Precalc/Trig Name_____ ID: 1

Law of Sines Ambiguous Case

Date_____ Period____

State the number of possible triangles that can be formed using the given measurements.

1) $m\angle A = 110°$, $c = 19$ cm, $a = 32$ cm

2) $m\angle A = 131°$, $a = 25$ yd, $c = 8$ yd

3) $m\angle B = 100°$, $a = 33$ km, $b = 29$ km

4) $m\angle B = 61°$, $a = 35$ mi, $b = 32$ mi

5) $m\angle A = 68°$, $c = 34$ yd, $a = 9$ yd

6) $m\angle A = 57°$, $c = 27$ m, $a = 25$ m

Solve each triangle. Round your answers to the nearest tenth.

7) $m\angle B = 27°$, $a = 28$ ft, $b = 18$ ft

8) $m\angle C = 54°$, $b = 24$ km, $c = 23$ km

9) $m\angle A = 32°$, $a = 17$ cm, $c = 5$ cm

10) $m\angle A = 52°$, $c = 29$ mi, $a = 27$ mi

11) $m\angle B = 135°$, $m\angle C = 6°$, $b = 27$ yd

12) $m\angle B = 34°$, $m\angle C = 53°$, $b = 14$ mi

13) $m\angle A = 47°$, $c = 34$ mi, $a = 33$ mi

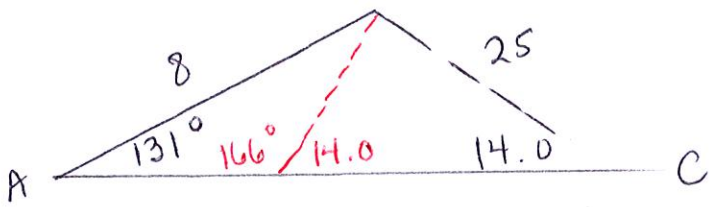
14) $m\angle B = 12°$, $m\angle C = 16°$, $a = 34$ km

15) $m\angle B = 24°$, $m\angle C = 40°$, $b = 19$ km

16) $m\angle B = 64°$, $a = 34$ ft, $b = 33$ ft

Ambiguous Case WS

2. $m\angle A = 131^\circ$, $a = 25$ yds, $c = 8$ yds | 1 triangle only



$$\frac{\sin 131^\circ}{25} = \frac{\sin C}{8}$$

$$\sin C = \frac{8 \sin 131^\circ}{25}$$

$$C = \sin^{-1}\left(\frac{8 \sin 131^\circ}{25}\right)$$

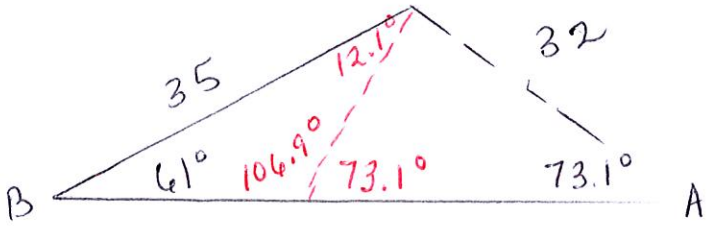
$$C \approx 14.0$$

A 2nd Δ is NOT POSSIBLE.

$$\begin{array}{r} 180^\circ \\ -131^\circ \\ -166^\circ \\ \hline -117^\circ \end{array}$$

The 3rd angle would need to be -117° in order to sum to 180°.

4. $m\angle B = 61^\circ$, $a = 35$, $b = 32$ | 2 triangles exist



$$\frac{\sin 61^\circ}{32} = \frac{\sin A}{35}$$

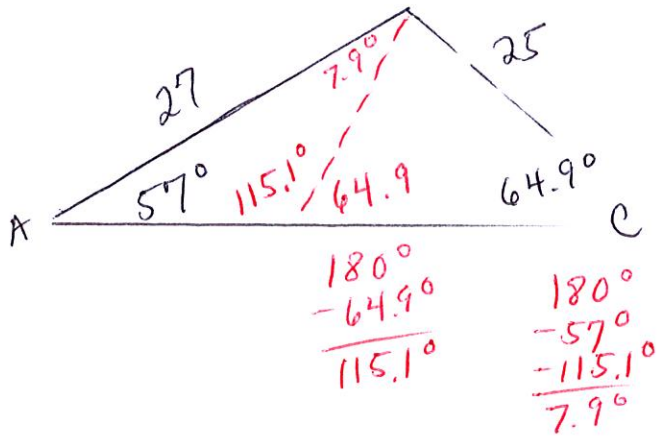
$$\sin^{-1}\left(\frac{35 \cdot \sin 61^\circ}{32}\right) = \sin A$$

$$A \approx 73.1^\circ$$

$$\begin{array}{r} 180^\circ \\ -73.1^\circ \\ \hline 106.9^\circ \end{array} \qquad \begin{array}{r} 180^\circ \\ -61^\circ \\ -106.9^\circ \\ \hline 12.1^\circ \end{array}$$

