Trigonometry with General Triangles

Solutions

Finding Missing Sides in a General Triangle

Finding Missing Angles in a General Triangle

Finding Missing Sides in a General Triangle

Q1) a) $\frac{a}{Sin\ 34°} = \frac{b}{Sin\ B} = \frac{c}{Sin\ 75°}$

$\frac{a}{Sin\ 34°} = \frac{b}{Sin\ B} = \frac{10}{Sin\ 75°}$

$\frac{a}{Sin\ 34°} = \frac{10}{Sin\ 75°}$

Rearranging gives

$a = \frac{10\ Sin\ 34°}{Sin\ 75°}$

$a = 5.8$ cm

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

$\frac{16}{Sin\ 83°} = \frac{b}{Sin\ 38°} = \frac{c}{Sin\ C}$

$\frac{16}{Sin\ 83°} = \frac{b}{Sin\ 38°}$

Rearranging gives

$b = \frac{16\ Sin\ 38°}{Sin\ 83°}$

$b = 9.9$ cm

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

$\frac{a}{Sin\ A} = \frac{12.5}{Sin\ 115°} = \frac{c}{Sin\ 47°}$

$\frac{12.5}{Sin\ 115°} = \frac{c}{Sin\ 47°}$

Rearranging gives

$c = \frac{12.5\ Sin\ 47°}{Sin\ 115°}$

$c = 10.2$ cm

Q2) a) $a^2 = b^2 + c^2 - 2bc\ Cos\ A$

$a^2 = 12^2 + 9^2 - 2 \cdot 12 \cdot 9\ Cos\ 60°$

$= 225 - 108$

$= 117$

$a = \sqrt{117} = 10.8\ cm$

b) $b^2 = a^2 + c^2 - 2ac\ Cos\ B$

$b^2 = 6^2 + 4^2 - 2 \cdot 6 \cdot 4\ Cos\ 110°$

$= 50 + 16.42$

$= 66.42$

$b = \sqrt{66.42}$

$= 8.1\ cm$

c) $r^2 = p^2 + q^2 - 2pq\ Cos\ R$

$r^2 = 9.6^2 + 18^2 - 2 \cdot 9.6 \cdot 18\ Cos\ 58°$

$= 416.16 - 183.1$

$= 233.06$

$r = \sqrt{233.06}$

$= 15.3\ cm$

Finding Missing Angles in a General Triangle

Q1) a) $\frac{Sin\ A}{a} = \frac{Sin\ B}{b} = \frac{Sin\ C}{c}$

$\frac{Sin\ x}{5.8} = \frac{Sin\ B}{b} = \frac{Sin\ 67.5°}{7.2}$

$\frac{Sin\ x}{5.8} = \frac{Sin\ 67.5°}{7.2}$

$Sin\ x = \frac{5.8\ Sin\ 67.5}{7.2}$

$Sin\ x = 0.744$

$x = sin^{-1}(0.744)$

$x = 48°$

$x = 46°$

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

$\frac{Sin\ x}{4.5} = \frac{Sin\ B}{b} = \frac{Sin\ 80°}{6.2}$

$\frac{Sin\ x}{4.5} = \frac{Sin\ 80°}{6.2}$

$Sin\ x = \frac{4.5\ Sin\ 80°}{6.2}$

$Sin\ x = 0.7$

$x = sin^{-1}(0.7)$

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

$\frac{Sin\ x}{a} = \frac{Sin\ B}{9.7} = \frac{Sin\ 60°}{12.4}$

$Sin\ x = \frac{9.7\ Sin\ 60°}{12.4}$

$Sin\ x = 0.677$

$x = sin^{-1}(0.677) = 43°$

Q2) a) $Cos\ A = \frac{b^2 + c^2 - a^2}{2bc}$

$Cos\ A = \frac{8^2 + 11^2 - 6^2}{2 \cdot 8 \cdot 11}$

$Cos\ A = 0.85$

$A = cos^{-1}(0.85)$

$A = 31.8°$

b) $Cos\ A = \frac{b^2 + c^2 - a^2}{2bc}$

$Cos\ A = \frac{5.8^2 + 6.2^2 - 4.2^2}{2 \cdot 5.8 \cdot 6.2}$

$Cos\ A = 0.76$

$A = cos^{-1}(0.76)$

$A = 40.8°$

c) $Cos\ P = \frac{q^2 + r^2 - p^2}{2qr}$

$Cos\ P = \frac{11^2 + 12^2 - 9^2}{2 \cdot 11 \cdot 12}$

$Cos\ P = 0.69$

$P = cos^{-1}(0.69)$

$P = 45.8°$