

Precalculus · Laws of Sines and Cosines and Triangle Area · Worksheet

Common Core G-SRT.D.9, G-SRT.D.10, G-SRT.D.11 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This precalculus law sines cosines worksheet gives 25 problems on laws of sines and cosines and triangle area, ordered from easy to hard, with a separate answer key.

These 25 problems practice triangle area with sine, the Law of Sines including the ambiguous SSA case, the Law of Cosines and Heron's formula. They follow standards G-SRT.D.9, G-SRT.D.10 and G-SRT.D.11.

Problems run from easy to hard and finish with six applications involving bearings, surveying, flight paths and shorelines. Round sides to the nearest hundredth and angles to the nearest tenth unless told otherwise.

Precalculus Common Core: G-SRT.D.9 · G-SRT.D.10 · G-SRT.D.11

Precalculus Law Sines Cosines Worksheet: problems 1-5

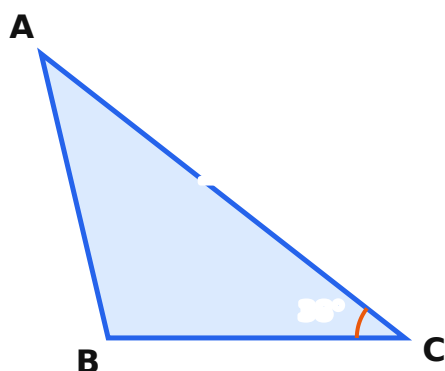
Problem 1: Area from two sides and an angle

Find the area of each triangle with sides a and b and included angle C . Round to the nearest hundredth when needed.

- a. $a=10$, $b=7$, $C=30^\circ$
- b. $a=12$, $b=9$, $C=90^\circ$
- c. $a=8$, $b=5$, $C=150^\circ$
- d. $a=6$, $b=6$, $C=60^\circ$

Problem 2: Area of a triangular sign

A triangular sign has two sides of 9 in. and 14 in. that meet at a 38° angle. Find its area to the nearest hundredth.



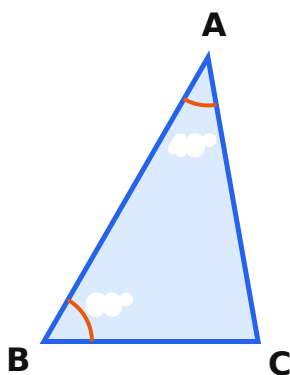
The angle between the 9 in. and 14 in. sides is 38 degrees.

Problem 3: Find the angle from the area

A triangle has area 30 square units and two sides of lengths 10 and 12. Find every possible measure of the angle between those sides.

Problem 4: Law of Sines with two angles

In the triangle shown, $A = 40^\circ$, $B = 60^\circ$ and $a = 10$. Find C , b and c to the nearest hundredth.



Two angles and a side opposite one of them.

Problem 5: Find the third angle and both sides

In triangle ABC , $A = 48^\circ$, $C = 71^\circ$ and $c = 20$. Solve the triangle. Round sides to the nearest hundredth.

Precalculus Law Sines Cosines Worksheet: problems 6-10

Problem 6: Law of Sines with the side between two angles

Sofia measures a triangular garden bed. Side a is 25 ft long and lies between angles $B = 52^\circ$

and $C = 67^\circ$. Find the other two sides to the nearest hundredth of a foot.

Problem 7: SSA with one solution

In triangle ABC , $A = 70^\circ$, $a = 15$ and $b = 10$. Show that exactly one triangle exists, then find B , C and c (angles to the nearest tenth, side to the nearest hundredth).

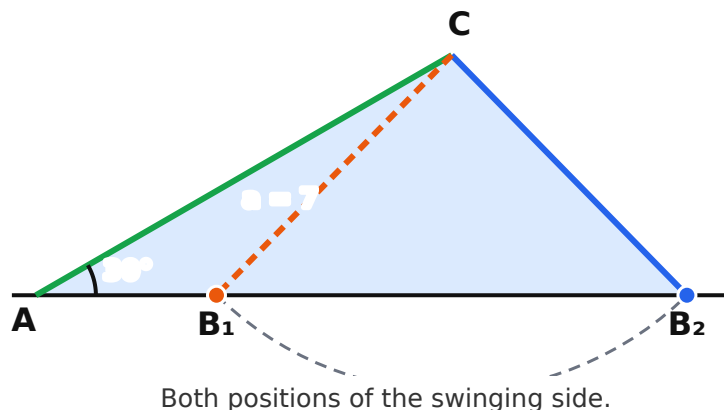
Problem 8: How many triangles?

Decide how many triangles satisfy each set of measurements.

- a. $A = 40^\circ$, $a = 5$, $b = 10$
- b. $A = 30^\circ$, $a = 5$, $b = 10$
- c. $A = 30^\circ$, $a = 7$, $b = 10$
- d. $A = 50^\circ$, $a = 12$, $b = 10$

Problem 9: Solve both triangles

In triangle ABC , $A = 30^\circ$, $a = 7$ and $b = 10$. Find both possible triangles (angles to the nearest tenth, sides to the nearest hundredth).



Problem 10: Another ambiguous case

Priya knows $A = 42^\circ$, $a = 18$ and $b = 24$. Show that two triangles are possible and find the third side of each.

Precalculus Law Sines Cosines Worksheet: problems 11-15

Problem 11: Law of Cosines: SAS

In triangle ABC , $a = 12$, $b = 7$ and $C = 55^\circ$. Find c to the nearest hundredth.