6. $m\angle A = 57^\circ, c = 27, a = 25$

2 triangles exist



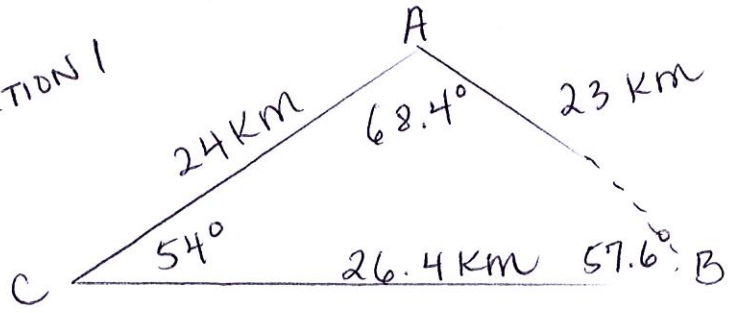
$$\frac{\sin 57^\circ}{25} = \frac{\sin c}{27}$$

$$\sin^{-1}\left(\frac{27 \sin 57^\circ}{25}\right) = \sin c$$

$$c \approx 64.9^\circ$$

8. $m\angle C = 54^\circ$, $b = 24$ Km, $c = 23$ Km

SOLUTION 1



$$\frac{\sin 54^\circ}{23} = \frac{\sin B}{24}$$

$$\sin^{-1}\left(\frac{24 \sin 54^\circ}{23}\right) = \sin B$$

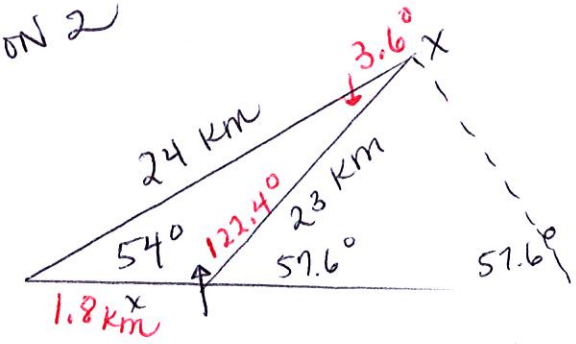
$$B \approx 57.6^\circ$$

$$\frac{\sin 54^\circ}{23} = \frac{\sin 68.4^\circ}{a}$$

$$a = \frac{23 \sin 68.4^\circ}{\sin 54^\circ}$$

$$a \approx 26.4$$

SOLUTION 2



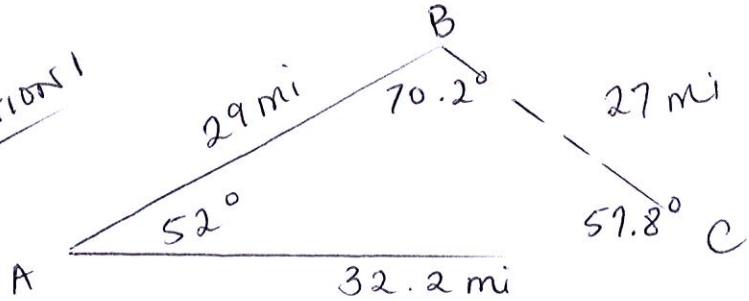
$$\frac{\sin 54^\circ}{23} = \frac{\sin 3.6^\circ}{x}$$

