LESSON MAKER PRO

Triangle Routes

Find exact distances and angles in non-right triangles.

HIGH SCHOOL · MT.PLUS.ALG.TRIG.5

MT.PLUS.ALG.TRIG.5 "Apply the Law of Sines and the Law of Cosines to find unknown measurements in non-right triangles."

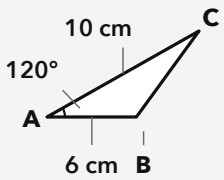
NAME _____ DATE _____

CHOOSE THE RIGHT LAW

When you know two sides and the angle between them, use the Law of Cosines: $c^2 = a^2 + b^2 - 2ab \cos C$.
When you know a side and its opposite angle, use the Law of Sines: $a/\sin A = b/\sin B$.

WORKED EXAMPLE

Find BC in the figure.

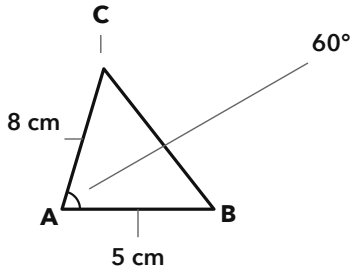


1. Use the Law of Cosines because the known angle is between the two known sides.
2. $BC^2 = 6^2 + 10^2 - 2(6)(10)\cos 120°$.
3. Since $\cos 120° = -1/2$, $BC^2 = 36 + 100 + 60 = 196$.
4. BC = 14 cm.

Answer: 14 cm

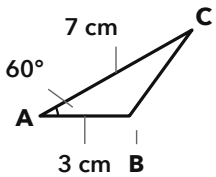
PRACTICE 6 problems

1 Find BC.



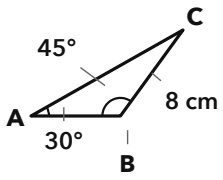
ANSWER _____

2 Find BC.



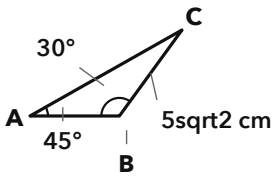
ANSWER _____

3 Find AC.



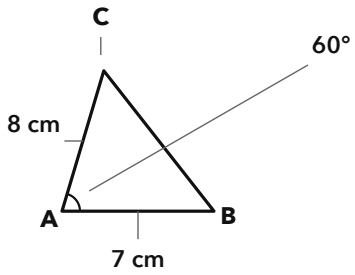
ANSWER _____

4 Find AC.



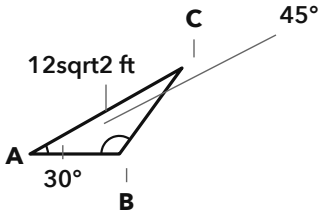
ANSWER _____

5 Find BC.



ANSWER _____

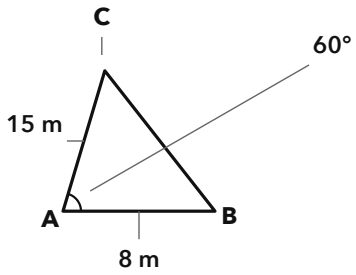
6 Find BC.



ANSWER _____

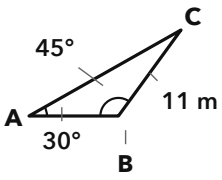
APPLY IT Show your work

1 At a skate park, two straight paths run from gate A to ramps B and C. How far apart are the ramps?



ANSWER _____

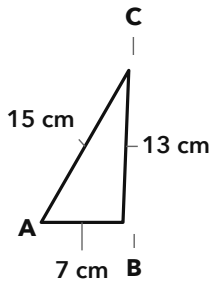
2 A game map shows three checkpoints, A, B, and C. What is the straight-line distance from A to C?



ANSWER _____

CHALLENGE One step up

Find angle A. Show how the side lengths tell you whether it is acute or obtuse.



WORK SPACE AND ANSWER

Triangle Routes

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find BC.	**7 cm**
2	Find BC.	**sqrt37 cm**
3	Find AC.	**8sqrt2 cm**
4	Find AC.	**5 cm**
5	Find BC.	**sqrt57 cm**
6	Find BC.	**12 ft**

PART 2 · APPLY IT

1. **13 m** Use the Law of Cosines: $BC^2 = 8^2 + 15^2 - 2(8)(15)(1/2) = 169$. Thus BC = 13 m.
2. **11sqrt2 m** Use the Law of Sines: AC/sin 45° = 11/sin 30°. Thus AC = 11sqrt2 m.

CHALLENGE

Angle A = 60°, so it is acute. By the Law of Cosines, $\cos A = (7^2 + 15^2 - 13^2)/(2(7)(15)) = 1/2$. A positive cosine shows that A is acute.

Accept equivalent exact radical forms. For the challenge, accept a correct Law of Cosines calculation and an explanation that cos A is positive.