

Answer on question 42445 – Math - Geometry

Solve the triangle. $B = 36^\circ$, $a = 38$, $c = 18$.

Solution:

1) Use the Law of Cosines to find the side b :

$$\cos(36^\circ) = \frac{1 + \sqrt{5}}{4} \approx 0.809017$$

$$b^2 = a^2 + c^2 - 2ac \cos(B) = 38^2 + 18^2 - 2 \cdot 38 \cdot 18 \cdot \cos(36^\circ) \\ \approx 1444 + 324 - 1368 \cdot 0.809017 \approx 661.264744$$

$$b \approx \sqrt{661.264744} \approx 25.715 \text{ (rounded to 3 decimal places)}$$

2) Use the Law of Cosines to find angle A :

$$\cos(A) = \frac{b^2 + c^2 - a^2}{2bc} \approx \frac{661.264744 + 324 - 1444}{2 \cdot 25.715 \cdot 18} \approx \frac{-458.735256}{925.74} \approx -0.4955$$

$$A \approx \arccos(-0.4955) \approx 119.7^\circ \text{ (rounded to 1 decimal place)}$$

3) Use the Law of Sine to find angle C :

$$\frac{25.715}{\sin(36^\circ)} = \frac{18}{\sin(C)} \Rightarrow \sin(C) \approx \frac{18 \sin(36^\circ)}{25.715} \approx 0.4114$$

$$C \approx \arcsin(0.4114) \approx 24.3^\circ$$

Answer: $b = 25.715$, $A = 119.7^\circ$, $C = 24.3^\circ$.