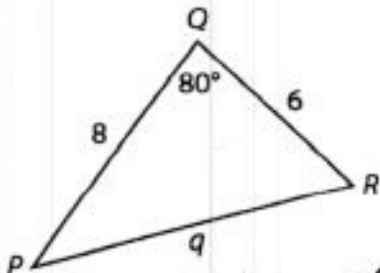


3. What information do you need to be able to use the Law of Cosines to solve a triangle?

SSS or SAS

Solve each triangle. Round to the nearest tenth.

4.



$$q^2 = 8^2 + 6^2 - 2(8)(6)\cos 80^\circ$$

$$q^2 = 83.33$$

$$q = 9.1$$

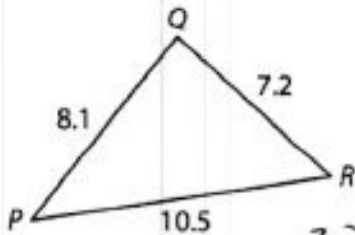
$$P = \cos^{-1}\left(\frac{6^2 - 8^2 - (9.1)^2}{-2(8)(9.1)}\right)$$

$$P = 40.4^\circ$$

$$R = 180 - 80 - 40.4$$

$$R = 59.6^\circ$$

8.



$$P = \cos^{-1}\left(\frac{7.2^2 - 8.1^2 - 10.5^2}{2(8.1)(10.5)}\right)$$

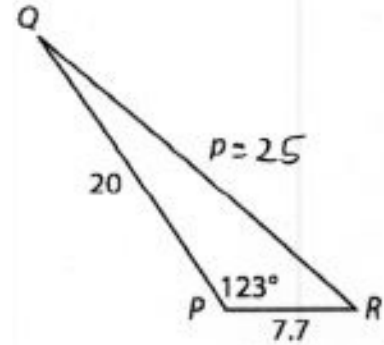
$$P = 43.2^\circ$$

$$Q = \cos^{-1}\left(\frac{10.5^2 - 7.2^2 - 8.1^2}{-2(7.2)(8.1)}\right)$$

$$Q = 86.5^\circ$$

$$R = 50.3^\circ$$

5.



$$p^2 = 20^2 + 7.7^2 - 2(20)(7.7)\cos 123^\circ$$

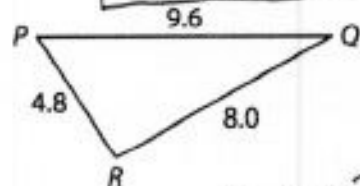
$$p^2 = 427.04$$

$$p = 25$$

$$R = \cos^{-1}\left(\frac{20^2 - 7.7^2 - 25^2}{-2(7.7)(25)}\right) = 42.4^\circ$$

$$Q = 14.6^\circ$$

9.



$$P = \cos^{-1}\left(\frac{8.0^2 - 9.6^2 - 4.8^2}{-2(9.6)(4.8)}\right)$$

$$P = 56.3^\circ$$

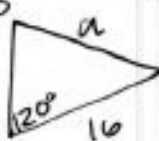
$$Q = \cos^{-1}\left(\frac{4.8^2 - 9.6^2 - 8.0^2}{-2(9.6)(8.0)}\right)$$

$$Q = 29.9^\circ$$

$$R = 93.8^\circ$$

Solve $\triangle ABC$. Round to the nearest tenth.

