LAW OF COSINES

OBLIQUE TRIANGLES

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TOPIC OUTLINE

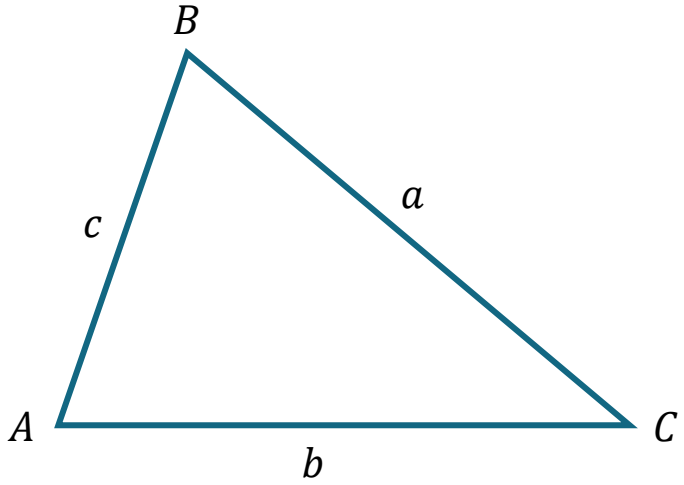
Law of Cosines

LAW OF COSINES

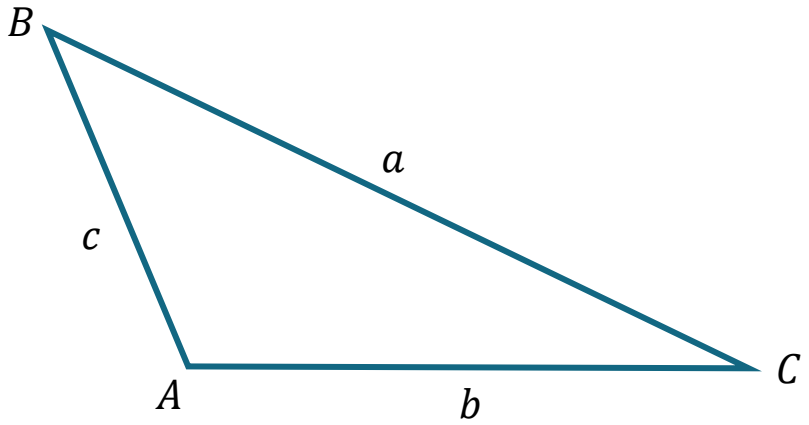
OBLIQUE TRIANGLE

An **oblique triangle** is a triangle that does not contain a right angle.

Acute Triangle – All three angles are less than 90°.

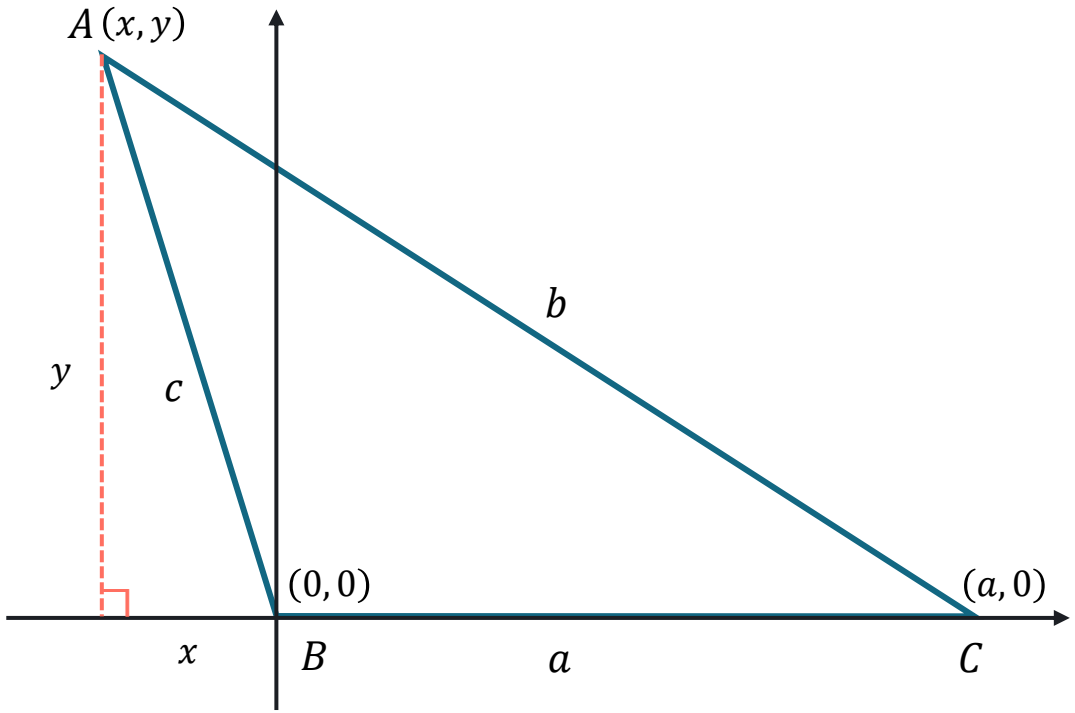


Obtuse Triangle – One of the angles is greater than 90°.



