**Example 1** Adding Polynomials with Algebra Tiles

Use algebra tiles to model \((3s^2 + 2s - 6) + (-s^2 - 2s + 1)\).
Write an addition sentence.

**Solution**

Model each polynomial.
\[
3s^2 + 2s - 6 \quad \quad -s^2 - 2s + 1
\]

Combine the tiles.

Group matching tiles.

Remove zero pairs.

The remaining tiles are:

They represent: \(2s^2 - 5\)

The addition sentence is: \((3s^2 + 2s - 6) + (-s^2 - 2s + 1) = 2s^2 - 5\)
5.4 Subtracting Polynomials

**Focus** Use different strategies to subtract polynomials.

To subtract a polynomial, we subtract each term of the polynomial.

**Example 1** Subtracting Polynomials with Algebra Tiles

Use algebra tiles to model \((3b^2 - 2b - 1) - (-2b^2 - b + 2)\).
Write a subtraction sentence.

**Solution**

Model: \(3b^2 - 2b - 1\)

To subtract \(-2b^2 - b + 2\), take away 2 \(\square\), 1 \(\square\), and 2 \(\square\).

There are no \(\square\) or \(\square\) to take away.
So, add 2 zero pairs of each tile:

So, these tiles also model \(3b^2 - 2b - 1\).

Take away the tiles for \(-2b^2 - b + 2\).

The remaining tiles represent: \(5b^2 - b - 3\)
The subtraction sentence is: \((3b^2 - 2b - 1) - (-2b^2 - b + 2) = 5b^2 - b - 3\)
Check 5.3a

1. Sketch algebra tiles to model each sum. Then write the sum.
   
   a) \((6p + 4) + (-2p + 1)\)

   Remaining tiles: ______________________________
   So, \((6p + 4) + (-2p + 1) = \) __________________

   b) \((2x^2 - x + 1) + (x^2 - 3)\)

   Remaining tiles: ______________________________
   So, \((2x^2 - x + 1) + (x^2 - 3) = \) __________________

   c) \((3e^2 + 6e - 5) + (-4e^2 - 3e + 8)\)

   Remaining tiles: ______________________________
   So, \((3e^2 + 6e - 5) + (-4e^2 - 3e + 8) = \) __________________

Algebra tiles are not always available. To add polynomials without tiles:
- remove the brackets
- add the coefficients of like terms

Check 5.4a

1. Use algebra tiles to model each difference. Sketch the tiles that remain, then write the difference.

   a) \((4p + 3) - (2p + 1)\)

   Remaining tiles: ______________________________
   So, \((4p + 3) - (2p + 1) = \) __________________

   b) \((5t + 1) - (-2t + 3)\)

   Remaining tiles: ______________________________
   So, \((5t + 1) - (-2t + 3) = \) __________________

   c) \((3e^2 + 2e - 4) - (4e^2 + 3e - 2)\)

   Remaining tiles: ______________________________
   So, \((3e^2 + 2e - 4) - (4e^2 + 3e - 2) = \) __________________
**Practice 5.3a**

1. Write the addition sentence modelled by each set of tiles. Use the variable $x$.
   
a) \[
   \begin{array}{c}
   \text{tiles} \\
   + \end{array}
   \]

   Remaining tiles:

   b) \[
   \begin{array}{c}
   \text{tiles} \\
   + \end{array}
   \]

   Remaining tiles:

2. Sketch algebra tiles to model each sum. Then write the sum.
   
a) \((-5w + 8) + (7w - 3) = \)
   
   Remaining tiles:

   b) \((-6t^2 - 3t + 2) + (4t^2 - t + 1) = \)
   
   Remaining tiles:

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**Practice 5.4a**

1. Write the subtraction sentence modelled by each set of tiles.
   
a) \[
   \begin{array}{c}
   \text{tiles} \\
   \downarrow
   \end{array}
   \]

   

   b) \[
   \begin{array}{c}
   \text{tiles} \\
   \downarrow
   \end{array}
   \]

   

2. Use algebra tiles to model each difference. Sketch the tiles that remain, then write the difference.
   
a) \((3r + 2) - (-2r + 3)\)
   
   Remaining tiles: 
   
   So, \((3r + 2) - (-2r + 3) = \)

   b) \((-4v^2 + 5v - 1) - (-3v^2 + 4v - 2)\)
   
   Remaining tiles: 
   
   So, \((-4v^2 + 5v - 1) - (-3v^2 + 4v - 2) = \)