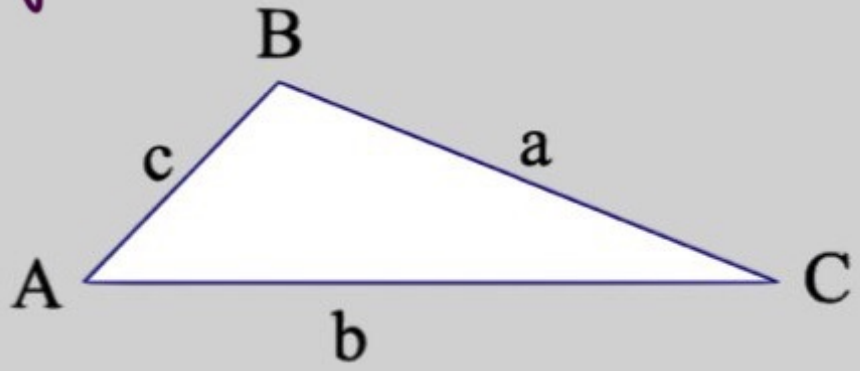
10.2 Law of Cosines

SSS → find angle

SAS → find side

LAW OF COSINES

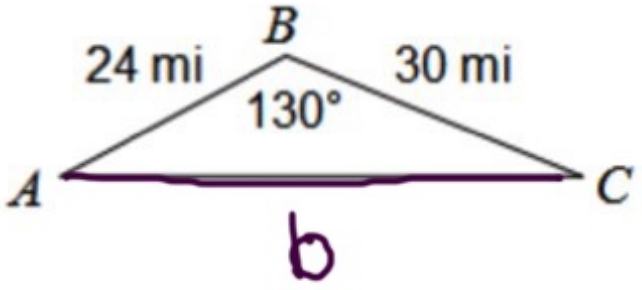
$$c^2 = a^2 + b^2 - 2ab\cos C$$



opposite angle/side are on opposite sides of the equation

*you will always be solving for one of these

N. Find *AC*.



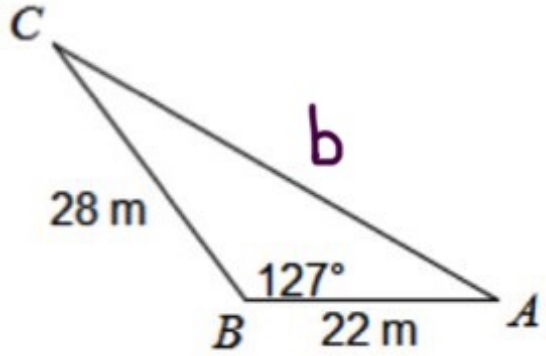
$b^2 = 24^2 + 30^2 - 2(24)(30)\cos 130°$

