Math Virtual Learning

Precalculus with Trigonometry

Students will solve ACT problems using either the Law of Sines or the Law of Cosines

April 14, 2020

Precalculus with Trigonometry
Lesson: April 14th, 2020

Objective/Learning Target:
Students will solve ACT problems using either the Law of Sines or the Law of Cosines

Throughout the past few lessons, we have been solving for missing sides and angles in a non-right triangle using either the Law of Sines or Law of Cosines. Today's lesson will summarize what you have learned and see if you can apply your knowledge to ACT math questions.

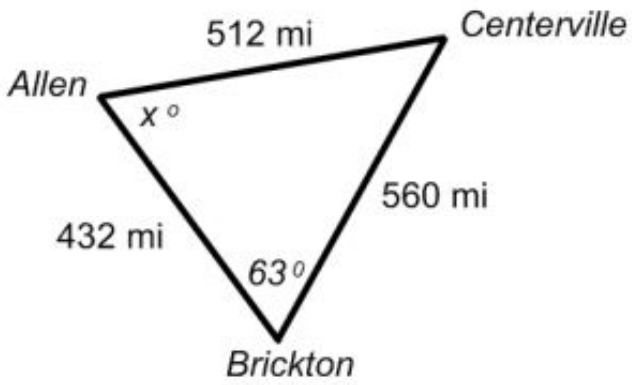
Let's Get Started:

Watch Video

ACT Practice on Law of Sines and Law of Cosines

Example

Barbara is trying to determine the proper flight path for an upcoming trip. Her map shows the distances between Allen, Brickton and Centerville as shown in the diagram below. She knows from a previous trip that the angle formed by the straight line distances from Allen to Brickton and Brickton to Centerville is 63 degrees. What is the approximate angle formed by the straight line distances from Allen to Brickton and Allen to Centerville, as marked by the *x* in the diagram?



(A) 65 degrees

(B) 71 degrees

(C) 77 degrees

(D) 79 degrees

(E) 85 degrees

Answer to example problem

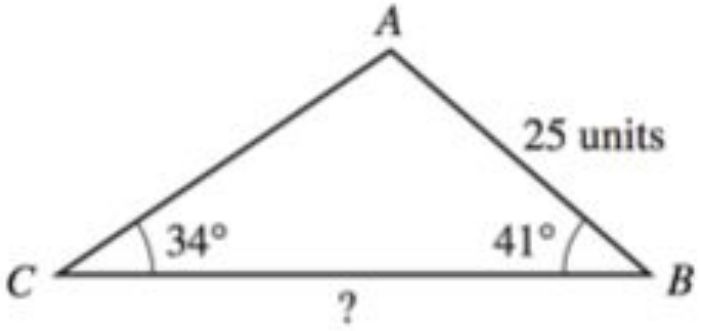
$$\frac{sinA}{a} = \frac{sinB}{b}$$
$$\frac{sin63}{512} = \frac{sinx}{560}$$
$$512\,sinx = 560\,sin63$$
$$sinx = \frac{560sin63}{512}$$
$$sinx = .974538$$
$$x = \text{Sin}^{-1}.974538$$
$$x = 77.04$$

The correct answer is Choice (C).

Practice problem #1

In $\triangle ABC$, shown below, the measure of $\angle B$ is 41°, the measure of $\angle C$ is 34°, and $\overline{AB}$ is 25 units long. Which of the following is an expression for the length, in units, of $\overline{BC}$?

(Note: The law of sines states that, for any triangle, the ratios of the sines of the interior angles to the lengths of the sides opposite those angles are equal.)



A. $\dfrac{25 \sin 105°}{\sin 41°}$

B. $\dfrac{25 \sin 105°}{\sin 34°}$

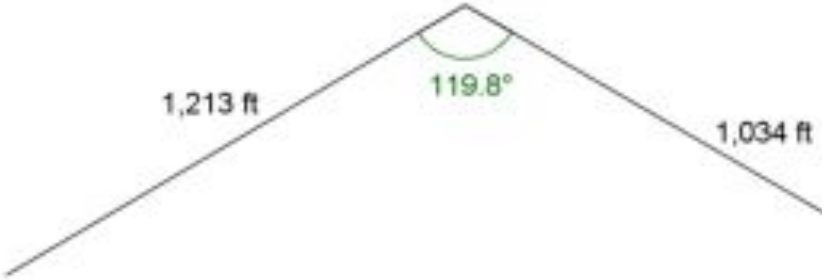
C. $\dfrac{25 \sin 75°}{\sin 41°}$

D. $\dfrac{25 \sin 41°}{\sin 105°}$

E. $\dfrac{25 \sin 34°}{\sin 75°}$

Practice problem #2

A surveyor took and recorded the measurements shown in the figure below. If the surveyor wants to use these 3 measurements to calculate the length of the pond, which of the following would be the most directly applicable?



F. The ratios for the side lengths of 30°-60°-90° triangles

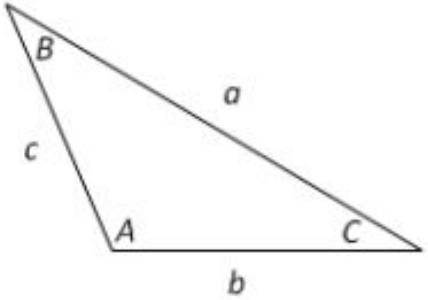
G. The ratios for the side lengths of 45°-45°-90° triangles

H. The law of cosines: For any ΔABC, where a is the length of the opposite $\angle A$, b is the length of the opposite $\angle B$, and c is the length of the side opposite $\angle C$, $a^2 = b^2 + c^2 - 2bc\cos(\angle A)$

J. The Pythagorean theorem

K. A formula for the area of a triangle

Practice problem #3



Given sides $a = 10$, $b = 5$ and angle $\angle A = 100^\circ$ determine the corresponding value for $\angle B$

A. 29.5^0 B. 31.7^0 C. 37.9^0

B. D. 42.1^0 E. cannot be determined

Answer Key to ACT practice

1. B angle A equals 105 degrees, then use Law of Sines to find BC

2. H It is not a right triangle, so you must use Law of Cosines

3. A use Law of Sines, then $sin^{-1}(0.5 \sin 100) = 29.5^{\circ}$

Additional Resources:

More ACT math practice

Easy/medium practice: ACT Math practice set 2

More difficult practice: ACT practice set 5