

Core concept 3.2: Trigonometry

This document is part of a set that forms the subject knowledge content audit for Key Stage 3 maths. The audit is based on the NCETM Secondary Professional Development materials and there is one document for each of the 17 core concepts. Each document contains audit questions with check boxes you can select to show how confident you are (1 = not at all confident, 2 = not very confident, 3 = fairly confident, 4 = very confident), exemplifications and explanations, and further support links. At the end of each document there is space to type reflections, targets and notes. The document can then be saved for your records.

3.2.1 Understand the trigonometric functions

How confident are you that you understand and can explain how the trigonometric functions are derived from the unit circle?

1

2

3

4

How confident are you that you understand and can explain how the sine, cosine and tangent ratios are derived from the sides of a right-angled triangle?

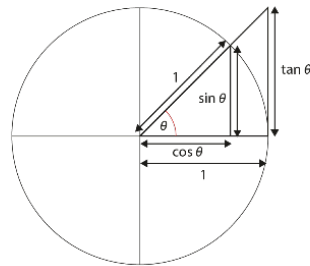
1

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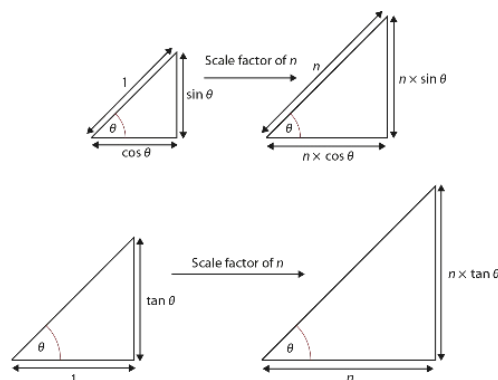
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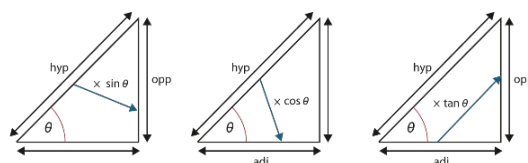
By using existing knowledge and understanding of similarity, scale factor and multiplicative relationships, students build an awareness of how the length of sides and size of angles in right-angled triangles can be calculated and, hence, provide solutions to a wide range of practical problems. The trigonometric ratios $\sin \theta = \frac{\text{opp}}{\text{hyp}}$, $\cos \theta = \frac{\text{adj}}{\text{hyp}}$ and $\tan \theta = \frac{\text{opp}}{\text{adj}}$ are seen in this diagram:



This sense of all right-angled triangles being a scaling of one of the two 'unit' right-angled triangles within the unit circle emphasises the multiplicative relationship *between* triangles.



Another important awareness is the multiplicative relationship (or ratio) *within* each right-angled triangle.



Subject Knowledge Audit (Key Stage 3 Mathematics)

Further support links

- NCETM Secondary Professional Development materials: 3.2 Trigonometry, pages 10-25
- NRICH: The history of trigonometry part 1 (and subsequent parts): <https://nrich.maths.org/6843>

3.2.2 Use trigonometry to solve problems in a range of contexts

How confident are you that you can explain how to use trigonometric relationships to find missing sides and angles in right angled triangles?

1

2

3

4

How confident are you that you can explain how to use trigonometric relationships to solve problems in a range of contexts?

1

2

3

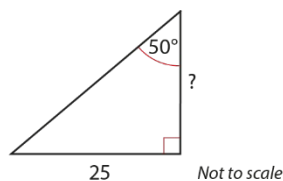
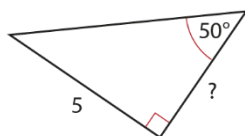
4

Finding missing sides and angles in any right-angled triangle is extremely useful in many practical situations (for example, finding: the height of inaccessible objects, the length of an object given the length of its shadow, and the direction in which to steer a boat across a river where there is a current).

Solving a wide range of standard and non-standard problems builds confidence in modelling real-life situations mathematically, and in recognising what information is given, what information is required and which trigonometric relationship needs to be used to reach a solution.

For example:

Find the missing side lengths in these triangles:



Notes