| Outcome | AEx5 | Student can consistently: | Substitute values into a given expression. |
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| **How the topic is examined** | • Examined through test paper questions.<br>• Questions are equally likely to appear on calculator or non-calculator papers. When expressions appear on non-calculator papers, the values to substitute in will be relatively straightforward.<br>• Students may be asked to substitute values into a formula or it may be in the form of a word problem, where the values could represent real-life variables.<br>• Questions will ask students to 'Substitute' or 'Evaluate'. | | |
| **Prior knowledge** | • Students should be confident with:<br>  ○ Expanding brackets (AEx1)<br>  ○ Simplifying expressions (AEx2)<br>  ○ Negative numbers<br>• In addition questions involving this topic can have links to:<br>  ○ Solving basic equations<br>  ○ Graphs<br>  ○ Sequences | | |
| **Suggested tuition approaches** | • There are two types of problems that students could meet:<br>  ○ The first type involves students substituting values into a given formula or expression and then evaluating. (e.g. Evaluate $5p - 3q$ when $p = 6$ and $q = -1.5$)<br>  ○ The second type of problem involves real-life formulae, where students have to extract information from the question and insert numbers into the given formula. Very occasionally students are asked to form the expression before substituting the values in. *(e.g. The amount of time required to cook an extra-large turkey is given by the formula $T = 0.6w + 40$. Where T is time in minute and w is the weight in kg. How long would it take to cook a turkey that is 15kg in weight?)*<br>• Students could be required to substitute values into any type of expression (e.g. linear, quadratic, exponential etc.…)<br>• This topic closely relates to many other algebraic topics, such as graphs and sequences. In these examples students would need to substitute values into expressions. | | |

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| **Common errors and misconceptions** | • Mistakes often happen when substituting negative numbers into expressions. Students need to be confident with negatives.<br>• Substituting into quadratic (and higher order) expressions can lead to a few mistakes. E.g. find $5p^2$ when p = 2. A common wrong answer is 100 as students multiply by 5 first and then square their answer. Instead it is only the p that is squared, so students should square 2 and then multiply by 5.<br>• Sometimes functions may be given in the form $f(x) = \ldots.$ and students are asked to evaluate $f(3)$, this means that they need to substitute 3 into the function given. |
| **Suggested resources** | • Questions<br>○ http://www.cimt.org.uk/projects/mepres/allgcse/bka2.pdf (pp 24 - 36)<br>○ https://corbettmaths.files.wordpress.com/2013/02/substitution-pdf1.pdf<br>• Past GCSE Questions<br>○ https://keshgcsemaths.files.wordpress.com/2013/11/32_algebra_substitution2.pdf<br>• Video tutorial<br>○ http://corbettmaths.com/2012/08/20/substitution-into-expressions/ |