<table>
<tr><td>Outcome</td><td>NR5</td><td>Student can consistently:</td><td>Find the original amount given a percentage change that has taken place.</td></tr>
<tr><td>How the topic is examined</td><td colspan="3">
<ul>
<li>This is sometimes referred to as reverse percentage problems.</li>
<li>Examined through test paper questions.</li>
<li>Questions can appear on calculator and non-calculator papers equally. When the questions appear on non-calculator papers, the percentages will be straightforward. Sometimes it may be a fractional increase instead of percentage.</li>
<li>The majority of original amount problems are in the form of word problems.</li>
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<tr><td>Prior knowledge</td><td colspan="3">
<ul>
<li>Students should be confident:
<ul>
<li>Working with powers.</li>
<li>Converting from percentages to decimals.</li>
<li>Using a calculator.</li>
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<tr><td>Suggested tuition approaches</td><td colspan="3">
<ul>
<li>Original amount problems are classified as problems where a percentage increase/decrease has taken place and you are given the new value. Students are then asked to find what the original amount was. (e.g. Amir buys a bike in a sale for £96. There is 20% off in the sale. How much did the bike cost originally?)</li>
<li>It is vital that students show all their working out.</li>
<li>Students really struggle to recognise these questions. The key phrase is “original amount” or “at the start” or “before the increase/decrease”</li>
<li>Once students have identified it is an original amount question, the steps are quite straightforward to find the answer.</li>
<li>Again there are two methods which students tend to use. The first method is easier to understand what is going on, but the second method is more mathematical.</li>
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<u>Method 1</u>
<ul>
<li>Get the students to decide whether or not the amount was increased or decreased. (decreased in our example)</li>
<li>Add or subtract this to or from 100% (e.g. 100% - 20% = 80%)</li>
<li>Students should now see that 80% = £96.</li>
<li>Find 1% now by dividing £96 by 80 = £1.20</li>
<li>To find the original amount (100%) we now multiply by 100 (£1.20 x100 = £120)</li>
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<u>Method 2</u>
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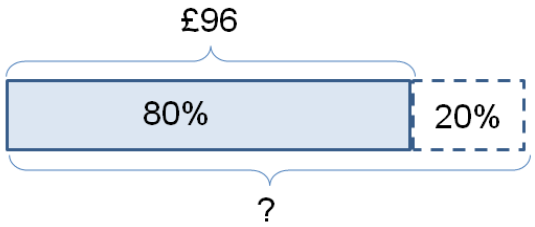
	• This is similar to method 1, except we use decimals instead of percentages. • Get the students to decide whether or not the amount was increased or decreased. (decreased in our example) • Change the percentage into a decimal and then add or subtract this to or from 1 (e.g. 1 – 0.2 = 0.8) • Now divide the amount by this decimal (£96 ÷ 0.8 = £120) • Visual diagrams can help student understand. This can be done through bar modelling.. 
Common errors and misconceptions	• The most common mistake that students make is they struggle to recognise the problem as an original amount question and so will just work out the percentage of the amount given and then either increase or decrease. To help this, students need to be exposed to plenty of mixed problems. • Students should always check their calculations and check if they are reasonable. For example if a bike had been reduced in price and the answer a student gets for the original amount is less than the sale price, then something has gone wrong. • Students want to use non calculator methods (build up method (NR3)) for all percentage questions, even when they have a calculator to use. It is not efficient for problems like these.
Suggested resources	• Questions o file:///C:/Users/TAP/AppData/Local/Microsoft/Windows/INetCache/IE/QH6FGTX7/Text.pdf (pp29-31) • Past GCSE Questions o https://keshgcsemaths.files.wordpress.com/2013/11/84_reverse-percentages.pdf • Video tutorial o https://www.youtube.com/watch?v=x3MCB0Rl3Bk