

Law of Sines, Law of Cosines and Area

Grade 12 – Precalculus math · Worksheet · Standards: G-SRT.D.9, G-SRT.D.10, G-SRT.D.11

Name: _____ Date: _____ Class: _____

These 20 problems cover triangle area, Heron's formula, the Law of Sines, the Law of Cosines, the ambiguous SSA case and navigation with bearings. They train standards G-SRT.D.9, G-SRT.D.10 and G-SRT.D.11. The last six problems use a pond, two ranger stations, a hiker, a lot and a garden with two possible shapes.

Standards: G-SRT.D.9, G-SRT.D.10, G-SRT.D.11 · **Level:** Grade 12 Precalculus

Problem 1 Area from Two Sides and an Angle (easy)

Find the area of a triangular flag with sides 14 inches and 9 inches enclosing an angle of 38° . Round to the nearest tenth.

Problem 2 Heron's Formula (easy)

Use Heron's formula to find the area of a sail with sides 20, 37 and 51 inches.

Problem 3 Law of Sines with AAS (easy)

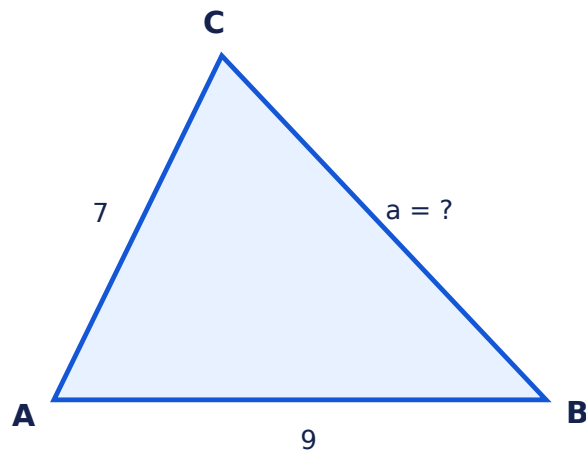
In triangle ABC , $A = 48^\circ$, $B = 71^\circ$ and $a = 12$. Find C , b and c to the nearest hundredth.

Problem 4 Law of Cosines for the Third Side (easy)

In triangle ABC , $a = 8$, $b = 11$ and $C = 52^\circ$. Find c to the nearest hundredth.

Problem 5 Third Side from a Figure (easy)

In the figure, sides 7 and 9 meet at A with an angle of 64° . Find the length of the third side to the nearest hundredth.



The angle at A is 64° ; sides $AC = 7$ and $AB = 9$.

Problem 6 Angle from Three Sides (easy)

A triangular plot has sides 8, 10 and 15 yards. Find its largest angle to the nearest tenth of a degree.

Problem 7 Law of Sines with ASA (medium)

In triangle ABC , $A = 36^\circ$, $C = 79^\circ$ and side $b = 20$. Find B , a and c to the nearest hundredth.

Problem 8 SSA with One Triangle (medium)

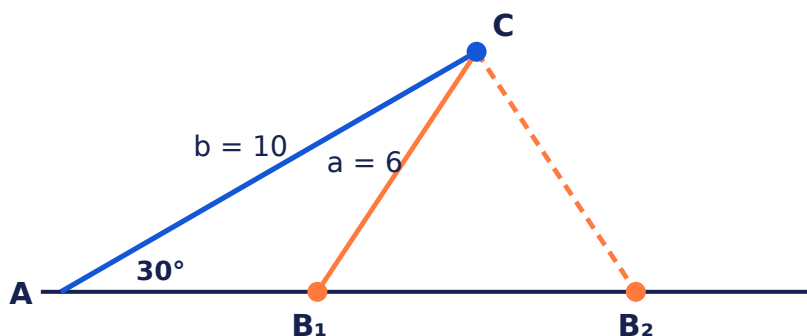
In triangle ABC , $A = 50^\circ$, $a = 15$ and $b = 11$. Find B , C and c .

Problem 9 SSA with No Triangle (medium)

Can a triangle have $A = 40^\circ$, $a = 5$ and $b = 9$? Justify your answer.

