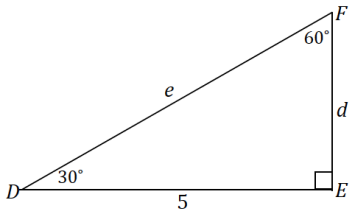
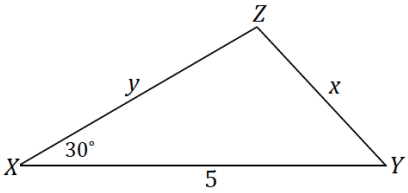
CH5 Review: Using Trigonometry to Find Side Lengths of a Triangle

Classwork

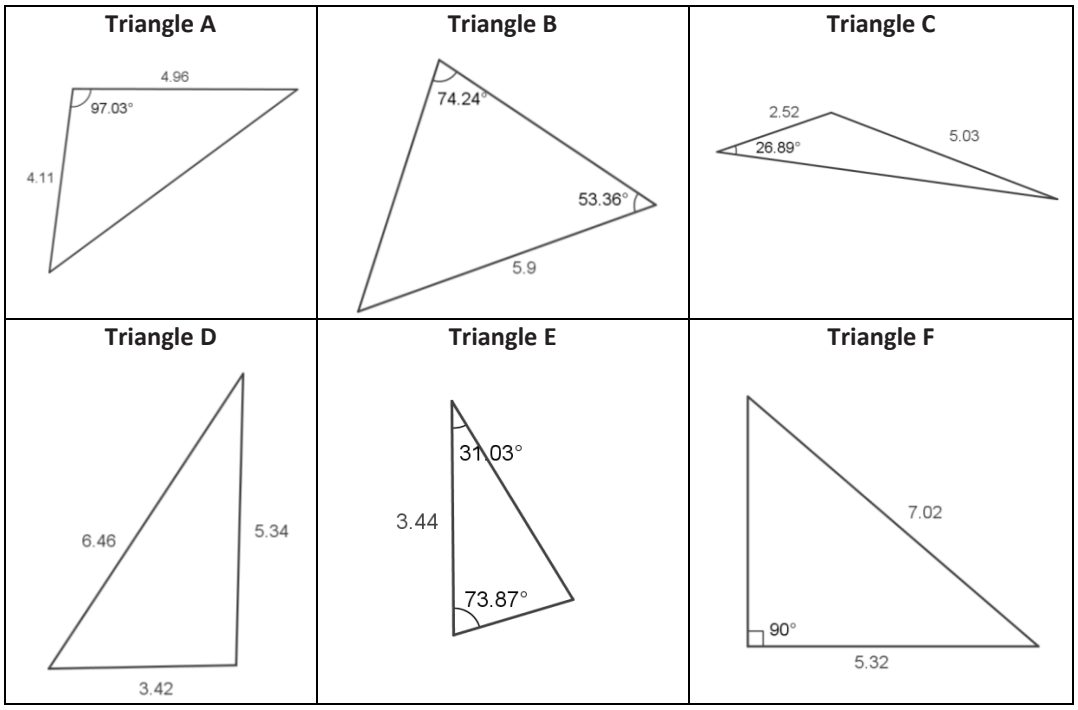
a. Find the lengths of d and e.



b. Find the lengths of x and y. How is this different from part (a)?



c. For each triangle shown below, decide whether you should use the law of sines, the law of cosines, or neither to begin finding the missing measurements. Explain how you know.



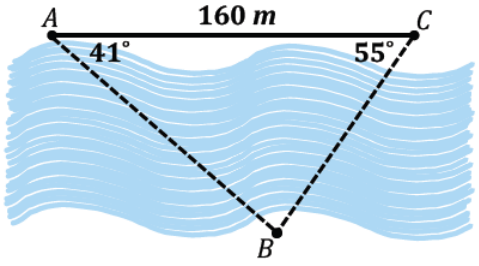
d. What types of given information will help you to decide which formula to use to determine missing measurements? Summarize your ideas in the table shown below:

Determining Missing Measurements

Given Measurements	Formulas to Use
Right Triangle	Trigonometry Functions Pythagorean Theorem
Non-Right Triangle	Law of Sines
Non-Right Triangle	Law of Cosines

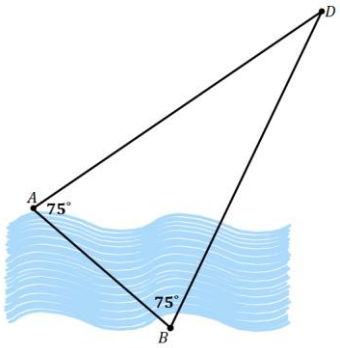
Example 1

A surveyor needs to determine the distance between two points A and B that lie on opposite banks of a river. A point C is chosen 160 meters from point A, on the same side of the river as A. The measures of $\angle BAC$ and $\angle ACB$ are $41°$ and $55°$, respectively. Approximate the distance from A to B to the nearest meter.



