac{\sin(95^\circ)}{18}$
 $\Rightarrow a(\sin(95^\circ)) = 18 \cdot \sin(37^\circ)$
 $\Rightarrow a = \frac{18 \cdot \sin(37^\circ)}{\sin(95^\circ)}$

$b = \frac{\sin(48^\circ)}{\sin(95^\circ)} = \frac{\sin(95^\circ)}{18}$
 $= 10.9m \checkmark$

$\Rightarrow b \cdot \sin(95^\circ) = 18 \cdot \sin(48^\circ)$
 $\Rightarrow b = \frac{18 \cdot \sin(48^\circ)}{\sin(95^\circ)} = 13.4m \checkmark$

(14) Given: $a = 43cm$
 $\angle B = 52^\circ$
 $\angle C = 29^\circ$

Find: $\angle A = 99^\circ$
 $b = 34.3cm$
 $c = 21.1cm$

$\angle A:$ $\angle A + 52^\circ + 29^\circ = 180^\circ$
 $\Rightarrow \angle A = 180 - 52 - 29$
 $= 99^\circ$

$b = \frac{\sin(52^\circ)}{\sin(99^\circ)} = \frac{\sin(99^\circ)}{43}$

$\Rightarrow b \sin(99^\circ) = 43 \sin(52^\circ)$

$\Rightarrow b = \frac{43 \cdot \sin(52^\circ)}{\sin(99^\circ)} = 34.3cm$

$c = \frac{\sin(29^\circ)}{\sin(99^\circ)} = \frac{\sin(99^\circ)}{43}$

$\Rightarrow c \sin(99^\circ) = 43 \cdot \sin(29^\circ)$

$\Rightarrow c = \frac{43 \cdot \sin(29^\circ)}{\sin(99^\circ)}$

$= 21.1cm$

(15) Given: $c = 76.0 \text{ ft}$
 $\angle A = 27.2^\circ$
 $\angle C = 115.5^\circ$

Find: $\angle B = 37.3^\circ$
 $a = 38.5 \text{ ft}$
 $b = 51.0 \text{ ft}$

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$\angle B: \angle B + 27.2 + 115.5 = 180$

$\Rightarrow \angle B = 180 - 27.2 - 115.5$
 $= 37.3^\circ$

$a = \frac{\sin(27.2^\circ)}{\sin(115.5^\circ)} = \frac{\sin(115.5^\circ)}{76}$

$\Rightarrow a \cdot \sin(115.5^\circ) = 76 \sin(27.2^\circ)$

$\Rightarrow a = \frac{76 \sin(27.2^\circ)}{\sin(115.5^\circ)} = 38.5$

$b: \frac{\sin(37.3^\circ)}{b} = \frac{\sin(115.5^\circ)}{76}$

$\Rightarrow b \cdot \sin(115.5^\circ) = 76 \cdot \sin(37.3^\circ)$

$\Rightarrow b = \frac{76 \sin(37.3^\circ)}{\sin(115.5^\circ)} = 51.0$

(16) Given $\angle C = 124.1^\circ$
 $\angle B = 18.7^\circ$
 $b = 94.6 \text{ m}$

Find: $\angle A = 37.2^\circ$
 $a = 178.4 \text{ m}$
 $c = 244.3 \text{ m}$

$\angle A: \angle A + 124.1 + 18.7 = 180$

$\Rightarrow \angle A = 180 - 124.1 - 18.7$
 $= 37.2^\circ$

$a = \frac{\sin(37.2^\circ)}{\sin(18.7^\circ)} = \frac{\sin(18.7^\circ)}{94.6}$

$\Rightarrow a \cdot \sin(18.7^\circ) = 94.6 \cdot \sin(37.2^\circ)$

$\Rightarrow a = \frac{94.6 \cdot \sin(37.2^\circ)}{\sin(18.7^\circ)}$

$= 178.4$

$c: \frac{\sin(124.1^\circ)}{c} = \frac{\sin(18.7^\circ)}{94.6}$

$\Rightarrow c \cdot \sin(18.7^\circ) = 94.6 \cdot \sin(124.1^\circ)$

$\Rightarrow c = \frac{94.6 \cdot \sin(124.1^\circ)}{\sin(18.7^\circ)} = 244.3$

#17 Given: $\angle A = 68.41^\circ$
 $\angle B = 54.23^\circ$
 $a = 12.75 \text{ ft}$

