

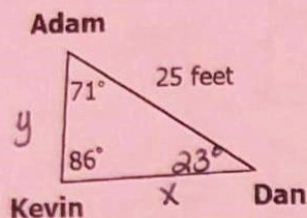
Law of Sines and Law of Cosines

Applications

Law of Sines

Give side measures to the nearest tenth and angle measures to the nearest degree.

- 1) Kevin, Adam, and Dan are passing a hockey puck. How far is Kevin from Adam? How far is Dan from Kevin?



$$\frac{\sin 23}{y} = \frac{\sin 86}{25} = \frac{\sin 71}{x}$$

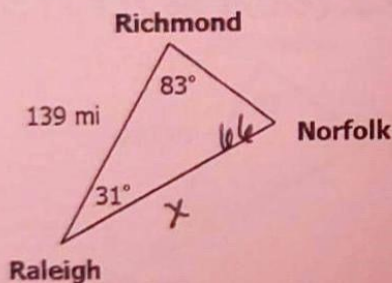
$$y = \frac{25 \sin 23}{\sin 86}$$

$$y = 9.8 \text{ ft}$$

$$x = \frac{25 \sin 71}{\sin 86}$$

$$x = 23.7 \text{ ft}$$

- 2) A pilot flying over the Norfolk airport is told he will have to redirect and land in either Richmond or Raleigh. Due to air traffic, he is then told he must land in Raleigh. Find the distance he will travel.

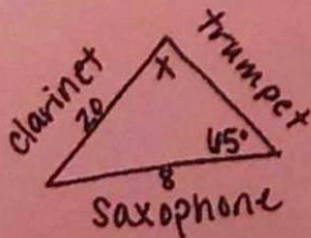


$$\frac{\sin 66}{139} = \frac{\sin 83}{x}$$

$$x = \frac{139 \sin 83}{\sin 66}$$

$$x = 151 \text{ mi}$$

- 3) Part of a marching band formed a triangle with the trumpet players on one side, clarinet players on one side, and saxophone players on the third side. The angle formed by the trumpet and saxophone players measured 65° . If the clarinet line is 20 feet long and the saxophone line is 8 feet long, find the angle formed by the trumpet and clarinet players.



$$\frac{\sin 65}{20} = \frac{\sin x}{8} = \sin$$

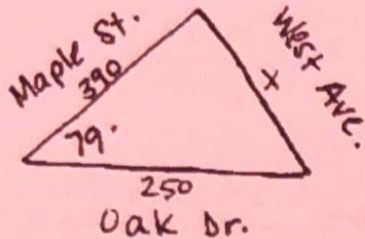
$$x = \sin^{-1}\left(\frac{8 \sin 65}{20}\right)$$

$$x = 21^\circ$$

Law of Cosines

Give side measures to the nearest tenth and angle measures to the nearest degree.

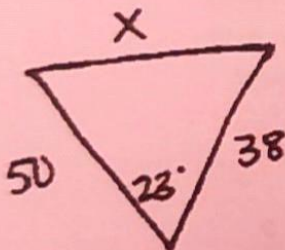
- 4) Maple Street, Oak Drive, and West Ave intersect to form a triangular piece of land. The angle formed by Maple Street and Oak Drive is 79° . If the Maple Street section of the triangle is 390 feet and the Oak Drive section is 250 feet, find the length of the West Ave section.



$$x = \sqrt{390^2 + 250^2 - 2(390)(250)\cos 79}$$

$$x = 421.2 \text{ ft}$$

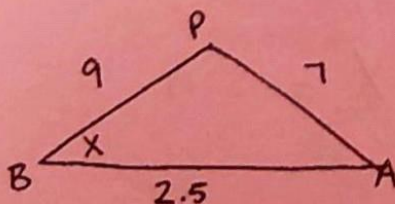
- 5) Jack and Tom start at a tree and begin running apart with an angle of 23° between them. If Jack runs 50 meters and Tom runs 38 meters, find the distance between them.



$$x = \sqrt{50^2 + 38^2 - 2(50)(38)\cos 23}$$

$$x = 21.1 \text{ m}$$

- 6) Two radar stations 2.5 miles apart are tracking an airplane. The straight-line distance between Station A and the plane is 7 miles. The straight-line distance between Station B and the plane is 9 miles. What is the angle of elevation from Station B to the plane?



$$x = \cos^{-1} \left(\frac{9^2 + 2.5^2 - 7^2}{2(9)(2.5)} \right)$$

$$x = 32^\circ$$