LAW OF COSINES

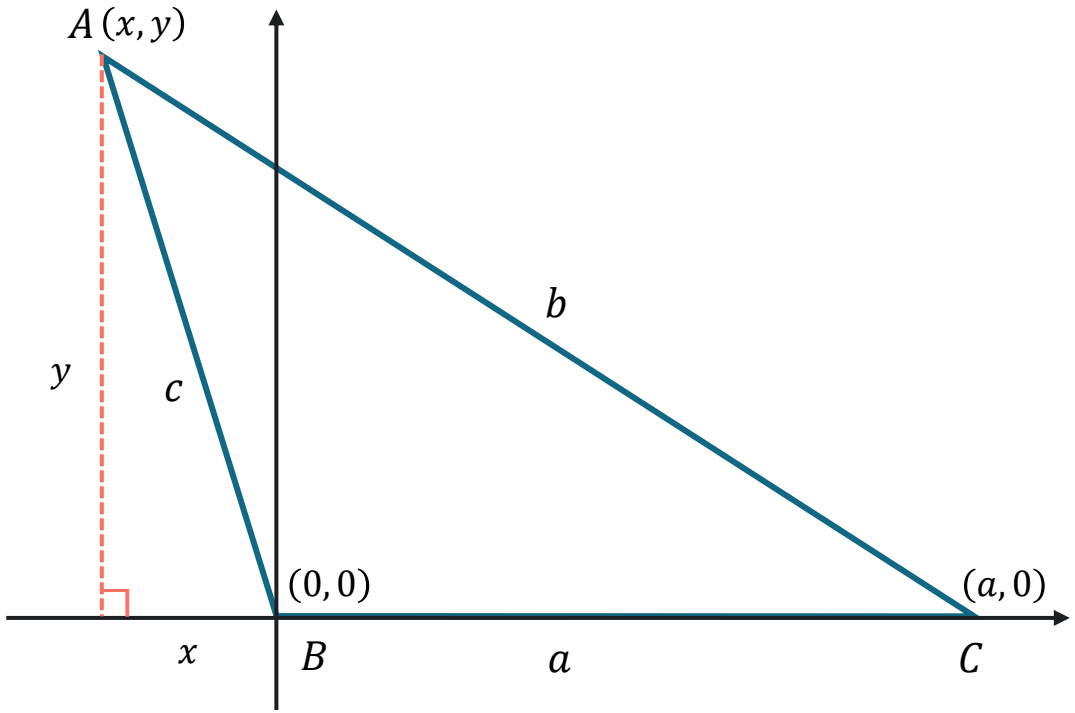
Obtuse Triangle ABC



Derivation of the Law of Cosines

LAW OF COSINES

Obtuse Triangle ABC



In any triangle ABC, with sides a, b, c

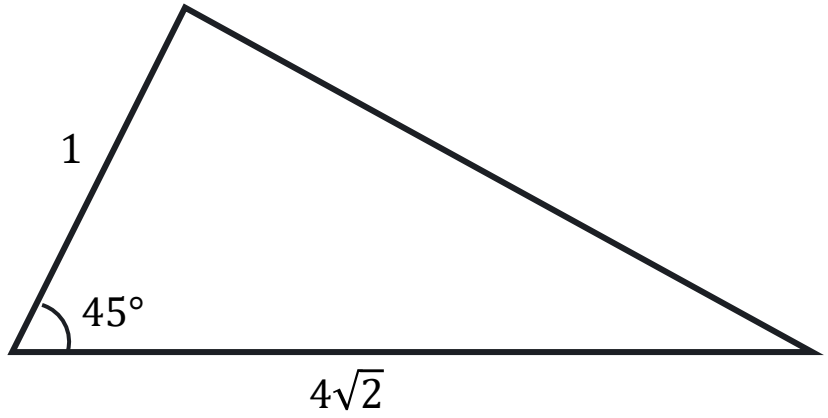
$$a^2 = b^2 + c^2 - 2bc\cos A$$

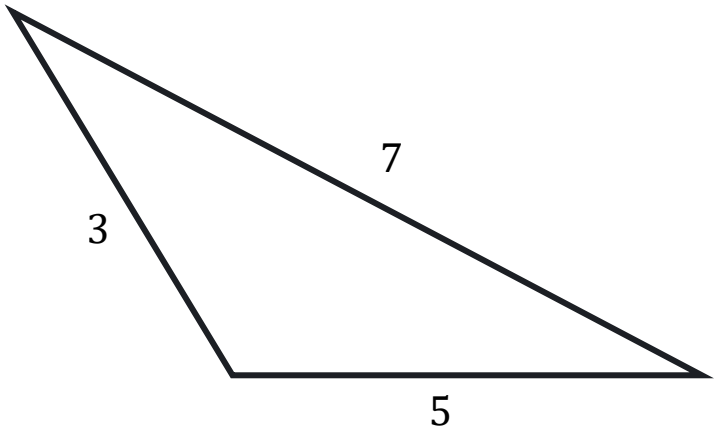
$$b^2 = a^2 + c^2 - 2ac\cos B$$

$$c^2 = a^2 + b^2 - 2ab\cos C$$

EXERCISE

Solve each triangle.



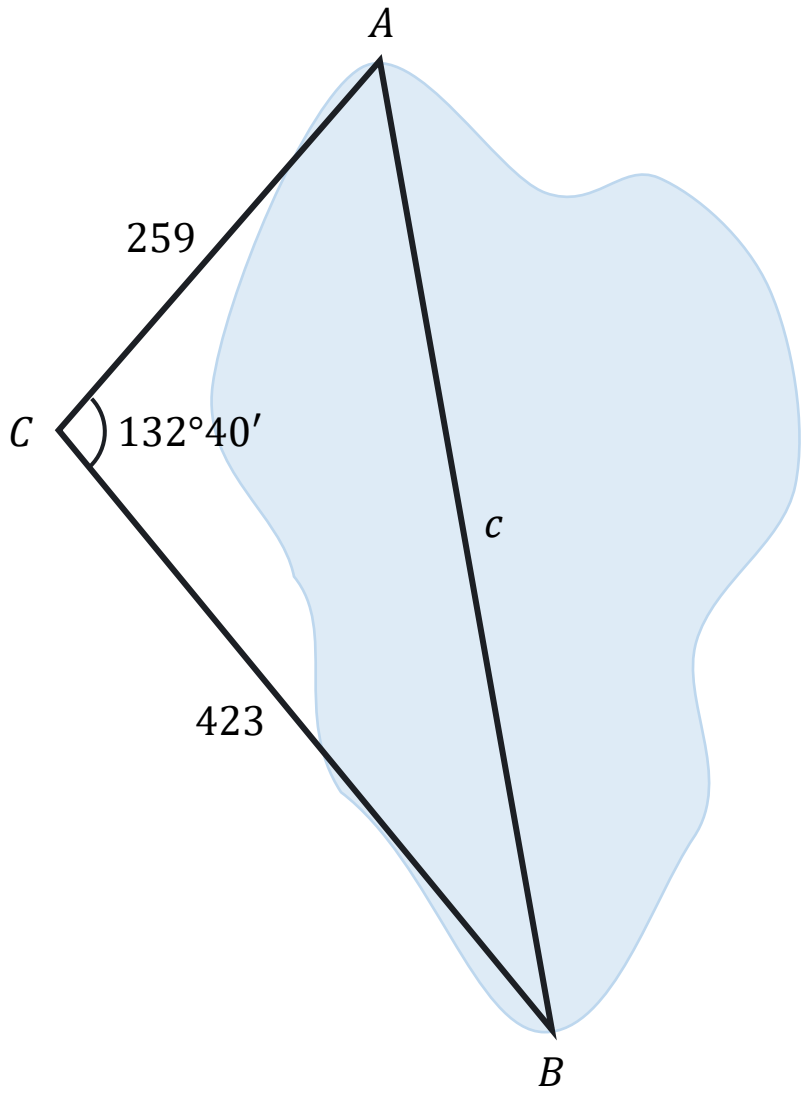


Solution

EXERCISE

A surveyor wishes to find the distance between two inaccessible points A and B on opposite sides of a lake. While standing at point C, she finds that $b = 259$ m, $a = 423$ m, and angle ACB measures $132°40'$. Find the distance c.

Solution



EXERCISE

A boat is 3 km away from Lighthouse A and 5 km away from Lighthouse B. From the boat's point of view, the angle between the two lighthouses is 60°. How far apart are the two lighthouses?

Solution

EXERCISE

Two ships leave a harbor together, traveling on courses that have an angle of 135°40′ between them. If each travels 402 mi, how far apart are they?

Solution

EXERCISE

A plane is 1 km from one landmark and 2 km from another. From the planes point of view the land between them subtends an angle of 45°. How far apart are the landmarks?

Solution

EXERCISE

Two drones start at the same point and fly in opposite directions. Drone 1 flies at a speed of 80 km/h, and Drone 2 flies at a speed of 60 km/h. The angle between their paths is 75°. How far apart will the drones be after 2 hours?

Solution

SEATWORK