



Using the Sine Rule to find missing sides

Key focus

This objective is for non-right-angled triangles where a student knows one complete side–opposite-angle pair and needs another side. The four source questions all give two angles and one side, so they are Sine Rule questions. They are not Cosine Rule questions (which normally use three sides, or two sides and the included angle), and they are not sine-area questions (which ask for area from two sides and the included angle).

Suggested teaching sequence

1. Mark each angle and physically trace across the triangle to its opposite side.
2. Circle the one complete known pair: a numerical side and its opposite numerical angle.
3. Write the Sine Rule with matching pairs vertically aligned:

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

4. Keep only the known pair and the pair containing the required side.
5. Rearrange before entering values in the calculator. For example,

$$\frac{x}{\sin X} = \frac{k}{\sin K} \implies x = \frac{k \sin X}{\sin K}.$$

6. Round only the final answer and attach the stated unit.
7. Check reasonableness: the larger angle must face the longer side.

Worked example

A triangle has a known side of 11.5 cm opposite 47° . The unknown side x is opposite 73° .

$$\frac{x}{\sin 73^\circ} = \frac{11.5}{\sin 47^\circ} \quad x = \frac{11.5 \sin 73^\circ}{\sin 47^\circ} = 15.0 \text{ cm (1 d.p.)}.$$

Because $73^\circ > 47^\circ$, it is sensible that $15.0 > 11.5$.

Watch for

- Pairing a side with an adjacent angle instead of its opposite angle.
- Using SOHCAHTOA simply because a sine button appears; there is no right angle here.
- Choosing the Cosine Rule when a complete opposite pair is already available.
- Typing $\sin^{-1}$ when finding a side. Inverse sine is used when the unknown is an angle.
- Rounding an intermediate sine value and carrying avoidable error into the final answer.
- Accepting an answer where the longest side is not opposite the largest angle.

Checks for understanding

- Can the student identify the complete known opposite pair without prompting?
- Can they write two correctly matched fractions from the Sine Rule?
- Can they rearrange to make the missing side the subject?
- Can they distinguish Sine Rule from Cosine Rule, SOHCAHTOA, and $\frac{1}{2}ab \sin C$?
- Can they calculate a second missing side and then a perimeter without rounding too early?