

## Section 5.3

# Adding Polynomials

Determine the sum of  $3x^2 + 2x + 4$  and  $-5x^2 + 3x - 5$

When we write the sum of two polynomials, we write each polynomial in brackets:

$$(3x^2 + 2x + 4) + (-5x^2 + 3x - 5)$$

Now, to solve...

We can solve the question with or without algebra tiles.

## Tiles

Display:  $3x^2 + 2x + 4$



Display:  $-5x^2 + 3x - 5$



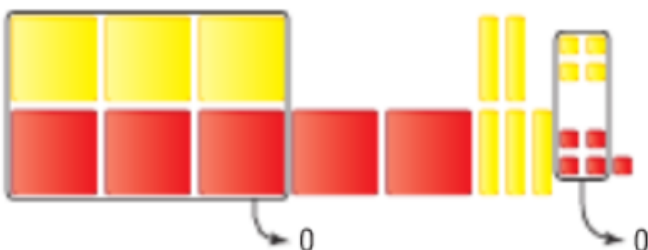
Combine the displays.



Group like tiles.



Remove zero pairs.



The remaining tiles represent

$$-2x^2 + 5x - 1.$$

## No Tiles

The sum is:

$$(3x^2 + 2x + 4) + (-5x^2 + 3x - 5)$$

This is written as:

$$3x^2 + 2x + 4 - 5x^2 + 3x - 5$$

Group like terms:

$$3x^2 - 5x^2 + 2x + 3x + 4 - 5$$

Combine like terms:

$$-2x^2 + 5x - 1$$

## Adding Polynomials Without Tiles

$$\text{Add: } (5c - 11) + (-4c^2 + c + 7)$$

We can add the polynomials by adding the coefficients of the like terms.  
We can do this in two different ways:

### Method 1:

Add horizontally:

$$\begin{aligned} & (5c - 11) + (-4c^2 + c + 7) && \text{Remove the brackets.} \\ = & 5c - 11 - 4c^2 + c + 7 && \text{Group like terms.} \\ = & -4c^2 + 5c + c - 11 + 7 && \text{Combine like terms by adding} \\ & && \text{their coefficients} \\ & && \text{(remember that c has a coefficient of 1!)} \\ = & -4c^2 + 6c - 4 \end{aligned}$$

## Method 2:

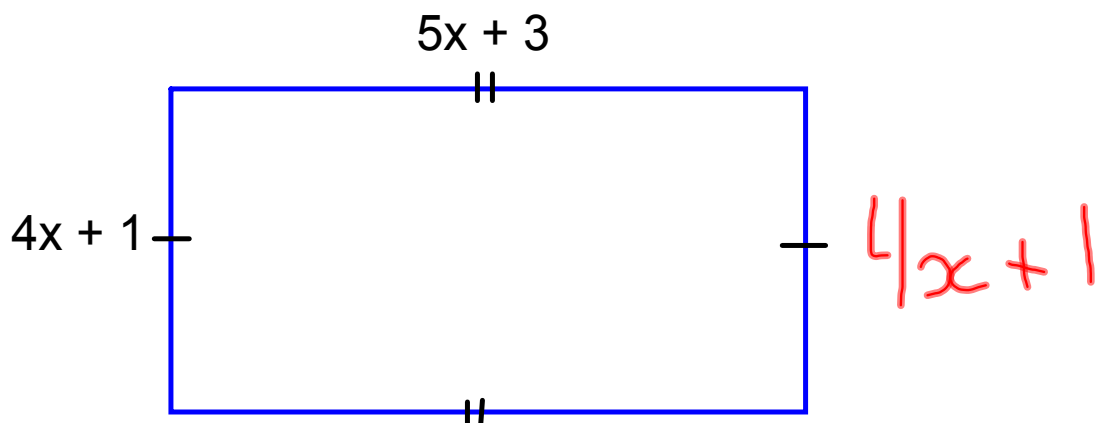
Add vertically. Line up the like terms, then add their coefficients.

$$\begin{array}{r} \phantom{+} \phantom{-4c^2} + 5c - 11 \\ + -4c^2 + c + 7 \\ \hline -4c^2 + 6c - 4 \end{array}$$

$$\text{So, } (5c - 11) + (-4c^2 + c + 7) = -4c^2 + 6c - 4$$

## Determining a Polynomial for the perimeter of a rectangle

- a) Write a polynomial for the perimeter of this rectangle.  
Simplify the polynomial.



Perimeter = the sum of all sides

$$= (4x + 1) + (4x + 1) + (5x + 3) + (5x + 3)$$

$$= 4x + 1 + 4x + 1 + 5x + 3 + 5x + 3$$

$$= 4x + 4x + 5x + 5x + 1 + 1 + 3 + 3$$

$$= 18x + 8$$

The perimeter is  $18x + 8$ .

b) Substitute to check the answer.

Choose a value for  $x$ , such as  $x = 1$ .

Write the addition sentence for the perimeter:

$$4x + 1 + 4x + 1 + 5x + 3 + 5x + 3 = 18x + 8$$

Substitute  $x = 1$

Do each side of the addition statement separately:

**Left Side:**

$$\begin{aligned} &4x + 1 + 4x + 1 + 5x + 3 + 5x + 3 \\ &= 4(1) + 1 + 4(1) + 1 + 5(1) + 3 + 5(1) + 3 \\ &= 4 + 1 + 4 + 1 + 5 + 3 + 5 + 3 \\ &= 26 \end{aligned}$$

**Right Side:**

$$\begin{aligned} &18x + 8 \\ &= 18(1) + 8 \\ &= 18 + 8 \\ &= 26 \end{aligned}$$

Since the left side equals the right side, the polynomial for the perimeter is correct!

## Adding Polynomials in Two Variables

$$\text{Add: } (3s^2 + s - 4c - 5cs + 2s^2) + (-5c^2 + 3cs + 6c - 4s + 7c^2)$$

Remove Brackets.

$$= 3s^2 + s - 4c - 5cs + 2s^2 - 5c^2 + 3cs + 6c - 4s + 7c^2$$

Group like terms.

$$= 3s^2 + 2s^2 + s - 4s - 4c + 6c - 5cs + 3cs - 5c^2 + 7c^2$$

Combine like terms.

$$= 5s^2 - 3s + 2c - 2cs + 2c^2$$

Practice Questions

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