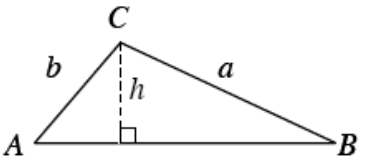
5-76. LAW OF SINES

Edwin wonders if Thui's and Ivan's methods can help find a way to relate the sides and angles of a non-right triangle. To find the height, Ivan and Thui each used the sine ratio with an acute angle and the hypotenuse of a right triangle.

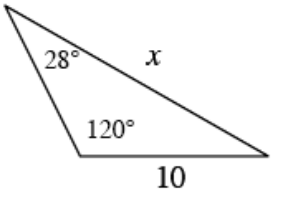


a. Use the triangle above to find **two expressions** for h using the individual right triangles like you did in problem 5-75.

b. Use your expressions from part (a) to show that $\frac{\sin(m\measuredangle B)}{b} = \frac{\sin(m\measuredangle A)}{a}$.

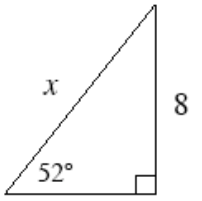
c. Describe where $\measuredangle B$ is located in relation to the side labeled b. How is $\measuredangle A$ related to the side labeled a?

d. The relationship $\frac{\sin(m\measuredangle B)}{b} = \frac{\sin(m\measuredangle A)}{a}$ is called the **Law of Sines**. Read the Math Notes box for this lesson to learn more about this relationship. Then use this relationship to solve for x in the triangle at right.



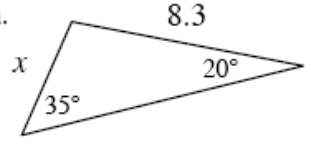
5-77. EXTENSION

Does the Law of Sines work for a right triangle as well? Test this idea by solving for x in the triangle at right twice: once using the Law of Sines and again using right-triangle trigonometry (such as sine, cosine, or tangent). What happened? If it worked, do you think it will work for all right triangles?

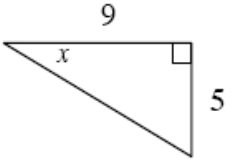


5-86. You now have many tools to solve for missing side lengths and angle measures. Decide which tool to use for each of the triangles below and solve for x. Decide if your answer is reasonable based on the diagram.

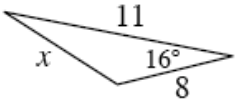
a.



b.

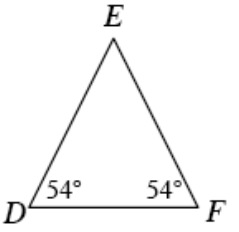


c.



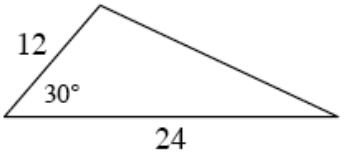
Review & Preview

5-79. Lizzie noticed that two angles in $\triangle DEF$, shown at right, have the same measure. Based on this information, what statement can you make about the relationship between $\overline{ED}$ and $\overline{EF}$?

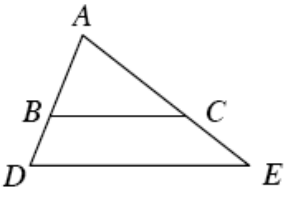


5-80. Find the length of $\overline{DF}$ in the diagram from problem 5-79 if $DE = 9$ units.

5-81. Find the area of the triangle at right. Show all work.



5-82. In the diagram at right, $\triangle ABC$ and $\triangle ADE$ are similar. If $AB = 5$, $BD = 4$, and $BC = 7$, then what is DE?



5-83. A particular spinner only has two regions: green and purple. If the spinner is randomly spun twice, the probability of it landing on green twice is 16%. What is the probability of the spinner landing on purple twice?

5-84. Solve the system of equations below. Write your solution as a point in (x, y) form. Check your solution.

$$y = -3x - 2$$
$$2x + 5y = 16$$