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- I. Model Problems.
- II. Practice Problems (1-6)
- III. Practice(harder) & Word Problems (7 - 18)
- IV. Challenge Problems
- V. Answer Key

Web Resources

www.mathwarehouse.com/law-of-sines

 [Law of Sines](#) -video Tutorial and practice problems

 [ambiguous case](#) - video Tutorial and practice problems

[Pictures of Law of Sines](#) (problem diagrams and formula)

[Law of Sines and Cosines Worksheets](#)

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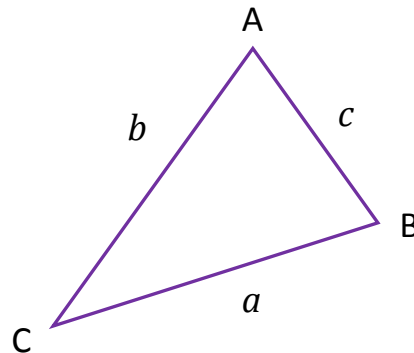
Law of Sines

For any $\triangle ABC$:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

or

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

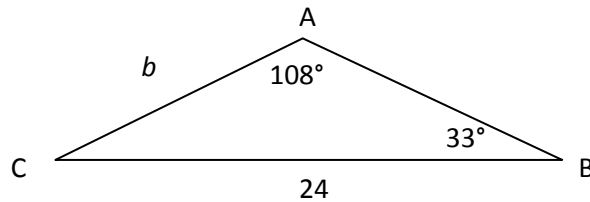


I. Model Problems

In the following example you will find the length of a side of a triangle using Law of Sines.

Example 1:

Find the length of b .



Write down known.

$$a = 24, m\angle A = 108^\circ, m\angle B = 33^\circ$$

Law of Sines

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

Substitute.

$$\frac{24}{\sin 108^\circ} = \frac{b}{\sin 33^\circ}$$

Simplify.

$$(\sin 33^\circ) \left(\frac{24}{\sin 108^\circ} \right) = b$$

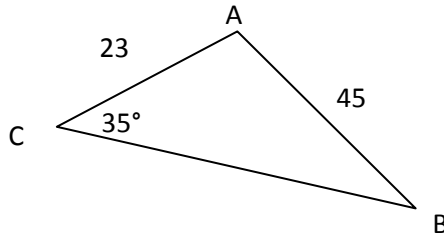
Round to the nearest hundredth.

$$b \approx 13.74$$

In the following example you will find the measure of an angle of a triangle using Law of Sines.

Example 2:

Find $m\angle B$.



Write down known.

$$b = 23, c = 45, m\angle C = 35^\circ$$

Law of Sines

$$\frac{\sin B}{b} = \frac{\sin C}{c}$$

Substitute.

$$\frac{\sin B}{23} = \frac{\sin 35^\circ}{45}$$

Isolate $\sin B$.

$$\sin B = \left(\frac{\sin 35^\circ}{45}\right)(23)$$

Find the inverse.

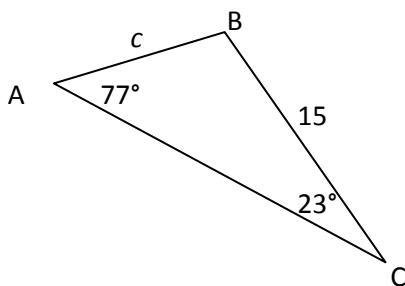
$$\sin B = \frac{23}{45}(\sin 35^\circ)$$

Round to the nearest whole degree.

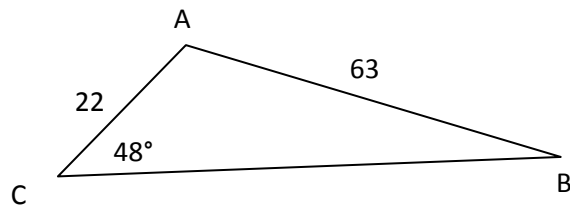
$$m\angle B \approx 17^\circ$$

II. Find the length of a side or measure of an angle using Law of Sines.

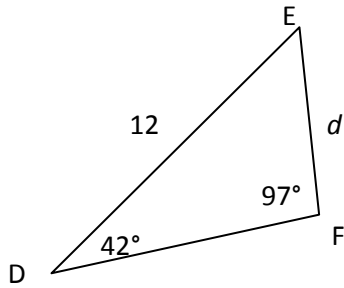
1. For $\triangle ABC$ find c to the nearest hundredth.



