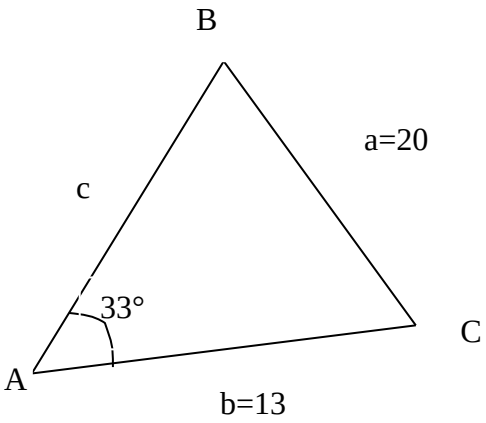
Answer on Question #42449 – Math – Analytic Geometry

Task

Solve the triangle.

A = 33°, a = 20, b = 13

Solution



Use the law of cosines to find side c:

$a^2 = b^2 + c^2 - 2bc\cos A$

Find the discriminant:

$D = 2b\cos A - 4(b^2 - a^2) = 2\cdot 13\cos 33^0 - 4(13^2 - 20^2) = 945.8062 \ (\cos 33^0 = 0.8387)$

$c_1 = \frac{2b\cos A + \sqrt{D}}{2} = \frac{2\cdot 13\cdot 0.8387 + \sqrt{945.8063}}{2} = 29.6081$

$c_2 = \frac{2b\cos A - \sqrt{D}}{2} = \frac{2\cdot 13\cdot 0.8387 - \sqrt{945.8063}}{2} = -7.802$

We choose $c = c_1$ because $c > 0$.

Use the law of sines to find the angle B:

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

$\sin B = \frac{13}{20}\sin 33^0 = \frac{13}{20}\cdot 0.5446 = 0.354 \Rightarrow B = \arcsin 0.354 = 20,73^0$

Known $A + B + C = 180^0$.

$C = 180^0 - A - B = 180^0 - 33^0 - 20.73^0 = 126.27^0$.

Answer:

$a = 20$

$b = 13$

$c = 29.6081$

$A = 33^0$

$B = 20.73^0$

$C = 126.27^0$