$$x = \frac{23 \sin 3.6^\circ}{\sin 54^\circ}$$

$$x \approx 1.8 \text{ Km}$$

10. $m\angle A = 52°$, $c = 29$ mi, $a = 27$ mi

SOLUTION 1



$$\frac{\sin 52°}{27} = \frac{\sin C}{29}$$

$$\sin^{-1}\left(\frac{29 \sin 52°}{27}\right) = \sin C$$

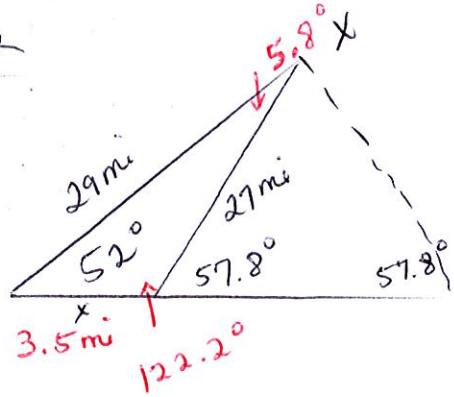
$$C \approx 57.8°$$

$$\frac{\sin 52°}{27} = \frac{\sin 70.2°}{b}$$

$$b = \frac{27 \sin 70.2°}{\sin 52°}$$

$$b \approx 32.2$$

SOLUTION 2



$$\frac{\sin 52°}{27} = \frac{\sin 5.8°}{x}$$

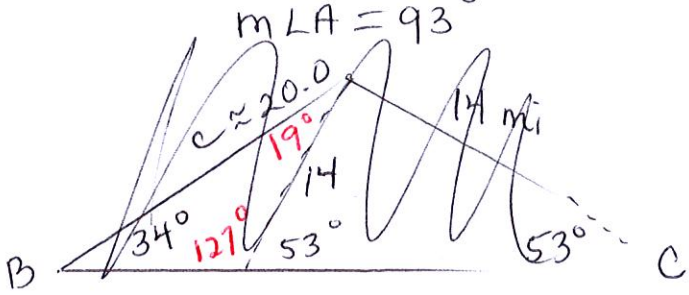
$$x = 27 \frac{\sin 5.8°}{\sin 52°}$$

$$x \approx 3.5$$

12. $\boxed{m\angle B = 34^\circ, m\angle C = 53^\circ}$, $b = 14$ mi

AAS

$m\angle A = 93^\circ$



$$\frac{\sin 34^\circ}{14} = \frac{\sin 53^\circ}{c}$$

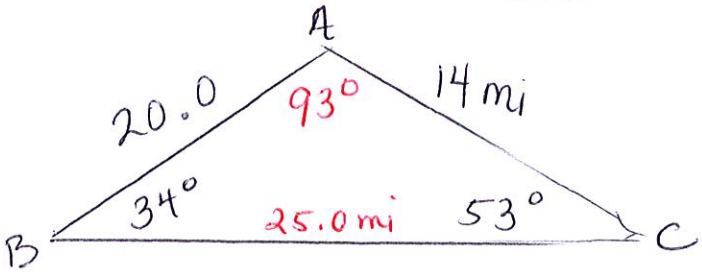
$$c = \frac{14 \sin 53^\circ}{\sin 34^\circ}$$

$$c \approx 20.0$$

$$\cancel{\frac{\sin 34^\circ}{14} = \frac{\sin 19}{x}}$$

$$\cancel{x = \frac{14 \sin 19^\circ}{\sin 34^\circ}}$$

There is no AMBIGUITY HERE. GIVEN ARE 2 ANGLES AND A SIDE. SIMPLY SOLVE FOR GIVEN Δ.



$$\frac{\sin 34^\circ}{14} = \frac{\sin 93^\circ}{a}$$

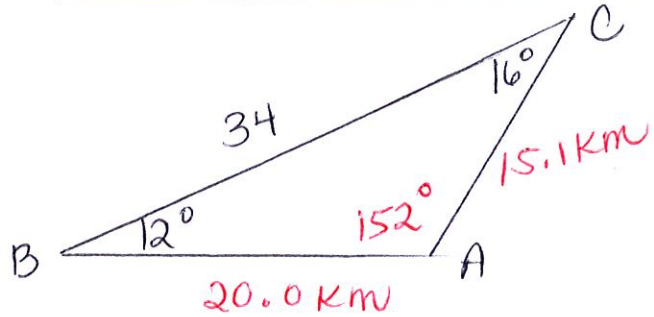
$$a = \frac{14 \sin 93^\circ}{\sin 34^\circ}$$

$$a \approx 25.0$$

14. $m\angle B = 12°$, $m\angle C = 16°$, $a = 34$ km

AAS

NO NEED TO TEST



$$\frac{\sin 152°}{34} = \frac{\sin 12°}{b}$$

$$b = \frac{34 \sin 12°}{\sin 152°}$$

$$b \approx 15.1$$

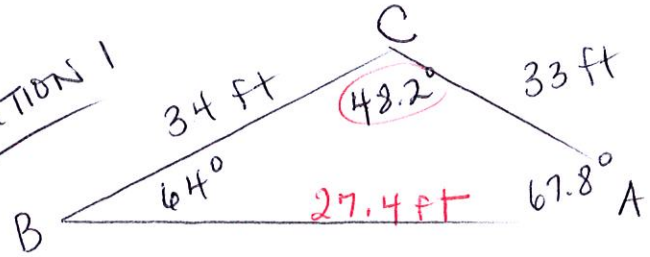
$$\frac{\sin 152°}{34} = \frac{\sin 16°}{c}$$

$$c = \frac{34 \sin 16°}{\sin 152°}$$

$$c \approx 20.0$$

16. $m\angle B = 64°$, $a = 34$ ft, $b = 33$ ft

SOLUTION 1



$$\frac{\sin 64°}{33} = \frac{\sin A}{34}$$

$$\sin^{-1}\left(\frac{34 \sin 64°}{33}\right) = \sin A$$

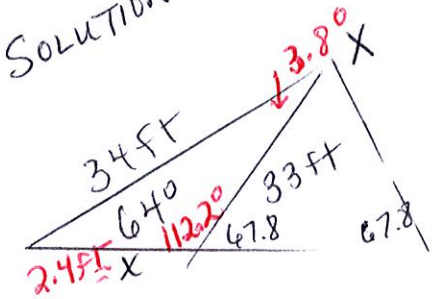
$$A \approx 67.8°$$

$$\frac{\sin 64°}{33} = \frac{\sin 48.2°}{c}$$

$$c = \frac{33 \sin 48.2°}{\sin 64°}$$

$$c \approx 27.4$$

SOLUTION 2



$$\frac{\sin 64°}{33} = \frac{\sin 3.8°}{x}$$

$$x = \frac{33 \sin 3.8°}{\sin 64°}$$

$$x \approx 2.4$$