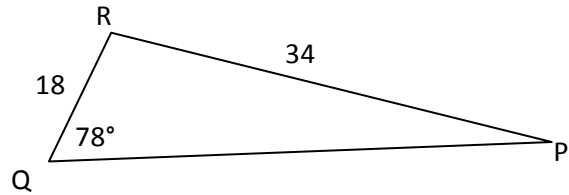
2. For $\triangle ABC$ find $m\angle B$ to the nearest whole degree.



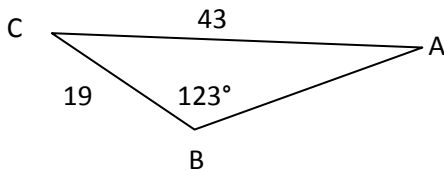
3. For $\triangle DEF$ find d to the nearest hundredth.



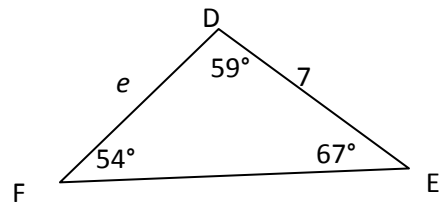
4. For $\triangle PQR$ find $m\angle P$ to the nearest whole degree.



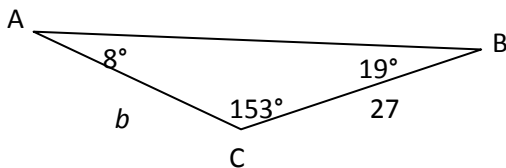
5. For $\triangle ABC$ find $m\angle A$ to the nearest whole degree.



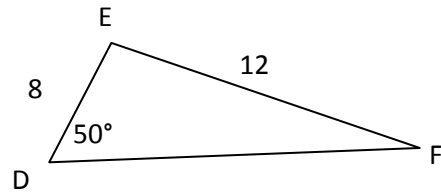
6. For $\triangle DEF$ find e to the nearest hundredth.



7. For $\triangle ABC$ find b to the nearest hundredth.



8. For $\triangle DEF$ find $m\angle F$ to the nearest whole degree.



9. For $\triangle ABC$, $a = 18$, $b = 6$, and $m\angle A = 28^\circ$. Find $m\angle B$ to the nearest whole degree.

11. For $\triangle DEF$, $d = 54$, $f = 27$, $m\angle D = 20^\circ$. Find $m\angle F$ to the nearest whole degree.

13. For $\triangle DEF$, $e = 34$, $m\angle D = 36^\circ$, $m\angle E = 72^\circ$, and $m\angle F = 72^\circ$. Find e to the nearest whole degree.

10. For $\triangle DEF$, $d = 24$, $m\angle D = 37^\circ$, and $m\angle E = 49^\circ$. Find e to the nearest whole degree.

12. For $\triangle ABC$, $a = 42$, $c = 72$, and $m\angle C = 41^\circ$. Find $m\angle A$ to the nearest whole degree.

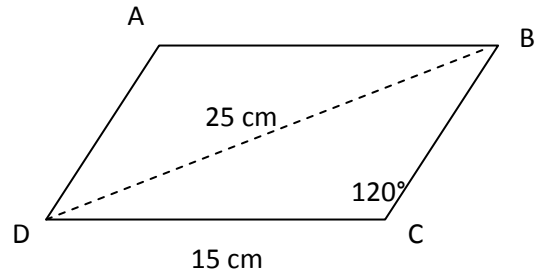
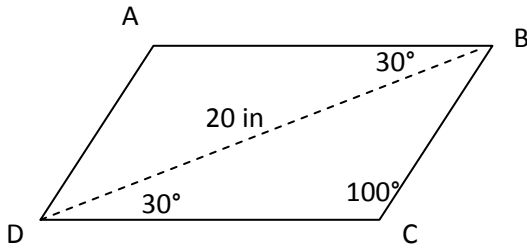
14. For $\triangle XYZ$, $x = 17$, $m\angle X = 24^\circ$, $m\angle Y = 44^\circ$, and $m\angle Z = 112^\circ$. Find z to the nearest whole degree.

