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- I. Model Problems.
- II. Choosing the Correct Formula
- III. Mixed Problems (using the formulas twice)
- III. Challenge questions
- IV. Answer Key

Web Resources

 Video explanation of Law of Cosines with additional practice problems

 Law of Cosines: www.mathwarehouse.com/lawofcosines

 Law of Sines: www.mathwarehouse.com/law-of-sines

 Ambiguous Case of Law of Sines : www.mathwarehouse.com/ambiguous-case

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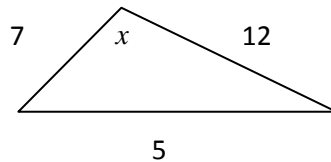
Law of Sines and Law of Cosines

Law of Sines: $\frac{a}{\sin a} = \frac{b}{\sin b} = \frac{c}{\sin c}$ or $\frac{\sin a}{a} = \frac{\sin b}{b} = \frac{\sin c}{c}$

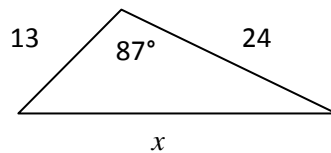
Law of Cosines: $a^2 = b^2 + c^2 - 2bc \cos A$

Law of Cosines is the best choice if:

Case 1: The length of all three sides of a triangle are known and you are trying to find an angle:

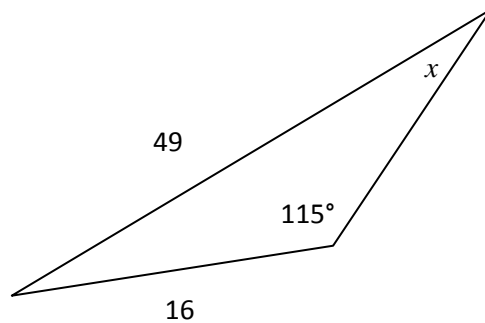


Case 2: Two sides and an enclosed angle are known and you are trying to find the side opposite the angle:

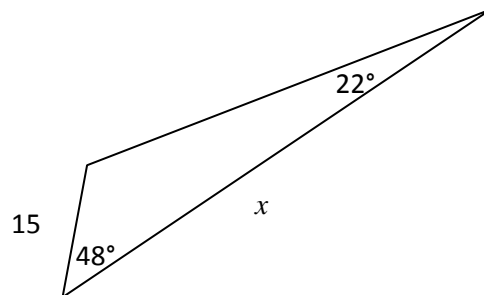


Law of Sines is the best choice if:

Case 3: Two sides and an angle opposite one of those sides is known and you are trying to find the other angle(s):



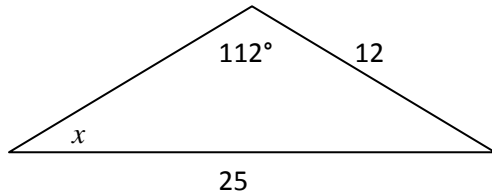
Case 4: Two angles and one side are known and you are trying to find the missing side(s):



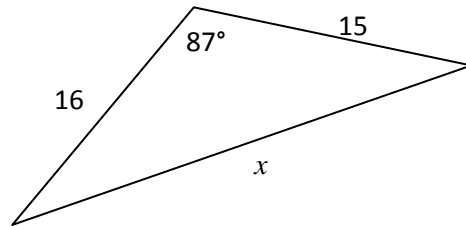
In general Law of Sines is easier to use so always check to see if you can use it first.

II. Determine whether the Law of Cosines or the Law of Sines is the best choice.

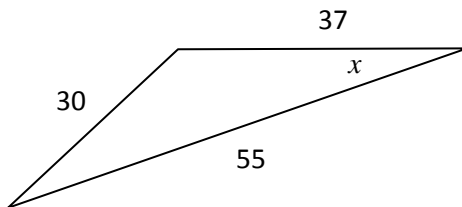
1. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).



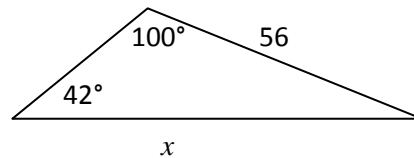
2. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).



