

# Equation or identity? (II)

## Teacher notes

### Why use this resource?

This resource, like the earlier [Equation or identity? \(I\)](#), probes the difference between an equation and an identity, and provides some thought-provoking examples to explore and helps develop critical reasoning skills for proving these are one or the other.

It also gives practice in manipulating known identities (and a chance to reinforce their learning). It could be used solely for practice in manipulating trigonometric equations and identities or used to explore or reinforce new knowledge about the compound angle formulae.

### Preparation

Students need to know the standard identities such as the trigonometric definitions and the Pythagorean identity (in all its versions) and the compound angle formulae (unless these will be explored through this resource).

Some knowledge of transformations might be needed for some approaches to solving these and familiarity with the graphs and thus the relationships between *sine* and *cosine* of a particular angle and between  $\sin A$  and  $\sin(180^\circ - A)$ , for example.

### Possible approaches

If this is used as practice manipulation then the class might start by writing down the identities they can remember, then share with a neighbour and then a group or whole class plenary before attempting the problem. Alternatively the equations could be given to pairs or small groups and the students allowed to assemble a list of the identities they need to use as they progress.

If knowledge of compound angle formulae is to be developed through use of the activity then students might start in pairs or small groups trying to identify which they think might be only equations, and identify what extra information they might need to know in order to prove one way or the other. Groups might be given the formulae to use or given just one formula to each group for a first period of time.

## Key questions

- Which formula might you try here?
- What simple triangles do you know that you could try this on?
- What different types of triangles are there? Are you convinced it would work for them all?
- What is the difference between an equation and an identity?
- How can you prove...?
- Can you convince your peers that...?
- Would any of your answers change if  $A$ ,  $B$  and  $C$  were allowed to be any angles?

## Possible support

- How are *sine* and *cosine* of an angle related?
- Might it be easier to work right to left?
- Can you think of another way of writing that part?
- How are  $A$ ,  $B$  and  $C$  related, so how about  $\sin A$ ,  $\sin B$  ...?
- What do you already know? (Sines/cosines of specific angles, ways angles are related, identities ...)

## Possible extension

- Are the identities true if  $A$ ,  $B$ , and  $C$  are not the angles of a triangle?
- What about the equations – for what sets of angles are they true?
- Could you find another way of proving any of these?

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A version of this resource has been featured on the [NRICH website](https://nrich.maths.org/). You might like to look at some students' solutions that have been submitted there.