

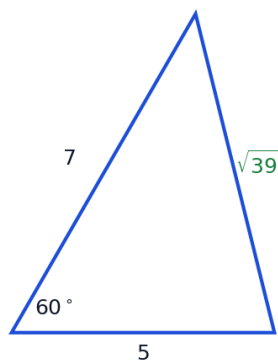
Solutions

7.1 Law of Sines and Law of Cosines

7.1.1. Two sides of lengths 5 and 7 enclose a 60° angle. Find the third side.

Solution. The law of cosines gives $c^2 = 25 + 49 - 2(5)(7)\cos 60^\circ = 39$. Thus $c = \sqrt{39}$.

Two sides and the included angle



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The opposite side is $\text{sqrt}(39)$.

7.1.2. For sides $a = 3$, $b = 4$, $c = 5$, find angle C using the law of cosines.

Solution. $\cos C = (9 + 16 - 25)/(2 \cdot 3 \cdot 4) = 0$, so $C = 90^\circ$.

7.1.3. If $A = 30^\circ$, $B = 60^\circ$, and $a = 6$, find b and C.

Solution. $C = 90^\circ$ and $b = 6\sin 60^\circ / \sin 30^\circ = 6\sqrt{3}$.

Solutions

7.2 The Ambiguous Case

7.2.1. For $A = 30^\circ$, $a = 5$, $b = 8$, find the two possible values of C to two decimals.

Solution. The possible B angles are 53.13° and 126.87° . Subtract each and A from 180° to obtain 96.87° and 23.13° .

7.2.2. For $A = 30^\circ$, $a = 4$, $b = 8$, how many triangles exist?

Solution. $\sin B = 1$, so $B = 90^\circ$ and $C = 60^\circ$. Exactly one triangle exists.

7.2.3. For $A = 30^\circ$, $a = 10$, $b = 8$, explain why only one inverse-sine candidate works.

Solution. $B_1 \approx 23.58^\circ$ works; $B_2 \approx 156.42^\circ$ gives $A + B_2 > 180^\circ$ and must be rejected.

Solutions

7.3 Inverse Trigonometric Functions

7.3.1. Evaluate $\arcsin(\sin(5\pi/6))$.

Solution. Sine is $1/2$, so the principal inverse is $\pi/6$, not $5\pi/6$.

7.3.2. Evaluate $\arctan(-1)$.

Solution. The principal value is $-\pi/4$.

7.3.3. Find $\cos(\arcsin(3/5))$.

Solution. The inverse sine angle is in quadrant I, so cosine is the positive value $4/5$.