Sine-ing the way

Teacher notes

underground mathematics

Why use this resource?

This resource reminds students of their knowledge of angles in circles (through the Warm-up) before the main Problem leads them through an elegant proof of the Sine Rule which incorporates the use of circle theorems. Students will also discover an interesting relationship between a triangle and the diameter of its circumcircle.

Preparation

For the main scaffolded task, students will need a printed sheet each to fill in, which could be printed on A3 paper (see the possible approaches below).

Possible approaches

The warm-up could be done as a mini whiteboard exercise, or students could work in groups on a large piece of paper. Students should be encouraged to justify their answers using circle theorems).

The main scaffolded task could be given to students to work on individually (possibly as a homework) and the results can then be discussed as a class so that any gaps filled in through discussion. The discussion could start with students working in pairs and then larger groups or a whole class plenary.

Alternatively, students could start with a sheet each and be given a minute or two to look at the first couple of boxes. Then students can work in pairs, checking their ideas as they go.

The scaffold structure could be printed on large sheets for students to work on in groups of four.

Key questions

- Can you find a pair of angles that are equal?
- How can you justify that they are equal?
- How does A being a right angle help?
- What is the relationship between the angles and sides of a right angles triangle?
- Can you write down a similar relationship for the final angle without drawing in A’?

Possible support

Encourage students to compare the working they are doing with the Warm-up. Which angles are equivalent?

What can they remember about right-angled triangles, can they remember the trigonometric ratios?

The suggestion section could be printed out and cut up as separate cards to be handed to students as appropriate. Students should be encouraged to think about how these suggestions are related to the specific steps in the problem they are tackling as well as the problem as a whole.

Possible extension

What difference does it make if the triangle has an obtuse angle? Can you construct a proof of the result? (Which circle theorems and properties of $\sin$ will students need to use if C' is in the opposite segment to C?)