

Guidance for tutors

Outcome	SPT1	Student can consistently:	Apply Pythagoras' theorem in 2D problems.
How the topic is examined	<ul style="list-style-type: none"> Examinated through test paper questions. Questions are equally likely to appear on calculator and non-calculator papers. Questions can ask students to find the longest side or one of the shorter sides. Sometimes a question requiring students to use Pythagoras' Theorem could be hidden within other questions and students have to extract the right-angled triangle. 		
Prior knowledge	<ul style="list-style-type: none"> Students should be confident with: <ul style="list-style-type: none"> Area of shapes (SLAV1) Substitution (AEx5) Rearranging formulae (AEx8) Solving equations (AEq1) In addition questions on this topic can have links to: <ul style="list-style-type: none"> Trigonometry (SPT2) 		
Suggested tuition approaches	<ul style="list-style-type: none"> Students need to understand that Pythagoras is used to find a missing side in a right-angled triangle if you know the other two sides. Pythagoras' theorem is given as $a^2 + b^2 = c^2$, where a, b and c are sides of a right-angled triangle and c is the longest side (also known as the hypotenuse). In words this is sometimes referred to as "the square of the longest side is equal to the sum of the two squares of the other two sides". 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. Sometimes right-angled triangles are hidden in other shapes and students have to realise they need to use Pythagoras. For example in the rectangle below you would have to use Pythagoras to find the length of the diagonal. 		

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	<div data-bbox="1070 282 1500 450" data-label="Image"> </div> <ul style="list-style-type: none"> • Questions on finding the longest side are equally as likely as those asking to find one of the shorter sides. • Students sometimes may be asked to prove that a triangle is right-angled. To prove that a triangle is right-angled then you would label the sides as usual and show that $a^2 + b^2 = c^2$. If Pythagoras' Theorem holds then the triangle is right angled. • Common Pythagoras triples that appear on non-calculator papers are (3, 4, 5) (6, 8, 10) and (5, 12, 13). These are triples such that the sum of the squares of the first two numbers is equal to the square of the third number.
<p>Common errors and misconceptions</p>	<ul style="list-style-type: none"> • The most common mistake that students make is to label the side they want to find c and therefore go on to add and square the two sides they know. This works if they are finding the longest side, but if they are finding a shorter side they should have subtracted. • A result of this is that sometimes students get a larger answer for one of the shorter sides. Get students to check their answer and encourage them to ask if it is reasonable and is it possible? • Sometimes units are mixed in these problems (e.g. one side in cm, one side in m). Students will need to convert one unit to the other. • Students often forget to square root their answer as the final step.
<p>Suggested resources</p>	<ul style="list-style-type: none"> • Questions <ul style="list-style-type: none"> ◦ http://www.cimt.org.uk/projects/mepres/allgcse/bka4.pdf (pp 118 - 126) ◦ https://corbettmaths.files.wordpress.com/2013/02/pythagoras-pdf2.pdf • Tutorial videos <ul style="list-style-type: none"> ◦ http://corbettmaths.com/2012/08/19/pythagoras-video/ • Past GCSE Questions <ul style="list-style-type: none"> ◦ https://keshgcsemaths.files.wordpress.com/2013/11/70_pythagoras.pdf

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