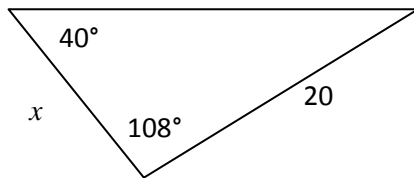
3. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).



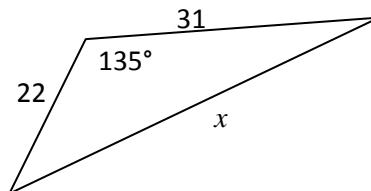
4. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).



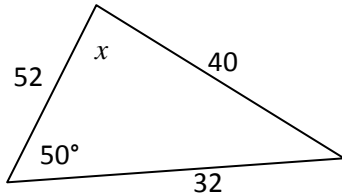
5. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).



6. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).



7. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).



9. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).

For ΔHJK , $j = 31$, $m\angle H = 132^\circ$, $m\angle J = 21^\circ$, and $m\angle K = 27^\circ$. Find h to the nearest whole number.

8. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).

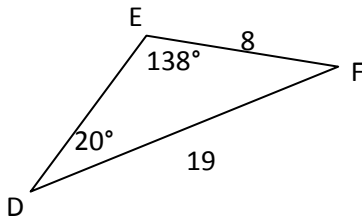
For ΔABC find the length of b to the nearest hundredth, given $a = 17$, $c = 34$, and $m\angle B = 94^\circ$.

10. State whether the Law of Sines or Law of Cosines is the best choice to solve for x for the given figure. Substitute the values into the appropriate formula (do not solve).

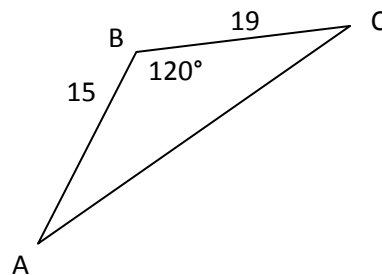
For ΔXYZ find the length of $m\angle Y$ to the nearest whole degree, given $x = 6$, $y = 9$, and $z = 12$.

III. Use the Law of Sines and Law of Cosines to find missing dimensions.

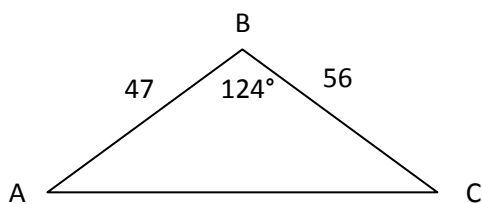
11. Find the missing dimensions of the triangle below. Round your answers to the nearest whole number.



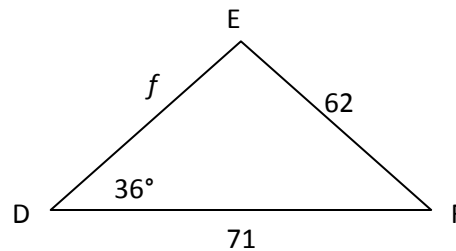
12. Find the $m\angle C$ to the nearest whole degree.



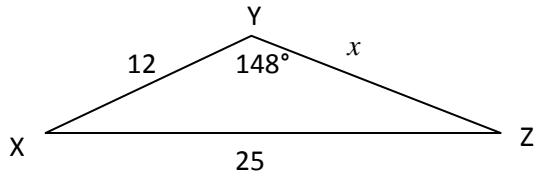
13. Find the missing dimensions of the triangle below. Round your answers to the nearest whole number.



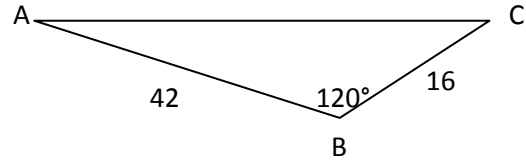
14. Find the f to the nearest whole number.



