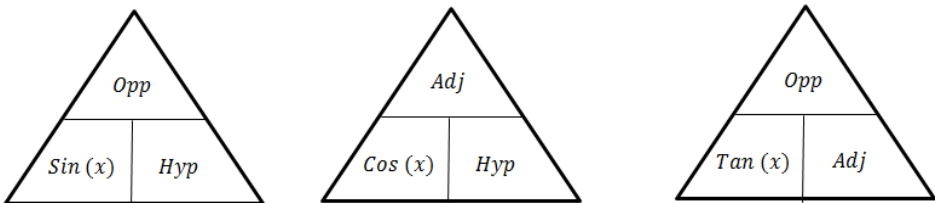# Pythagoras and Trigonometry

Guidance for tutors

Outcome	SPT3	Student can consistently:	Find the size of a missing angle in a right angled triangle using sine, cosine or tangent functions.
How the topic is examined			- Examined through test paper questions. - It is most likely that these questions will appear on calculator papers. - Sometimes students can be asked to find a missing angle on a non-calculator paper. In this instance students will be given the value of the specific ratio for a particular angle or they could be one of the ratios that students are expected to know off by heart. - Students are likely to be provided with a diagram, but students may be expected to draw a diagram for a given question. It is important that students meet questions like this.
Prior knowledge			- Students should be confident: - Solving basic equations (AEq1) - Rearranging simple formulae (AEx8) - Using a calculator. - In addition questions on this topic can have links to: - Bearings - Pythagoras's Theorem (SPT1) - Area and perimeter (SLAV1)
Suggested tuition approaches			- Students should cover mixed problems involving sine, cosine and tangent as opposed to focussing on one ratio at a time. - Students need to work on problems where they are asked find angle x and examples where it asks them to find angle BCD. - Students need to recall the trigonometric ratios, sine, cosine and tangent. Some students like to remember the pneumonic SOH CAH TOA - The steps involved in solving simple trigonometry problems should include: - Draw a triangle (where necessary) and label all three sides. - Selecting the correct trigonometric ratio and substitute numbers in.

Guidance for tutors

	- o Once students have substituted in they should solve the equation. Students should understand that to find a missing angle they need to use the inverse sine, cosine and tangent functions ($sin^{-1}(x)$, $cos^{-1}(x)$ and $tan^{-1}(x)$) - Ensure that students show ALL their steps in their working out. - Students should aim to give their answers to 3 significant figures. - Some students use SOH CAH TOA triangles to help them work out the required side. *Opp / Sin (x)	Hyp* *Adj / Cos (x)	Hyp* *Opp / Tan (x)	Adj* - The inverse functions can usually be found by pressing shift before pressing sin, cos or tan on their calculator.
Common errors and misconceptions	- Questions might ask students to find particular sides or angles (e.g. angle x or angle CDE). Some students may struggle to understand the angle it is referring to. - Students can round prematurely and they end up getting the wrong answer (e.g. $sin x = \frac{7}{19}$ students then will work out $7 \div 19 = 0.4$ and then find the inverse and get 23.6, when they should have done the inverse sine of a number to at least 6 decimal places. Advise students to get the best answer by doing $x = sin^{-1}\left(\frac{7}{19}\right)$ - Ask students to double check the calculation they put into their calculator. - On most modern calculators it is important that students close the bracket after the fraction. - Students should check that the calculator they are using is in degrees (deg) mode.

Suggested resources	- Questions
	  - o http://www.cimt.org.uk/projects/mepres/allgcse/bka4.pdf (pp 135 – 138)
	  - o https://corbettmaths.files.wordpress.com/2013/02/trigonometry-exercise-pdf.pdf
	  - o https://corbettmaths.files.wordpress.com/2013/02/trigonometry-pdf1.pdf
	- Past GCSE Questions
	  - o https://keshgcsemaths.files.wordpress.com/2013/11/89_trigonometry.pdf
	- Explanation video

Guidance for tutors

	o http://corbettmaths.com/2013/03/30/trigonometry-missing-angles/