Problem 10 SSA with Two Triangles (medium)

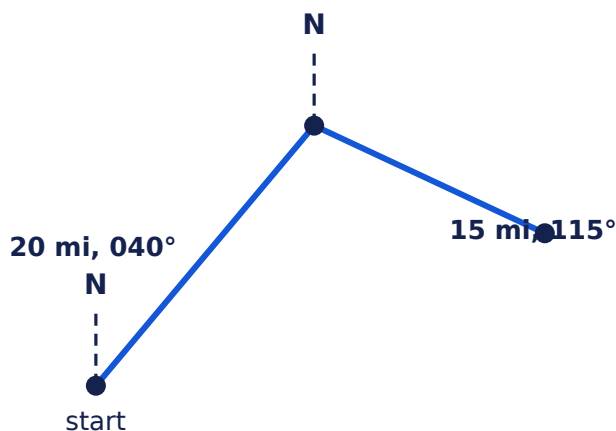
Triangle ABC has $A = 32^\circ$, $a = 9$ and $b = 13$. Show that two triangles fit, and solve both for B , C and c (one decimal place). The figure shows the idea for similar data.



Angle $A = 30^\circ$, $b = 10$ and $a = 6$ fit two triangles.

Problem 11 Ship on Two Bearings (medium)

A ship sails 20 miles on a bearing of 040° , then 15 miles on a bearing of 115° . How far is it from its starting point? Round to the nearest tenth.



Path of the ship.

Problem 12 Area from Three Decimal Sides (medium)

Find the area of a triangle with sides 7.2, 8.5 and 10.1 centimeters, to the nearest tenth.

Problem 13 Find the Area After Solving (medium)

In triangle ABC , $A = 52^\circ$, $B = 63^\circ$ and $a = 10$. Find side b , angle C and the area, rounded to the nearest tenth.

Problem 14 Area of a Parallelogram (medium)

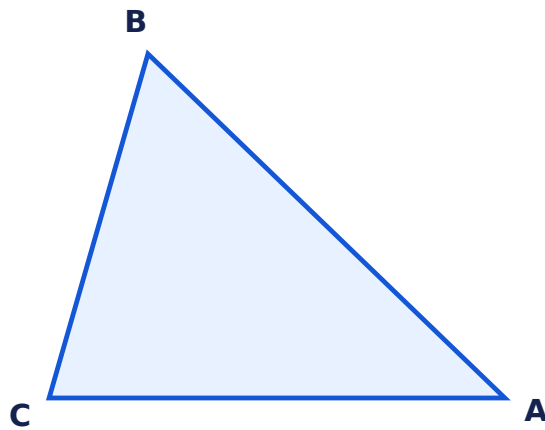
A parallelogram has sides 12 and 18 and an included angle of 65° . Use triangle area to find its area to the nearest tenth.

Problem 15 All Three Angles from Three Sides (medium)

A triangle has sides 12, 15 and 20. Find all three angles to the nearest tenth of a degree.

Problem 16 Distance Across a Pond (hard)

Points A and B are on opposite sides of a pond. From point C , $CA = 210$ feet, $CB = 165$ feet and angle $ACB = 74^\circ$. Find the distance AB .



Triangle across the pond: $CA = 210$ ft, $CB = 165$ ft, angle $C = 74^\circ$.

Problem 17 Locating a Fire from Two Stations (hard)

Two ranger stations A and B are 8.4 miles apart. A fire F is sighted at an angle of 62° from the line AB at station A and 48° at station B . How far is the fire from each station?

Problem 18 Hiker Back to Camp (hard)

A hiker walks 3.5 miles on a bearing of 025° , then 2.2 miles on a bearing of 140° . How far is she from camp, and what angle does her straight-line path back make with her first leg at the start? Round to the nearest tenth of a mile and degree.

Problem 19 Triangular Lot (hard)

A triangular lot has sides 120, 150 and 190 feet. Find its area, then the cost of sod at \$0.85 per

square foot.

Problem 20 A Garden with Two Possible Shapes (hard)

A triangular garden has angle $A = 28^\circ$, side $AC = 18$ feet and side $BC = 11$ feet. Show that two shapes are possible, and find the length AB and the area for each (one decimal place).