15. For $\triangle ABC$, $b = 45$, $c = 11$, and $m\angle B = 123^\circ$. Find $m\angle C$ to the nearest whole degree.

16. For $\triangle DEF$, $e = 98$, $m\angle D = 52^\circ$, $m\angle E = 71^\circ$, and $m\angle F = 57^\circ$. Find d to the nearest whole degree.

17. For parallelogram ABCD below find BC to the nearest tenth.

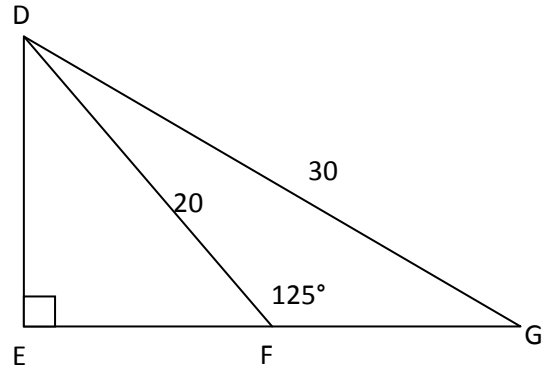
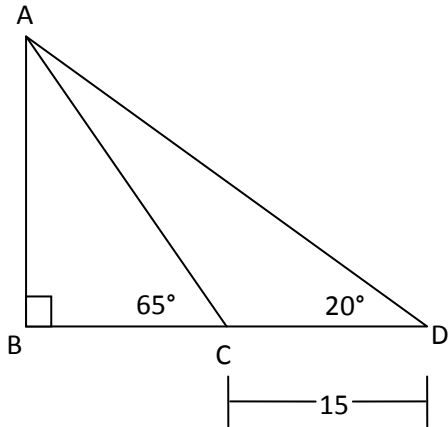
18. For parallelogram ABCD below find $m\angle DBC$ to the nearest whole degree.



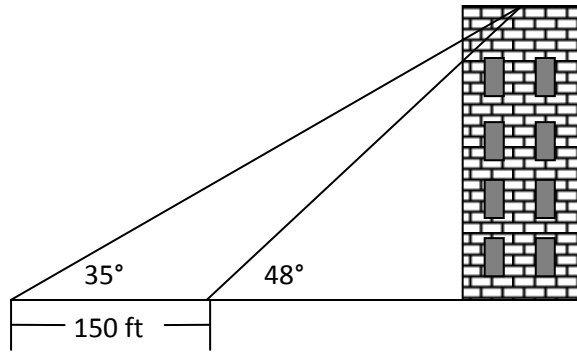
III. Challenge Problems

19. For the figure below find BC to the nearest whole number. $CD = 15$.

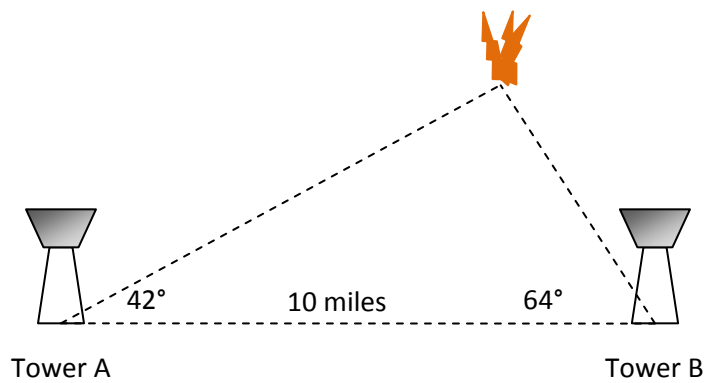
20. For the figure below find $m\angle EDG$ to the nearest whole degree.