15. Find the x to the nearest whole number.

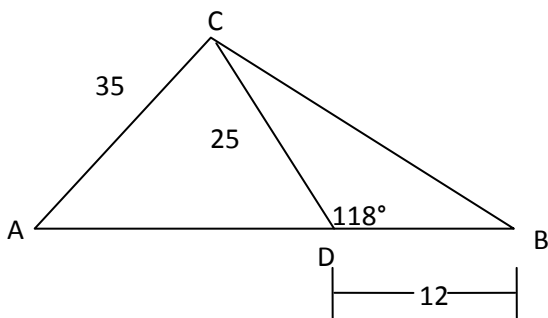


16. Find the $m\angle A$ to the nearest whole degree.

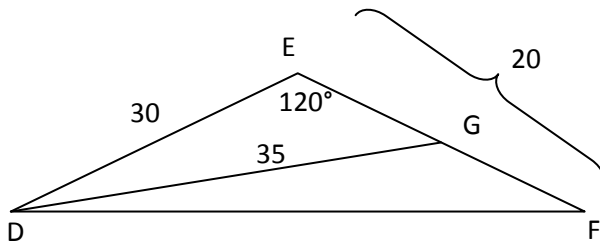


IV. Challenge Problems

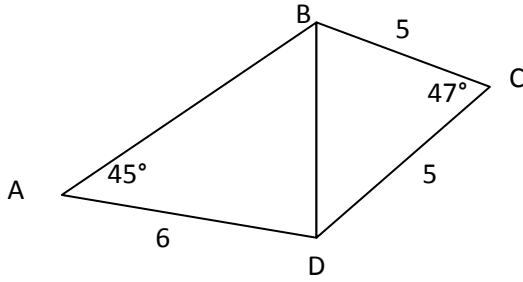
17. Find the $m\angle A$ to the nearest whole degree.



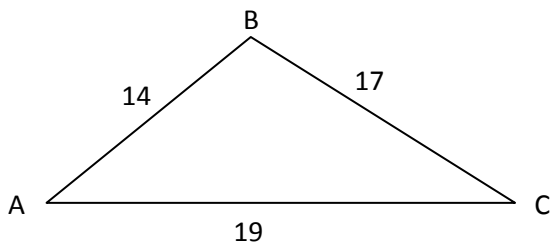
18. Find the $m\angle DGF$ to the nearest whole degree.



19. Find the $m\angle ABD$ to the nearest whole degree.



20. Find the angle measurements of all angles in the triangle below to the nearest whole degree.



III. Answer Key

1. Law of Sines $\frac{\sin 112^\circ}{25} = \frac{\sin x}{12}$
2. Law of Cosines $x^2 = 16^2 + 15^2 - 2(16)(15)\cos 87^\circ$
3. Law of Cosines $(30)^2 = 37^2 + 55^2 - 2(37)(55)\cos x$
4. Law of Sines $\frac{x}{\sin 100^\circ} = \frac{56}{\sin 42^\circ}$
5. Law of Sines $\frac{20}{\sin 40^\circ} = \frac{x}{\sin 32^\circ}$
6. Law of Cosines $x^2 = 22^2 + 31^2 - 2(22)(31)\cos 135^\circ$
7. Law of Sines $\frac{\sin 50^\circ}{32} = \frac{\sin x}{40}$
8. Law of Cosines $b^2 = 17^2 + 34^2 - 2(17)(34)\cos 94^\circ$
9. Law of Sines $\frac{h}{\sin 132^\circ} = \frac{31}{\sin 21^\circ}$
10. Law of Cosines $(9)^2 = 6^2 + 12^2 - 2(6)(12)\cos Y$
11. $f \approx 3, m\angle F \approx 22^\circ$
12. $m\angle C \approx 26^\circ$
13. $b \approx 91, m\angle A \approx 31^\circ, m\angle C \approx 25^\circ$
14. $f \approx 103$ or 11
15. $x \approx 14$
16. $m\angle A = 15^\circ$
17. $m\angle A \approx 39^\circ$
18. $m\angle DGF \approx 132^\circ$
19. No solution- no figure with these dimensions can be constructed
20. $m\angle A \approx 60^\circ, m\angle B \approx 75^\circ, m\angle C \approx 45^\circ$