10. $m\angle A = 120^\circ$, $b = 16$, $c = 20$



$$a^2 = 20^2 + 16^2 - 2(20)(16)\cos 120$$

$$a = 31.2$$

$$B = \cos^{-1}\left(\frac{16^2 - 20^2 - 31.2^2}{-2(20)(31.2)}\right)$$

$$B = 27.7^\circ \quad C = 32.3^\circ$$

14. $a = 5$, $b = 8$, $c = 6$

$$A = \cos^{-1}\left(\frac{5^2 - 8^2 - 6^2}{-2 \cdot 8 \cdot 6}\right) = 38.6^\circ$$

$$B = \cos^{-1}\left(\frac{8^2 - 6^2 - 5^2}{-2(6)(5)}\right) = 92.9^\circ$$

$$C = 48.5^\circ$$

11. $m\angle B = 78^\circ$, $a = 6$, $c = 4$

$$b^2 = 6^2 + 4^2 - 2(6)(4)\cos 78$$

$$b = 6.5$$

$$A = \cos^{-1}\left(\frac{6^2 - 4^2 - 6.5^2}{-2(4)(6.5)}\right) = 64.7^\circ$$

$$C = 37.3^\circ$$

15. $a = 30$, $b = 26$, $c = 35$

$$A = \cos^{-1}\left(\frac{30^2 - 26^2 - 35^2}{-2(26)(35)}\right) = 56.6^\circ$$

$$B = \cos^{-1}\left(\frac{26^2 - 35^2 - 30^2}{-2(35)(30)}\right) = 46.4^\circ$$

$$C = 77^\circ$$

18. Critical Thinking Find the length of \overline{AE} .

$$b^2 = 10^2 + 12^2 - 2 \cdot 10 \cdot 12 \cos 78$$

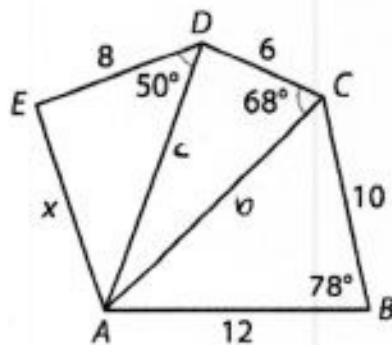
$$b = 13.9$$

$$c^2 = 13.9^2 + 6^2 - 2(13.9)(6)\cos 68^\circ$$

$$c = 12.9$$

$$x^2 = 12.9^2 + 8^2 - 2(12.9)(8)\cos 50$$

$$x = 9.9$$



25. **Explain the Error** Abby uses the Law of Cosines to find $m\angle A$ when $a = 2$, $b = 3$, $c = 5$. The answer she gets is 0° . Did she make an error? Explain.

$$A = \cos^{-1} \left(\frac{2^2 - 3^2 - 5^2}{-2 \cdot 3 \cdot 5} \right) = 0^\circ, \text{ no... but those side lengths do not form a triangle because... } 2 + 3 \not\geq 5$$

22. **Represent Real-World Problem** Two performers hang by their knees from trapezes, as shown.



- a. To the nearest degree, what acute angles A and B must the ropes of each trapeze make with the horizontal if the performer on the left is to grab the wrists of the performer on the right and pull her away from her trapeze?
- b. Later, the performer on the left grabs the trapeze of the performer on the right and lets go of his trapeze. To the nearest degree, what angles A and B must the ropes of each trapeze make with the horizontal for this trick to work?

a.) $A = \cos^{-1} \left(\frac{20^2 - 21^2 - 30^2}{-2 \cdot 21 \cdot 30} \right) = \boxed{41.7^\circ}$
 $B = \cos^{-1} \left(\frac{21^2 - 20^2 - 30^2}{-2 \cdot 20 \cdot 30} \right) = \boxed{44.3^\circ}$

b.) $A = \cos^{-1} \left(\frac{26^2 - 15^2 - 30^2}{-2 \cdot 15 \cdot 30} \right) = \boxed{60^\circ}$
 $B = \cos^{-1} \left(\frac{15^2 - 26^2 - 30^2}{-2 \cdot 26 \cdot 30} \right) = \boxed{30^\circ}$

Review

1. $\sin \theta = -\frac{\sqrt{3}}{2}, 0 \leq \theta \leq 2\pi$

2. $\cot \theta = \text{und}, 0 \leq \theta \leq 2\pi$

$\frac{5\pi}{3}, \frac{4\pi}{3}$

$0, \pi$