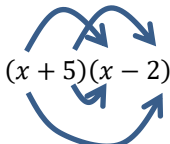


Guidance for tutors

The table below outlines useful information for tutors as well as some suggested approaches and resources.

Outcome	AEx1	Student can consistently:	Expanding brackets (single and double brackets)								
How the topic is examined	<ul style="list-style-type: none">• Examined through test paper questions.• Questions are equally likely to appear on calculator or non-calculator papers.• Questions might involve either one or two brackets (e.g. $3(5x - 4)$ and $(y + 3)(y - 6)$)• Terms in brackets are mostly linear (i.e. of the form $ax + b$)• The question in the exam will either say “Expand” or “Expand and simplify”.										
Prior knowledge	<ul style="list-style-type: none">• Students should be confident with:<ul style="list-style-type: none">◦ Negative numbers◦ Multiplication• In addition questions involving expanding brackets can have links to:<ul style="list-style-type: none">◦ Simplifying expressions (AEx2)◦ Index laws (AEx3)										
Suggested tuition approaches	<ul style="list-style-type: none">• There are two different questions that students can be asked:<ul style="list-style-type: none">◦ “Expand” – students just have to multiply out the brackets◦ “Expand and simplify” – student multiply out the brackets and then simplify the expression (links with AEx2)• Types of questions are shown in the table. <table><tr><th>Expand</th><th>Expand and simplify</th></tr><tr><td>$5(2p - 7)$</td><td>$2(3m + 1) + 2(m - 4)$</td></tr><tr><td>$x(x + 6)$</td><td>$(x + 5)(x + 3)$</td></tr><tr><td>$3ab^2(a - 5b^3)$</td><td>$(3y - 4)^2$</td></tr></table>			Expand	Expand and simplify	$5(2p - 7)$	$2(3m + 1) + 2(m - 4)$	$x(x + 6)$	$(x + 5)(x + 3)$	$3ab^2(a - 5b^3)$	$(3y - 4)^2$
Expand	Expand and simplify										
$5(2p - 7)$	$2(3m + 1) + 2(m - 4)$										
$x(x + 6)$	$(x + 5)(x + 3)$										
$3ab^2(a - 5b^3)$	$(3y - 4)^2$										

- When expanding brackets students should realise that they are “multiplying” out the bracket.
- Single bracket
 - The term on the outside multiplies by each of the terms on the inside.
 - Some students may use arrows to show this.
- Double brackets
 - Students multiply each term in the first bracket by each term in the second bracket.
 - To do this there are a variety of methods that students use to ensure they do not miss any terms.

FOIL	Smiley face	Grid method									
FOIL stands for First, Outside, Inside, Last. <ul style="list-style-type: none"> ▪ Multiply first terms first ▪ Multiply outside terms ▪ Multiply inside terms ▪ Multiply Last terms 	This is essentially the FOIL method, but has arrows on the expression so that it ends up looking like a smiley face	Many students are used to grid multiplication and so this has been extended to algebraic terms. This method is best if there are more than two terms in each bracket.									
$(x + 5)(x - 2)$ F : $x \times x = x^2$ O : $x \times -2 = -2x$ I : $5 \times x = 5x$ L : $5 \times -2 = -10$	 $= x^2 - 2x + 5x - 10$	<table border="1"> <tr> <td></td><td>x</td><td>$+5$</td></tr> <tr> <td>x</td><td>x^2</td><td>$+5x$</td></tr> <tr> <td>-2</td><td>$-2x$</td><td>-10</td></tr> </table>		x	$+5$	x	x^2	$+5x$	-2	$-2x$	-10
	x	$+5$									
x	x^2	$+5x$									
-2	$-2x$	-10									

- In each example it is important to simplify the expression – see AEx2
- Sometimes questions ask students to expand an expression like this $(x - 3)^2$ or $(3p - 5a)^2$. For this type of expression, students need to think of this as a double bracket expansion. (e.g. $(x - 3)(x - 3)$)
- To challenge students more you could cover more complicated expressions:
 - $(3x + 5)\left(2x - \frac{7}{2}\right)$ – coefficient of $x > 1$ and/or fractional terms and coefficients.
 - $(3 - 2x)(x + 6)$ – negative x expressions.
 - $(3a^2 + 2a + 3)(2a + 5)$ – More than two terms in a bracket.

<p>Common errors and misconceptions</p>	<ul style="list-style-type: none"> Students add or subtract instead of multiplying – particularly when getting the last term. For example: <ul style="list-style-type: none"> For $3(2x + 6)$ a common mistake is to write $5x + 9$ or $6x + 9$ For $(x + 5)(x - 3)$ a common mistake for the last term would be to write $+ 2$ (i.e. they have done $5 - 3$) For expressions like $(x - 3)^2$ or $(3p - 5a)^2$ students don't realise this is a double bracket expansion and just square each term. Students miss out some terms in the algebraic expansion. To avoid this encourage them to use one of the methods above. Students make errors when simplifying (see AEx2)
<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/bkb10.pdf (pp 188-189, 201-204) https://corbettmaths.files.wordpress.com/2013/02/expanding-brackets-exercise-13-pdf.pdf https://corbettmaths.files.wordpress.com/2013/02/expanding-two-brackets-exercise-14-pdf.pdf Tutorials <ul style="list-style-type: none"> http://corbettmaths.com/2013/12/23/expanding-brackets-video-13/ http://corbettmaths.com/2013/12/23/expanding-two-brackets-video-14/ Past GCSE Questions <ul style="list-style-type: none"> https://keshgcsemaths.files.wordpress.com/2013/11/58_algebra_expand-and-factorise.pdf https://keshgcsemaths.files.wordpress.com/2013/11/85_algebra_quadratics.pdf