Plug into calculator on a single line

$\sqrt{b^2} = \sqrt{2401.61}$

$b = 49.01$ mi

O. Find *AC*.

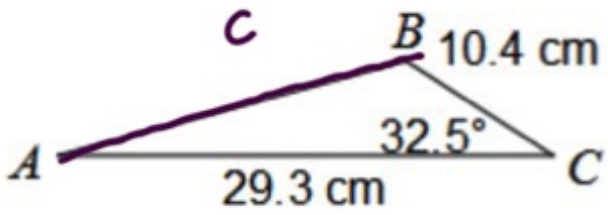


$b^2 = 28^2 + 22^2 - 2(28)(22)\cos 127°$

$\sqrt{b^2} = \sqrt{2009.44}$

$b = 44.83$

P. Find *AB*.

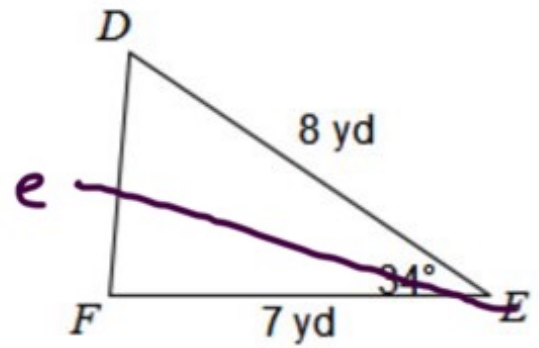


$c^2 = 10.4^2 + 29.3^2 - 2(29.3)(10.4)\cos 32.5$

$\sqrt{c^2} = \sqrt{452.65}$

$c = 21.28$ cm

Q. Find *DF*.

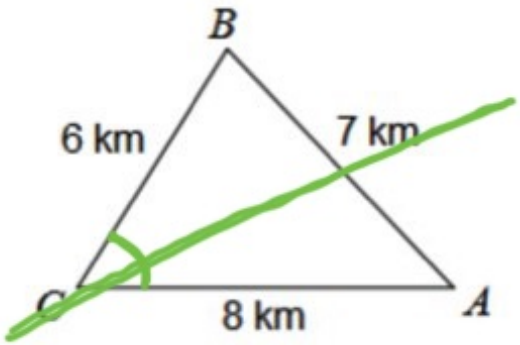


$e^2 = 7^2 + 8^2 - 2(7)(8)\cos 34°$

$\sqrt{e^2} = \sqrt{20.15}$

$e = 4.49$ yd

R. Find $m\angle C$.



$7^2 = 6^2 + 8^2 - 2(6)(8)\cos C$

$49 = 100 - 96\cos C$

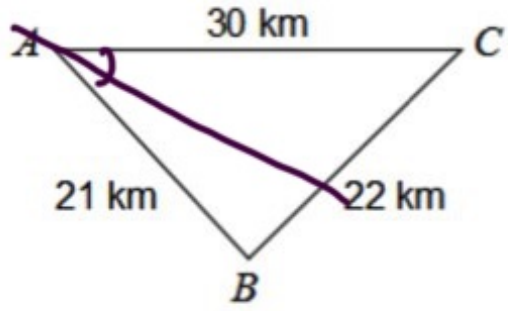
$-100 \quad -100$

$\frac{-51}{-96} = \frac{-96\cos C}{-96}$

$\cos^{-1}(\cos C) = \cos^{-1}(0.531)$

$C = 58°$

S. Find $m\angle A$.



$22^2 = 21^2 + 30^2 - 2(21)(30)\cos A$

$484 = 1341 - 1260\cos A$

$-1341 \quad -1341$

$\frac{-857}{-1260} = \frac{-1260\cos A}{-1260}$

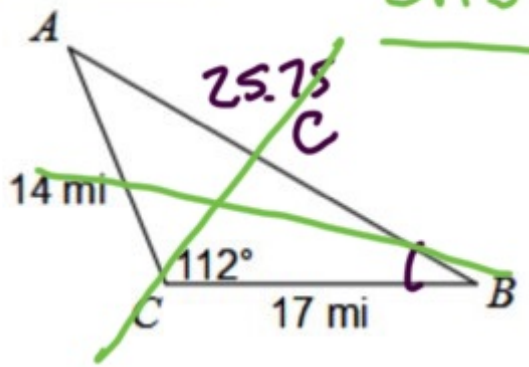
$\cos^{-1}(\cos C) = \cos^{-1}(0.68)$

$C = 47°$

EXAMPLE

Use the Law of Sines AND the Law of Cosines to find each measure indicated. If there is not enough information, write NEI.

T. Find $m\angle B$.



SAS → use cosines to find c

$c^2 = 14^2 + 17^2 - 2(14)(17)\cos 112°$

$\sqrt{c^2} = \sqrt{663.61}$

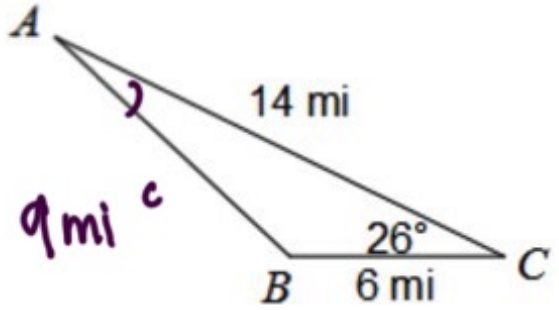
$c = 25.75$ mi

Use sines to find $\angle B$

$\frac{14}{1} \cdot \frac{\sin B}{14} = \frac{\sin 112°}{25.75} \cdot \frac{14}{1}$

$\sin^{-1}(\sin B) = \sin^{-1}(0.504)$ → $\boxed{B = 30°}$

U. Find $m\angle A$.



$c^2 = 6^2 + 14^2 - 2(6)(14)\cos 26°$

$\sqrt{c^2} = \sqrt{81.00}$

$c = 9$ mi

$\frac{6}{1} \cdot \frac{\sin A}{6} = \frac{\sin 26°}{9} \cdot \frac{6}{1}$

$\sin^{-1}(\sin A) = \sin^{-1}(0.292)$

$A = 17°$

LAW OF SINES

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

Find side

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

Find angle

Use when:

ASA
AAS
> Find side

SSA → find angle

LAW OF COSINES

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

Use when:

SSS → find angle

SAS → find side