

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.