

### Single Brackets: Problem Solving

1. Simplify the following expression and explain each step:  $3[2x + 4] - 5$ .
2. If a student claims that  $2[3x - 4] = 6x - 4$ , identify and explain the error in their reasoning.
3. Expand and simplify:  $4[5 - 2y] + 3[y + 1]$ . Show your working and reasoning.
4. Given the expression  $7 - 2[4x - 1]$ , describe how the value of the expression changes as  $x$  increases. Explain your reasoning.
5. A teacher writes the following on the board:  $6[2a + 3] - 4[5 - a]$ . Without calculating, predict whether the result will be positive, negative, or zero for  $a = 1$ . Justify your answer.
6. Rewrite the expression  $8 - 3[2x + 5]$  so that it does not contain any brackets, and explain why each term is positive or negative.
7. Create an expression using single brackets that is equivalent to  $10x - 15$ . Explain your process.
8. Two students expanded  $5[x - 2]$  differently: Student A got  $5x - 10$ , Student B got  $5x - 2$ . Who is correct? Explain why.
9. If  $m = -2$ , evaluate and explain the steps for the expression  $4[3m + 7]$ .
10. Explain why the distributive property is important when working with single brackets. Give an example to support your explanation.

# Maths with Melissa

## Answer Key

1.  $3[2x + 4] - 5 = 3 \times 2x + 3 \times 4 - 5 = 6x + 12 - 5 = 6x + 7$ . Each term inside the brackets is multiplied by 3, then subtract 5.
2. The error is not multiplying both terms inside the brackets by 2; the correct expansion is  $2 \times 3x - 2 \times 4 = 6x - 8$ .
3.  $4[5 - 2y] + 3[y + 1] = 4 \times 5 - 4 \times 2y + 3 \times y + 3 \times 1 = 20 - 8y + 3y + 3 = 23 - 5y$ . Each bracket is expanded separately, then like terms are combined.
4. As  $x$  increases,  $4x$  increases, so  $2[4x - 1]$  increases, making  $7 -$  (a larger number), so the expression decreases as  $x$  increases.
5. Substitute  $a = 1$ :  $6[2 \times 1 + 3] - 4[5 - 1] = 6[2 + 3] - 4[4] = 6 \times 5 - 16 = 30 - 16 = 14$  (positive). Since the first bracket gives a larger positive value than the second, the result is positive.
6.  $8 - 3[2x + 5] = 8 - (3 \times 2x + 3 \times 5) = 8 - 6x - 15 = -6x - 7$ . Each term in the bracket is multiplied by -3, changing their signs accordingly.
7. One possible expression:  $5[2x - 3] = 5 \times 2x - 5 \times 3 = 10x - 15$ . The process involves factoring  $10x - 15$  as  $5(2x - 3)$ .
8. Student A is correct;  $5[x - 2] = 5 \times x - 5 \times 2 = 5x - 10$ . Student B did not multiply -2 by 5.
9. Substitute  $m = -2$ :  $4[3 \times -2 + 7] = 4[-6 + 7] = 4[1] = 4$ . Each operation is performed step by step.
10. The distributive property ensures all terms inside the bracket are multiplied by the factor outside. For example,  $2[a + 5] = 2a + 10$ ; missing this step leads to incorrect answers.