Law of Sines

Trigonometry Worksheet · Grade 10-12

Name: _____ Date: _____ Score: / 9

Learning Objectives

- Apply the Law of Sines to find missing sides of oblique triangles
- Apply the Law of Sines to find missing angles of oblique triangles
- Correctly label angles and their corresponding opposite sides

Use the Law of Sines to find each missing side or angle, rounding answers to two decimal places where needed.

1. In triangle ABC, angle A = 110°, a = 125 in, b = 100 in. Find angle B.

$$\frac{125}{\sin 110^\circ} = \frac{100}{\sin B}$$

Answer: _____

2. In triangle ABC, angle A = 110° and angle B = 48.74°. Find angle C.

$$C = 180^\circ - A - B$$

Answer: _____

3. In triangle ABC, angle A = 110°, angle C = 21.26°, and a = 125 in. Find side c.

$$\frac{125}{\sin 110^\circ} = \frac{c}{\sin 21.26^\circ}$$

Answer: _____

4. In triangle ABC, angle A = 40°, angle B = 75°, a = 12 cm. Find side b.

$$\frac{12}{\sin 40^\circ} = \frac{b}{\sin 75^\circ}$$

Answer: _____

5. In triangle ABC, angle A = 40°, angle B = 75°. Find angle C.

$$C = 180^\circ - 40^\circ - 75^\circ$$

Answer: _____

6. In triangle ABC, angle A = 35°, angle C = 80°, a = 10 m. Find side c.

$$\frac{10}{\sin 35^\circ} = \frac{c}{\sin 80^\circ}$$

Answer: _____

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7. In triangle ABC, a = 8, b = 11, angle A = 32°. Find angle B (acute solution).

$$\frac{8}{\sin 32^\circ} = \frac{11}{\sin B}$$

Answer: _____

8. In triangle ABC, angle A = 25°, angle B = 60°, a = 7 ft. Find side b.

$$\frac{7}{\sin 25^\circ} = \frac{b}{\sin 60^\circ}$$

Answer: _____

9. In triangle ABC, angle B = 95°, angle C = 30°, b = 20 in. Find side c.

$$\frac{20}{\sin 95^\circ} = \frac{c}{\sin 30^\circ}$$

Answer: _____

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ANSWER KEY & SOLUTIONS

Remind students that the side opposite an angle shares the same letter (lowercase) and that calculators must be set to degree mode.

Solutions

1. In triangle ABC, angle A = 110°, a = 125 in, b = 100 in. Find angle B.

$$\frac{125}{\sin 110^\circ} = \frac{100}{\sin B}$$

→ *Set up the Law of Sines using the pair a/sin A and b/sin B*
→ *Cross multiply to get sin B equals 100 times sin 110 degrees divided by 125*
→ *Compute sin B is approximately 0.7518*
→ *Take the inverse sine to find B is approximately 48.74 degrees*

Answer: $B \approx 48.74^\circ$

2. In triangle ABC, angle A = 110° and angle B = 48.74°. Find angle C.

$$C = 180^\circ - A - B$$

→ *Recall that the three interior angles of a triangle sum to 180 degrees*
→ *Subtract angle A and angle B from 180 degrees*
→ *C is approximately 180 minus 110 minus 48.74, which is 21.26 degrees*

Answer: $C \approx 21.26^\circ$

3. In triangle ABC, angle A = 110°, angle C = 21.26°, and a = 125 in. Find side c.

$$\frac{125}{\sin 110^\circ} = \frac{c}{\sin 21.26^\circ}$$

→ *Set up the Law of Sines pairing side a with angle A and side c with angle C*
→ *Solve for c by multiplying both sides by sin 21.26 degrees*
→ *Compute c equals 125 times sin 21.26 degrees divided by sin 110 degrees*
→ *Side c is approximately 48.22 inches*

Answer: $c \approx 48.22$ in

4. In triangle ABC, angle A = 40°, angle B = 75°, a = 12 cm. Find side b.

$$\frac{12}{\sin 40^\circ} = \frac{b}{\sin 75^\circ}$$

→ *Use the Law of Sines pairing side a with angle A and side b with angle B*
→ *Multiply both sides by sin 75 degrees*
→ *Compute b equals 12 times sin 75 degrees divided by sin 40 degrees*
→ *Side b is approximately 18.03 centimeters*

Answer: $b \approx 18.03$ cm

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5. In triangle ABC, angle A = 40°, angle B = 75°. Find angle C.

$$C = 180^\circ - 40^\circ - 75^\circ$$

→ *Use the fact that the interior angles sum to 180 degrees*
→ *Subtract the two known angles from 180*
→ *C equals 65 degrees*

Answer: $C = 65^\circ$

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6. In triangle ABC, angle A = 35°, angle C = 80°, a = 10 m. Find side c.

$$\frac{10}{\sin 35^\circ} = \frac{c}{\sin 80^\circ}$$

→ *Apply the Law of Sines pairing side a with angle A and side c with angle C*
→ *Solve for c by multiplying both sides by sin 80 degrees*
→ *Compute c equals 10 times sin 80 degrees divided by sin 35 degrees*
→ *Side c is approximately 17.17 meters*

Answer: $c \approx 17.17$ m

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7. In triangle ABC, a = 8, b = 11, angle A = 32°. Find angle B (acute solution).

$$\frac{8}{\sin 32^\circ} = \frac{11}{\sin B}$$

→ *Set up the Law of Sines pairing a with angle A and b with angle B*
→ *Cross multiply to get sin B equals 11 times sin 32 degrees divided by 8*
→ *Compute sin B is approximately 0.7289*
→ *Take the inverse sine to obtain B approximately 46.84 degrees*

Answer: $B \approx 46.84^\circ$

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8. In triangle ABC, angle A = 25°, angle B = 60°, a = 7 ft. Find side b.

$$\frac{7}{\sin 25^\circ} = \frac{b}{\sin 60^\circ}$$

→ *Use the Law of Sines pairing side a with angle A and side b with angle B*
→ *Multiply both sides by sin 60 degrees*
→ *Compute b equals 7 times sin 60 degrees divided by sin 25 degrees*
→ *Side b is approximately 14.34 feet*

Answer: $b \approx 14.34$ ft

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9. In triangle ABC, angle B = 95°, angle C = 30°, b = 20 in. Find side c.

$$\frac{20}{\sin 95^\circ} = \frac{c}{\sin 30^\circ}$$

→ *Apply the Law of Sines pairing side b with angle B and side c with angle C*
→ *Solve for c by multiplying both sides by sin 30 degrees*
→ *Compute c equals 20 times sin 30 degrees divided by sin 95 degrees*
→ *Side c is approximately 10.04 inches*

Answer: $c \approx 10.04$ in