Can you find... trigonometry edition
Teacher notes

Why use this resource?

A resource for students to build up experience working with graphs of trigonometric functions.

Students are asked to suggest graphs of trigonometric functions which satisfy certain conditions. In the first part of the problem students are asked to suggest one graph, while in the second they are asked to suggest two or three graphs which simultaneously satisfy a set of conditions.

Please note that the resource uses radians, but the main ideas do not depend on this.

Possible approach

The resource is in two parts and these do not necessarily have to be attempted at the same time. The first part could be used to focus students on transformations of standard sine and cosine waves. You could ask for "another example, and another..." to encourage students to explore how much flexibility there is within the given conditions.

Some questions in the second part have been asked in two stages and it is worth encouraging students to try to find graphs for the first stage before moving on to the second. Students have to draw on their knowledge of key properties of trigonometric functions, such as periodicity, amplitude and asymptotes, as well as relationships between $\sin$, $\cos$ and $\tan$. These problems could be attempted using sketch graphs or graphing software.

Key questions

- What transformations of $y = \sin x$ can you sketch?

- What different ways can you force the graph of $y = \sin x$, $y = \cos x$ or $y = \tan x$ to pass through a particular point?

Possible extension

A general form of a sine wave is $y = c\sin(ax + b) + d$. Can students recognise this in any of the graphs they have suggested? What constraints do the given conditions put on this form - how much choice is there?

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A version of this resource has been featured on the NRICH website in two parts, here and
here. You might like to look at some students' solutions that have been submitted there.

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