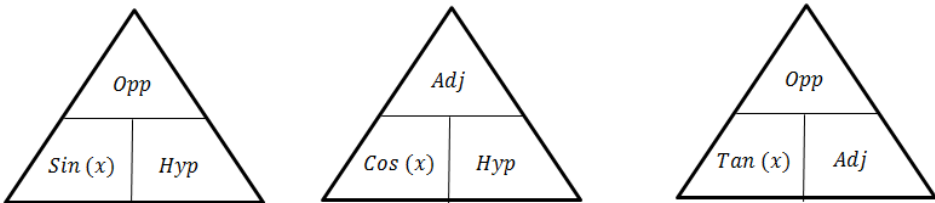


Guidance for tutors

| Outcome | SPT9 | Student can consistently: | Solve problems involving Pythagoras' Theorem and trigonometry in 3D. |
|------------------------------|--|---------------------------|--|
| How the topic is examined | <ul style="list-style-type: none"> Examinated through test paper questions. It is most likely that these questions will appear on calculator papers. Students are likely to be provided with a diagram, but in some cases students may be expected to draw a diagram for a given question. With trigonometry and Pythagoras in 3D drawing triangles is more vital than when answering standard trig equations. | | |
| Prior knowledge | <ul style="list-style-type: none"> Students should be confident: <ul style="list-style-type: none"> Solving basic equations (AEq1) Rearranging simple formulae (AEx8) Pythagoras's Theorem (SPT1) Trigonometry (SLT2 and SPT3) Sine and cosine rules (SPT5 and SPT6) In addition questions on this topic can have links to: <ul style="list-style-type: none"> Volume of prisms (SLAV4) | | |
| Suggested tuition approaches | <ul style="list-style-type: none"> Trigonometry and Pythagoras in 3D are just extensions of Pythagoras and trigonometry in 2D. The key to success in these topics is to spot the right angled triangles. Often you will have to find the first triangle to work out a side and angle and then use this in a different triangle to find the side and angle that you want to find. Here are the steps involved: <ul style="list-style-type: none"> Look at the diagram given (you will be given one) and put on the length or angle you need to find even if you have to draw it in. Try to find the right angle triangle that you need to use first. Draw it out flat in 2D on the page. Use Pythagoras or trigonometry to find the missing side or angle you need. Students need to recall the trigonometric ratios, sine, cosine and tangent. Some students like to remember the mnemonic SOH CAH TOA The steps involved in solving simple trigonometry problems should include: <ul style="list-style-type: none"> Drawing a triangle (where necessary) and labelling the three sides. | | |

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| | <ul style="list-style-type: none"> ○ Selecting the correct trigonometric ratio and substituting the numbers in. ○ Once students have substituted in they should solve the equation. • Ensure that students show ALL their steps in their working out. • Some students use SOH CAH TOA triangles to help them work out the required side. <div style="text-align: center;">  </div> <ul style="list-style-type: none"> • A reminder that when solving problems involving Pythagoras's theorem here are the steps involved: <ul style="list-style-type: none"> ○ Draw out the right-angled triangle (if it is hidden within a diagram) ○ Label the sides of the triangle a, b and c. Remember c is longest side. The longest side is always opposite the right-angle. ○ Write down $a^2 + b^2 = c^2$ ○ Substitute the numbers in and solve. |
| Common errors and misconceptions | <ul style="list-style-type: none"> • Questions might ask students to find particular sides or angles (e.g. side AB or angle CDE). Some students may struggle to understand which side or angle it is referring to. You may also need to draw the information on the diagram. • See SPT1, 2, 3 for notes on mistakes students make with trigonometry and Pythagoras. • Students have a tendency to always multiply to solve problems. • Ask students to double check the calculation they put into their calculator. • Check that the calculator is in degrees (deg) mode. |
| Suggested resources | <ul style="list-style-type: none"> • Questions <ul style="list-style-type: none"> ○ http://www.cimt.org.uk/projects/mepres/allgcse/bkc18.pdf ○ https://corbettmaths.files.wordpress.com/2013/02/3d-trig-pdf.pdf ○ https://corbettmaths.files.wordpress.com/2013/02/3d-pythagoras-pdf.pdf • Past GCSE Questions <ul style="list-style-type: none"> ○ https://keshgcsemaths.files.wordpress.com/2013/11/105_3d-pythagoras.pdf • Video tutorial |

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- <http://corbettmaths.com/2013/12/07/3d-trigonometry/>
- <http://corbettmaths.com/2012/08/19/3d-pythagoras/>