How to answer Exam Questions

Step-by-step guide to answering exam questions on these key topics:

Pythagoras

Right-angled Trigonometry

Non-right-angled Trigonometry

Simultaneous Equations

How to answer Pythagoras questions

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1:</td>
<td>Write out Pythagoras’ Theorem.</td>
<td>$a^2 + b^2 = c^2$</td>
</tr>
<tr>
<td>Step 2:</td>
<td>Identify the <strong>Hypotenuse</strong>. This is the longest side of the triangle, and is always represented by $c$ in the formula. Remember, $a$ and $b$ can be any way round as long as $c$ is the longest side (always opposite the right angle).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td>Step 3:</td>
<td>Substitute the numbers into the formula.</td>
<td>$a^2 + 3^2 = 5^2$</td>
</tr>
</tbody>
</table>
| Step 4: | Rearrange and simplify the equation, then solve to find the value of the unknown side. | $a^2 + 9 = 25$  
$a^2 = 16$  
$a = 4$ |
| Step 5: | Remember to round your answer if the question asks you to, and include units. | $a = 4cm$ |
### How to answer Right-angled Trigonometry questions

<table>
<thead>
<tr>
<th>Step 1:</th>
<th>Label the sides of the triangle with <strong>Hyp</strong>, <strong>Opp</strong> and <strong>Adj</strong>. These stand for: <strong>hypotenuse</strong> (longest side, always opposite the right angle), <strong>opposite</strong> (opposite the angle we are interested in) and <strong>adjacent</strong> (next to (‘adjacent to’) the angle we are interested in).</th>
</tr>
</thead>
</table>
|         | ![Diagram](https://via.placeholder.com/150)  
|         | **Opp**  
|         | 3 cm  
|         | **Hyp**  
|         | 6 cm  
|         | **Adj**  
|         | **x**  |

| Step 2: | Work out which trigonometric formula you need to use. This is decided by which of the two sides you are interested in.  
\[
\sin x = \frac{\text{Opp}}{\text{Hyp}} \\
\cos x = \frac{\text{Adj}}{\text{Hyp}} \\
\tan x = \frac{\text{Opp}}{\text{Adj}}
\] |

| Step 3: | Substitute in the numbers you know.  
\[
\sin x = \frac{3}{6}
\] |

| Step 4: | Rearrange (if necessary) and solve. Remember, the opposite of \( \sin \) is \( \sin^{-1} \). It’s usually found above the \( \sin \) button on your calculator, activated by pressing **shift**.  
\[
\sin x = 0.5 \\
x = \sin^{-1} 0.5 \\
x = 30°
\] |

| Step 5: | Remember to round your answer if the question asks you to, and include units.  
\[
x = 30°
\] |
### How to answer Non-right-angled Trigonometry questions

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1:</strong></td>
<td>Label your triangle. Use lower case (a, b) and (c) for the sides (any order), and upper case (A, B) and (C) for the angles, so that angle (A) is opposite side (a), etc.</td>
</tr>
</tbody>
</table>
| **Step 2:** | Decide which rule to use (all given in the front of your exam).  
**Sine Rule** is for when you know the length of a side and the opposite angle (eg \(b\) and \(B\)).  
**Cosine Rule** is for when you don’t (eg, you have all 3 sides but no angles, or you have 2 sides and the angle in between).  
**Area of a triangle** can calculate the area of any triangle as long as you know two sides and the angle in between. |
| **Step 3:** | Substitute your values into the formula.  
\[a^2 = b^2 + c^2 - 2bc \cos A\]  
\[x^2 = 5^2 + 4^2 - 2 \times 5 \times 4 \times \cos 30\] |
| **Step 4:** | Rearrange and solve to find the unknown values.  
\[x^2 = 6.3589 \ldots\]  
\[x = 2.5217 \ldots\] |
| **Step 5:** | Remember to round your answer if the question asks you to, and include units.  
\[x = 2.52\text{cm to 3 s.f.}\] |
How to answer Simultaneous Equations questions

Substitution Method

Note: Often the Elimination method is slightly quicker, but is trickier to understand, and doesn’t work for more complicated equations.

| Step 1: | Choose the simplest looking equation, and rearrange so it gives \( x \) in terms of \( y \) or \( y \) in terms of \( x \). | \( 6x + 2y = -3 \)  
\( 2y = -3 - 6x \)  
\( y = -1.5 - 3x \) |
|---------|-------------------------------------------------|-------------------------------------------------|
| Step 2: | Substitute this expression for \( x \) (or \( y \), as in this example) into the other equation. Wherever you see that letter, replace it with what our first equation says it is equal to. | \( 4x - 3y = 11 \)  
\( 4x - 3(-1.5 - 3x) = 11 \) |
| Step 3: | Simplify, rearrange and solve to find one of the unknowns. | \( 4x + 4.5 + 9x = 11 \)  
\( 13x + 4.5 = 11 \)  
\( 13x = 6.5 \)  
\( x = 0.5 \) |
| Step 4: | Substitute this value back into whichever equation looks simplest (the one you made from the first equation is usually best). | \( y = -1.5 - 3x \)  
\( y = -1.5 - 3 \times 0.5 \)  
\( y = -1.5 - 1.5 \)  
\( y = -3 \) |
| Step 5: | Check that your solutions work in the original equations, and then write them as your final answer. | \( x = 0.5 \)  
\( y = -3 \) |

Note: if one of your equations is a quadratic, step 3 will take more work, as you will need to solve a quadratic equation.