Key focus

This objective is for non-right-angled triangles where one complete side–opposite-angle pair is known and a second side is opposite the required angle. Students rearrange the Sine Rule to find the sine of the angle, then apply inverse sine. The supplied practice grid models the same sequence: label the triangle, choose matching fractions, rearrange, and calculate. Missing sides, the Cosine Rule, the sine area formula, and the ambiguous case sit outside this objective.

Suggested teaching sequence

1. Trace straight across each vertex to identify its opposite side. Mark the complete numerical side–angle pair first.
2. Write the angle-over-side form of the Sine Rule so the unknown angle is already in a numerator:
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}.$$
3. Keep only the known pair and the pair containing the required angle.
4. Rearrange before using the calculator. For example,
$$\frac{\sin x}{p} = \frac{\sin K}{k} \quad \Longrightarrow \quad \sin x = \frac{p \sin K}{k}.$$
5. Use inverse sine only after $\sin x$ has been isolated:
$$x = \sin^{-1}\left(\frac{p \sin K}{k}\right).$$
6. Keep the full calculator value. Round the final angle only and include the degree symbol.
7. Where a third angle is required, use $180^\circ - A - B$ with the unrounded calculated angle.
8. Check the side–angle order: the shorter of two compared sides must face the smaller angle.

Worked example

A side of 18 cm is opposite 67°. A side of 13 cm is opposite x.

$$\frac{\sin x}{13} = \frac{\sin 67^\circ}{18} \qquad \sin x = \frac{13 \sin 67^\circ}{18}$$

$$x = \sin^{-1}\left(\frac{13 \sin 67^\circ}{18}\right) = 41.7^\circ \text{ (1 d.p.).}$$

This is reasonable because $13 < 18$, so the angle opposite 13 cm should be smaller than 67°.

Watch for

- Pairing an angle with an adjacent side instead of the side directly opposite it.

- Mixing the side-over-sine and sine-over-side forms within one equation.
- Using $\sin$ instead of $\sin^{-1}$ after isolating $\sin x$.
- Applying inverse sine before multiplying and dividing the full right-hand side.
- Rounding an intermediate sine value or a first angle before using the triangle angle sum.
- Accepting an angle whose relative size contradicts the lengths of the opposite sides.
- Introducing the supplementary inverse-sine solution here. All questions in this objective are deliberately chosen so the acute result is uniquely determined by the displayed side order or an obtuse known angle.

Checks for understanding

- Can the student point to the side opposite a named angle without calculating?
- Can they identify the complete known pair and write two correctly matched fractions?
- Can they isolate $\sin x$ and use inverse sine with the calculator in degree mode?
- Can they explain why the shorter side must be opposite the smaller angle?
- Can they use the unrounded value of x to calculate the remaining angle accurately?