

5.3 The Law of Sines

3. Answers:

$$d. \frac{\sin 40.3^\circ}{l} = \frac{\sin 123.5^\circ}{6.3}, l = 4.9$$

$$e. \frac{\sin 9^\circ}{o} = \frac{\sin 31^\circ}{15}, o = 4.6$$

$$f. \frac{\sin 127^\circ}{q} = \frac{\sin 21.8^\circ}{3.62}, q = 7.8$$

$$4. \angle G = 180^\circ - 62.1^\circ - 21.3^\circ = 96.6^\circ$$

$$\frac{\sin 96.6^\circ}{g} = \frac{\sin 21.3^\circ}{108}, g = 295.3$$

$$\frac{\sin 62.1^\circ}{h} = \frac{\sin 21.3^\circ}{108}, h = 262.8$$

5.

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

Law of Sines

$$a(\sin B) = b(\sin A)$$

Cross multiply

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

Divide by $b(\sin B)$

6. Answers:

$$a. \tan 54^\circ = \frac{h}{7.15} \rightarrow h = 9.8, \cos 67^\circ = \frac{9.8}{x} \rightarrow x = 25.2$$

b. The angle we are finding is the one at the far left side of the triangle.

$$8.9^2 = 11.2^2 + 12.6^2 - 2 \cdot 11.2 \cdot 12.6 \cos A \rightarrow A = 43.4^\circ$$

$$\frac{\sin 43.4^\circ}{x} = \frac{\sin 31^\circ}{11.2} \rightarrow x = 14.9$$

7. First we need to find the other two sides in the triangle.

- $\frac{\sin 64^\circ}{218} = \frac{\sin 11^\circ}{x} = \frac{\sin 105^\circ}{y}, x = 46.3, y = 234.3$, where y is the length of the original flight plan.
- The modified flight plan is $218 + 46.3 = 264.3$.
- Dividing both by 495 mi/hr, we get 32 min (modified) and 28.4 min (original).
- Therefore, the modified flight plan is 3.6 minutes longer.

8. First, we need to find the distance between Stop B (B) and Stop C (C).

- $\frac{\sin 36^\circ}{12.3} = \frac{\sin 41^\circ}{B} = \frac{\sin 103^\circ}{C}, B = 13.7, C = 20.4$.
- The total length of her route is $1.1 + 12.3 + 13.7 + 20.4 + 1.1 = 48.6$ miles.
- Dividing this by 45 mi/hr, we get that it will take her 1.08 hours, or 64.8 minutes, of actual driving time.
- In addition to the driving time, it will take her 6 minutes (three stops at 2 minutes per stop) to deliver the three packages, for a total roundtrip time of 70.8 minutes.
- Subtracting this 70.8 minutes from 10:00 am, she will need to leave by 8:49 am.