Problem 12: Law of Cosines with an obtuse angle

Two sides of a triangle measure 6 and 11 and the angle between them is 120° . Find the third side to the nearest hundredth.

Problem 13: Law of Cosines: SSS

A triangle has sides 7, 9 and 12. Find its largest angle first, then the other two angles, to the nearest tenth of a degree.

Problem 14: Law of Cosines and the Pythagorean theorem

Apply the Law of Cosines to find the largest angle of each triangle.

- Sides 5, 12 and 13.
- Sides 8, 15 and 17.
- Explain what the result tells you about the Pythagorean theorem.

Problem 15: Choose the law

For each triangle, decide whether to start with the Law of Sines or the Law of Cosines. Give a reason.

- $A = 50^\circ$, $B = 70^\circ$, $a = 9$
- $b = 8$, $c = 11$, $A = 40^\circ$
- $a = 6$, $b = 7$, $c = 10$
- $A = 35^\circ$, $a = 9$, $b = 12$

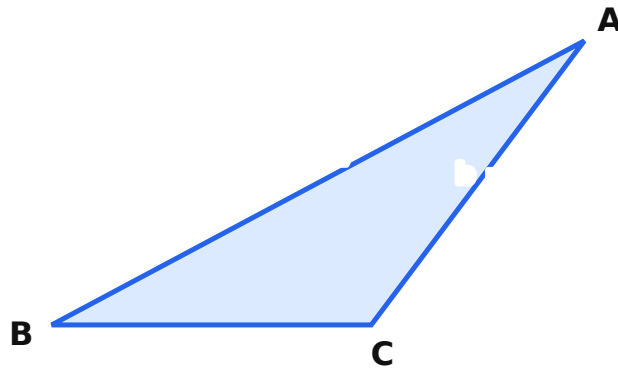
Precalculus Law Sines Cosines Worksheet: problems 16-20

Problem 16: Heron's formula

Use Heron's formula to find the area of a triangle with sides 7, 8 and 9. Give the exact value and a decimal rounded to the nearest hundredth.

Problem 17: Heron's formula on a flat triangle

Find the area of the triangle with sides 9, 10 and 17.



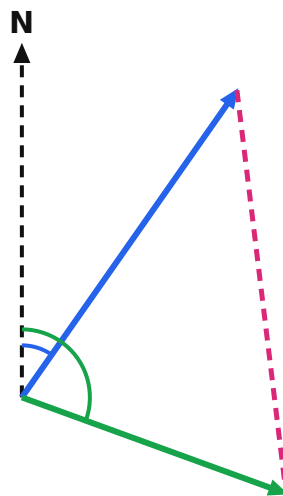
A long, flat triangle.

Problem 18: Two ways to find an area

A triangle has sides 6, 8 and 10. Find its area with Heron's formula, then with $\frac{1}{2}ab\sin C$ using the angle between the sides 6 and 8, and compare.

Problem 19: Two boats leave a dock

At 1:00 p.m. two boats leave the same dock. Boat 1 travels at 24 mph on bearing 035° and boat 2 travels at 18 mph on bearing 110° . How far apart are they at 3:00 p.m.? Round to the nearest hundredth.



The distances after 2 hours are 48 and 36 miles.

Problem 20: Width of a lake

A surveyor stands at point C and measures 410 ft to one end of a lake and 560 ft to the other end. The angle between the two lines of sight is 72° . Find the width of the lake to the nearest

foot.

Precalculus Law Sines Cosines Worksheet: problems 21-25

Problem 21: A lot with two possible shapes

Noah measures an angle of 28° at corner A of a lot. The fence along AC is 90 ft, and the fence BC opposite A is 50 ft. Find both possible lengths of side AB to the nearest tenth of a foot.

Problem 22: Cost of sod

A triangular lawn has two sides of 120 ft and 150 ft meeting at a 65° corner. Sod costs \$0.65 per square foot. Find the area to the nearest square foot and the cost of the sod to the nearest dollar.

Problem 23: Fertilizing a field

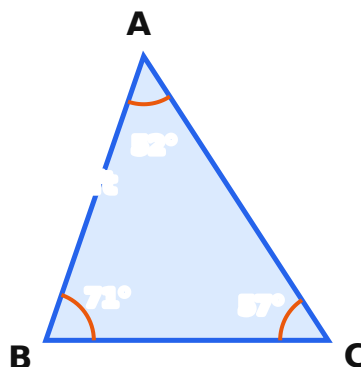
A triangular field has sides 300 ft, 400 ft and 500 ft. One bag of fertilizer covers 5,000 square feet and costs \$18. Find the area with Heron's formula, the number of bags needed and the total cost.

Problem 24: Plane flight on two bearings

A plane leaves an airport and flies 200 mi on bearing 060° , then turns and flies 150 mi on bearing 140° . Find the straight-line distance back to the airport (nearest tenth of a mile) and the bearing of the plane from the airport (nearest tenth of a degree).

Problem 25: Distance to a sailboat

Mei and Jamal stand 300 ft apart on a straight shore. Mei sights a sailboat at 52° from the shoreline and Jamal sights it at 71° from the shoreline, both measured toward the boat. Find the boat's distance from Mei and its shortest distance from the shore, to the nearest tenth of a foot.



Mei at A, Jamal at B, the boat at C.

How to use this precalculus law sines cosines worksheet

Print this precalculus law sines cosines worksheet as a PDF, solve every problem on paper, then compare with the answer key.

