

## Linear Equations with Brackets

### Starter

1. (Review of last lesson)

Expand: (a)  $2(5x - 7)$  (b)  $-8(3x - 5)$  (c)  $8(3x - 4) - 6(2x - 5)$

2. (Review of Y7 material)

Solve: (a)  $4x = 28$  (b)  $9x - 5 = 49$  (c)  $3 - 8x = 35$

### Notes

When solving linear equations involving brackets there are two ways to do it. Either:

- A. Expand the brackets and then rearrange, or
- B. Divide by the number in front of the bracket and then rearrange

Which method, A or B, would be best for these equations:

(i)  $3(x - 8) = 15$

**Method B**

Since 15 is divisible by 3,  
we can divide by 3 first.

(ii)  $4(x + 7) = 17$

**Method A**

Since 17 is not divisible by 4,  
it is better to expand the brackets first.

When the number in front of the bracket divides the other side, divide and solve.

When the number in front of the bracket does not divide the other side, expand and solve.

**N.B.** Expanding brackets first works well in all situations so this should be the default method.

*If in doubt, expand the brackets.*

**E.g. 1** Solve: (a)  $3(x - 8) = 15$  (b)  $4(x + 7) = 17$

**Working:** (a)  $3(x - 8) = 15$   
*Divide by 3:*  $x - 8 = 5$   
*Add 8:*  $x = 13$

**E.g. 2** Solve (a)  $5(q - 3) = 29$  (b)  $-(x - 7) = 23$

**Working:** (a) *29 is not divisible by 5 so expand the brackets*  
 $5(q - 3) = 29$   
*Expand the brackets:*  $5q - 15 = 29$   
*Add 15:*  $5q = 44$   
*Divide by 5:*  $q = \frac{44}{5} = 8\frac{4}{5}$

**N.B.** If questions have 2 sets of single brackets, *expand and collect like terms* before solving.

**E.g. 3** Solve: (a)  $3(m + 1) + 2(m - 3) = 36$  (b)  $2(y - 3) - 4(y - 1) = -6$

**Working:** (a)  $3(m + 1) + 2(m - 3) = 36$   
*Expand the brackets:*  $3m + 3 + 2m - 6 = 36$   
*Collect like terms:*  $5m - 3 = 36$   
*Add 3:*  $5m = 39$   
*Divide by 5:*  $m = \frac{39}{5} = 7\frac{4}{5}$

**Unknown appears on both sides of the equation**

When the unknown appears on both sides of the equation:

1. Expand any brackets.
2. Collect like terms
3. Solve

**E.g. 4** Solve: (a)  $5(x - 3) = 7(2x + 9)$  (b)  $4(3x - 8) = 9(5 - 6x)$

**Working:** (a)  $5(x - 3) = 7(2x + 9)$   
*Expand the brackets:*  $5x - 15 = 14x + 63$   
*Collect like terms:*  $5x - 14x = 63 + 15$   
 $-9x = 78$   
*Divide by 5:*  $x = \frac{78}{-9} = -\frac{26}{3} = -8\frac{2}{3}$

**Video:** [Solving linear equations](#)  
[Solving linear equations with brackets](#)

[Solutions to Starter and E.g.s](#)

**Exercise**

p133 Ex 8.2 Qu 1aceg, 2ac, 3-5, 6ace, 7-9 (Qu 8 has unknown on both sides)

**Summary**

When solving linear equations involving brackets, expand the brackets and then rearrange.

[Textbook answers \(only available during a lockdown\)](#)