Find:
 $\angle C = 57.36^\circ$
 $b = 11.1 \text{ ft}$
 $c = 11.2 \text{ ft}$

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$\angle C:$
 $\angle C = 180 - 68.41 - 54.23$
 $= 57.36^\circ \checkmark$

$b:$

$$\frac{\sin(54.23^\circ)}{b} = \frac{\sin(68.41^\circ)}{12.75}$$

$\Rightarrow b \cdot \sin(68.41^\circ) = 12.75 \sin(54.23^\circ)$

$\Rightarrow b = \frac{12.75 \sin(54.23^\circ)}{\sin(68.41^\circ)}$

$c:$

$$\frac{\sin(57.36^\circ)}{c} = \frac{\sin(68.41^\circ)}{12.75} = 11.1 \checkmark$$

$\Rightarrow c \cdot \sin(68.41^\circ) = 12.75 \sin(57.36^\circ)$

$\Rightarrow c = \frac{12.75 \sin(57.36^\circ)}{\sin(68.41^\circ)} = 11.2 \checkmark$

#18 Given $\angle C = 74.08^\circ$
 $\angle B = 69.38^\circ$
 $c = 45.38 \text{ m}$

Find: $\angle A = 36.54^\circ$
 $a = 28.10 \text{ m}$
 $b = 44.2 \text{ m}$

$\angle A:$
 $\angle A + 74.08 + 69.38 = 180$
 $\Rightarrow \angle A = 180 - 74.08 - 69.38$
 $= 36.54^\circ \checkmark$

$a:$

$$\frac{\sin(36.54^\circ)}{a} = \frac{\sin(74.08^\circ)}{45.38}$$

$\Rightarrow a \cdot \sin(74.08^\circ) = 45.38 \cdot \sin(36.54^\circ)$

$\Rightarrow a = \frac{45.38 \sin(36.54^\circ)}{\sin(74.08^\circ)}$

$b:$

$$\frac{\sin(69.38^\circ)}{b} = \frac{\sin(74.08^\circ)}{45.38 \text{ m}} = 28.10 \checkmark$$

$\Rightarrow b \cdot \sin(74.08^\circ) = 45.38 \sin(69.38^\circ)$

$\Rightarrow b = \frac{45.38 \sin(69.38^\circ)}{\sin(74.08^\circ)} = 44.2 \checkmark$

GIVEN:
 #19. $\angle A = 87.2^\circ$
 $\angle C = 74.3^\circ$
 $b = 75.9$

Find:
 $\angle B = 18.5^\circ$
 $a = 238.9$
 $c = 230.3$

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$\angle B: \angle B = 180 - 87.2 - 74.3$
 $= 18.5^\circ \checkmark$

$a: \frac{\sin(87.2^\circ)}{a} = \frac{\sin(18.5^\circ)}{75.9}$

$\Rightarrow a \cdot \sin(18.5^\circ) = 75.9 \sin(87.2^\circ)$

$\Rightarrow a = \frac{75.9 \sin(87.2^\circ)}{\sin(18.5^\circ)}$

$= 238.9 \checkmark$

$c: \frac{\sin(74.3^\circ)}{c} = \frac{\sin(18.5^\circ)}{75.9}$

$\Rightarrow c \cdot \sin(18.5^\circ) = 75.9 \sin(74.3^\circ)$

$\Rightarrow c = \frac{75.9 \sin(74.3^\circ)}{\sin(18.5^\circ)} = 230.3 \checkmark$

GIVEN:
 #23. $\angle A = 39.70^\circ$
 $\angle C = 30.35^\circ$
 $b = 39.74$

Find: $\angle B = 109.95^\circ$
 $a = 27.0$
 $c = 21.4$

$a: \frac{\sin(39.70^\circ)}{a} = \frac{\sin(109.95^\circ)}{39.74}$

$\angle B: \angle B = 180 - 39.70 - 30.35$
 $= 109.95^\circ \checkmark$

$\Rightarrow a \cdot \sin(109.95^\circ) = 39.74 \sin(39.70^\circ)$

$\Rightarrow a = \frac{39.74 \sin(39.70^\circ)}{\sin(109.95^\circ)}$

$= 27.0 \checkmark$

$c: \frac{\sin(30.35^\circ)}{c} = \frac{\sin(109.95^\circ)}{39.74}$

$\Rightarrow c \cdot \sin(109.95^\circ) = 39.74 \sin(30.35^\circ)$

$\Rightarrow c = \frac{39.74 \sin(30.35^\circ)}{\sin(109.95^\circ)} = 21.4 \checkmark$