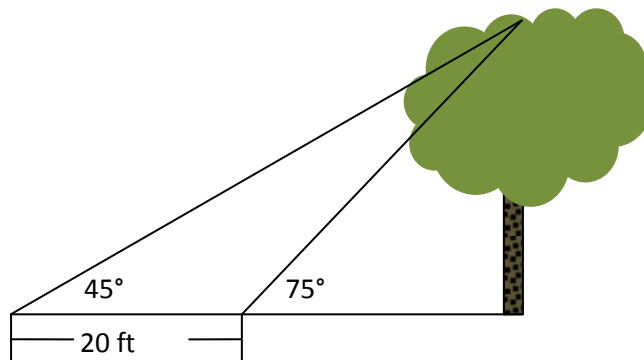
21. Find the height of the building in the figure below to the nearest foot.



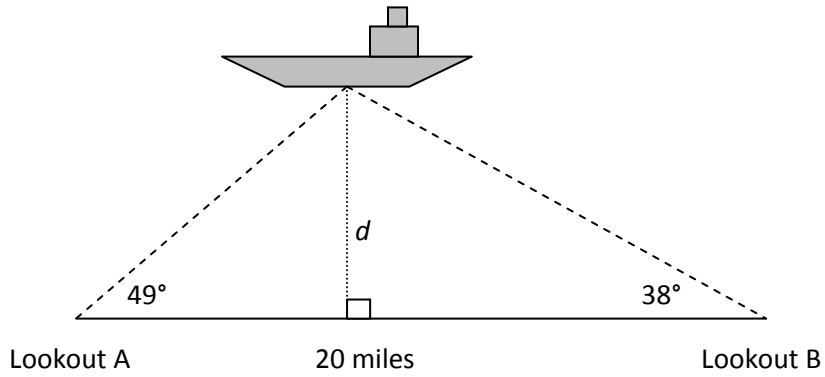
22. Fire towers A and B are located 10 miles apart. They use the direction of the other tower as 0° . Rangers at fire tower A spots a fire at 42° , and rangers at fire tower B spot the same fire at 64° . How far from tower A is the fire to the nearest tenth of a mile?



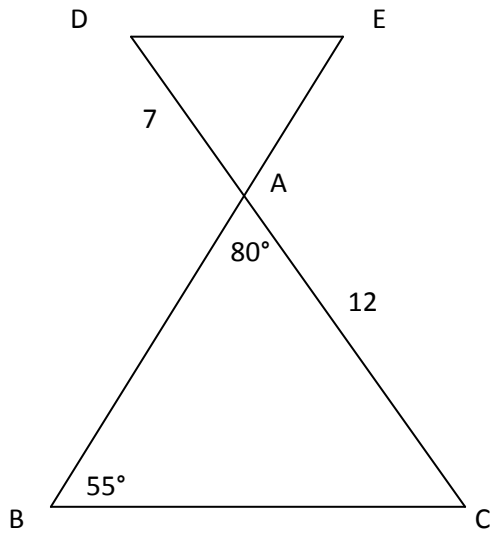
23. Find the height of the tree below to the nearest foot.



24. Triangulation can be used to find the location of an object by measuring the angles to the object from two points at the end of a baseline. Two lookouts 20 miles apart on the coast spot a ship at sea. Using the figure below find the distance, d , the ship is from shore to the nearest tenth of a mile.



25. $\triangle DEA \sim \triangle CBA$. Find DE to the nearest whole number.



VI. Answer Key

1. $c \approx 6.02$
2. $m\angle B \approx 15^\circ$
3. $d \approx 8.09$
4. $m\angle P \approx 31^\circ$
5. $m\angle A \approx 22^\circ$
6. $e \approx 7.96$
7. $b \approx 63.16$
8. $m\angle F \approx 31^\circ$
9. $m\angle B \approx 9^\circ$
10. $e \approx 30.10$
11. $m\angle F \approx 10^\circ$
12. $m\angle A \approx 23^\circ$
13. $d \approx 21.01$
14. $z \approx 38.75$
15. $m\angle C \approx 12^\circ$
16. $d \approx 81.67$
17. 10.2 inches
18. 31°
19. 3
20. 57°
21. 284 ft
22. 9.0 miles
23. 27 ft
24. 15.1 miles
25. 8