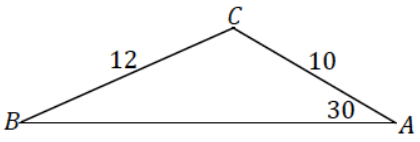
Example 2

Our friend the surveyor from Example 1 is doing some further work. He has already found the distance between points A and B (from Example 1). Now he wants to locate a point D that is equidistant from both A and B and on the same side of the river as A. He has his assistant mark the point D so that $\angle ABD$ and $\angle BAD$ both measure $75°$. What is the distance between D and A to the nearest meter?

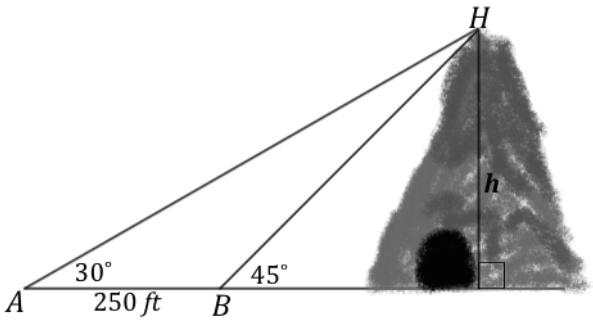


Exercises 1– 7

1. In $\triangle ABC$, $m\angle A = 30$, $a = 12$, and $b = 10$. Find $\sin\angle B$. Include a diagram in your answer.

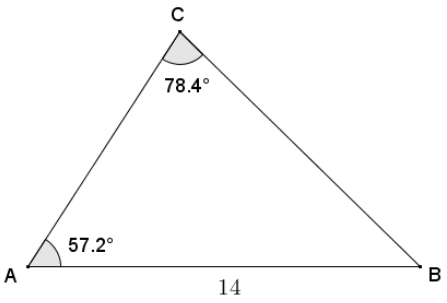


2. A car is moving toward a tunnel carved out of the base of a hill. As the accompanying diagram shows, the top of the hill, H, is sighted from two locations, A and B. The distance between A and B is 250 ft. What is the height, h, of the hill to the nearest foot?

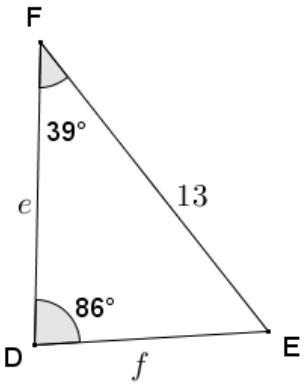


3. Given $\triangle ABC$, $AB = 14$, $\angle A = 57.2°$, and $\angle C = 78.4°$, calculate the measure of angle B to the nearest tenth of a degree, and use the law of sines to find the lengths of $\overline{AC}$ and $\overline{BC}$ to the nearest tenth.

   Calculate the AREA of $\triangle ABC$ to the nearest square unit.

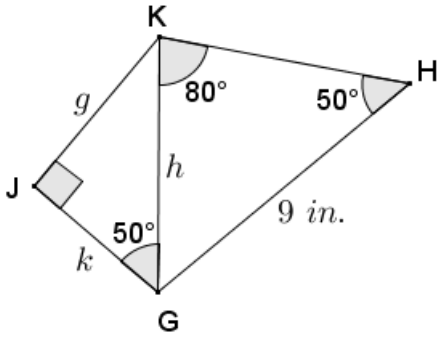


4. Given $\triangle DEF$, $\angle F = 39°$, and $EF = 13$, calculate the measure of $\angle E$, and use the law of sines to find the lengths of $\overline{DF}$ and $\overline{DE}$ to the nearest hundredth.



5. At the base of a pyramid, a surveyor determines that the angle of elevation to the top is $53°$. At a point 75 meters from the base, the angle of elevation to the top is $35°$. What is the distance from the base of the pyramid up the slanted face to the top?

6. Given quadrilateral $GHKJ$, $m\angle H = 50°$, $m\angle HKG = 80°$, $m\angle KGJ = 50°$, $m\angle J$ is a right angle, and $GH = 9$ in., use the law of sines to find the length of $\overline{GK}$, and then find the lengths of $\overline{GJ}$ and $\overline{JK}$ to the nearest tenth of an inch.



7. Given triangle LMN, $LM = 10$, $LN = 15$, and $m\angle L = 38°$, use the law of cosines to find the length of $\overline{MN}$ to the nearest tenth.