

# A level Maths

## Summer Assignment

EDEXCEL 9MAO

<https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2017.html>

### 1a-1 Expanding brackets and simplifying expressions

#### A LEVEL LINKS

**Scheme of work:** 1a. Algebraic expressions – basic algebraic manipulation, indices and surds

#### Key points

- When you expand one set of brackets you must multiply everything inside the bracket by what is outside.
- When you expand two linear expressions, each with two terms of the form  $ax + b$ , where  $a \neq 0$  and  $b \neq 0$ , you create four terms. Two of these can usually be simplified by collecting like terms.

#### Examples

**Example 1** Expand  $4(3x - 2)$

$4(3x - 2) = 12x - 8$	Multiply everything inside the bracket by the 4 outside the bracket
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**Example 2** Expand and simplify  $3(x + 5) - 4(2x + 3)$

$3(x + 5) - 4(2x + 3)$ $= 3x + 15 - 8x - 12$ $= 3 - 5x$	<ol style="list-style-type: none"> <li>1 Expand each set of brackets separately by multiplying <math>(x + 5)</math> by 3 and <math>(2x + 3)</math> by <math>-4</math></li> <li>2 Simplify by collecting like terms: <math>3x - 8x = -5x</math> and <math>15 - 12 = 3</math></li> </ol>
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**Example 3** Expand and simplify  $(x + 3)(x + 2)$

$(x + 3)(x + 2)$ $= x(x + 2) + 3(x + 2)$ $= x^2 + 2x + 3x + 6$ $= x^2 + 5x + 6$	<ol style="list-style-type: none"> <li>1 Expand the brackets by multiplying <math>(x + 2)</math> by <math>x</math> and <math>(x + 2)</math> by 3</li> </ol>
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	<b>2</b> Simplify by collecting like terms: $2x + 3x = 5x$
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**Example 4** Expand and simplify  $(x - 5)(2x + 3)$

$\begin{aligned} (x - 5)(2x + 3) \\ &= x(2x + 3) - 5(2x + 3) \\ &= 2x^2 + 3x - 10x - 15 \\ &= 2x^2 - 7x - 15 \end{aligned}$	<b>1</b> Expand the brackets by multiplying $(2x + 3)$ by $x$ and $(2x + 3)$ by $-5$  <b>2</b> Simplify by collecting like terms: $3x - 10x = -7x$
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## Practice

**1** Expand.

**a**  $3(2x - 1)$

**c**  $-(3xy - 2y^2)$

**b**  $-2(5pq + 4q^2)$

**2** Expand and simplify.

**a**  $7(3x + 5) + 6(2x - 8)$

**c**  $9(3s + 1) - 5(6s - 10)$

**b**  $8(5p - 2) - 3(4p + 9)$

**d**  $2(4x - 3) - (3x + 5)$

**3** Expand.

**a**  $3x(4x + 8)$

**c**  $-2h(6h^2 + 11h - 5)$

**b**  $4k(5k^2 - 12)$

**d**  $-3s(4s^2 - 7s + 2)$

**4** Expand and simplify.

**a**  $3(y^2 - 8) - 4(y^2 - 5)$

**c**  $4p(2p - 1) - 3p(5p - 2)$

**b**  $2x(x + 5) + 3x(x - 7)$

**d**  $3b(4b - 3) - b(6b - 9)$

**5** Expand  $\frac{1}{2}(2y - 8)$

**6** Expand and simplify.

**a**  $13 - 2(m + 7)$

**b**  $5p(p^2 + 6p) - 9p(2p - 3)$

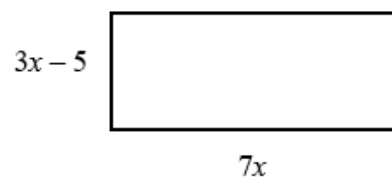
### Watch out!

When multiplying (or dividing) positive and negative numbers, if the signs are the same the answer is '+'; if the signs are different the answer is '-'.

- 7 The diagram shows a rectangle.

Write down an expression, in terms of  $x$ , for the area of the rectangle.

Show that the area of the rectangle can be written as  $21x^2 - 35x$



- 8 Expand and simplify.

a  $(x + 4)(x + 5)$

b  $(x + 7)(x + 3)$

c  $(x + 7)(x - 2)$

d  $(x + 5)(x - 5)$

e  $(2x + 3)(x - 1)$

f  $(3x - 2)(2x + 1)$

g  $(5x - 3)(2x - 5)$

h  $(3x - 2)(7 + 4x)$

i  $(3x + 4y)(5y + 6x)$

j  $(x + 5)^2$

k  $(2x - 7)^2$

l  $(4x - 3y)^2$

## Extend

- 9 Expand and simplify  $(x + 3)^2 + (x - 4)^2$

- 10 Expand and simplify.

a  $\left(x + \frac{1}{x}\right)\left(x - \frac{2}{x}\right)$

b  $\left(x + \frac{1}{x}\right)^2$

## Answers

1 a  $6x - 3$   
c  $-3xy + 2y^2$

b  $-10pq - 8q^2$

2 a  $21x + 35 + 12x - 48 = 33x - 13$   
b  $40p - 16 - 12p - 27 = 28p - 43$   
c  $27s + 9 - 30s + 50 = -3s + 59 = 59 - 3s$   
d  $8x - 6 - 3x - 5 = 5x - 11$

3 a  $12x^2 + 24x$   
c  $10h - 12h^3 - 22h^2$

b  $20k^3 - 48k$

d  $21s^2 - 21s^3 - 6s$

4 a  $-y^2 - 4$   
c  $2p - 7p^2$

b  $5x^2 - 11x$

d  $6b^2$

5  $y - 4$

6 a  $-1 - 2m$

b  $5p^3 + 12p^2 + 27p$

7  $7x(3x - 5) = 21x^2 - 35x$

8 a  $x^2 + 9x + 20$   
c  $x^2 + 5x - 14$   
e  $2x^2 + x - 3$   
g  $10x^2 - 31x + 15$   
i  $18x^2 + 39xy + 20y^2$   
k  $4x^2 - 28x + 49$

b  $x^2 + 10x + 21$

d  $x^2 - 25$

f  $6x^2 - x - 2$

h  $12x^2 + 13x - 14$

j  $x^2 + 10x + 25$

l  $16x^2 - 24xy + 9y^2$

9  $2x^2 - 2x + 25$

10 a  $x^2 - 1 - \frac{2}{x^2}$

b  $x^2 + 2 + \frac{1}{x^2}$