

## 5.3 Adding Polynomials

**FOCUS** Use different strategies to add polynomials.

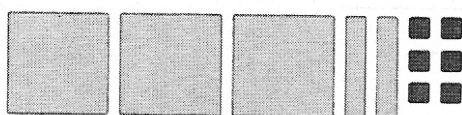
### Example 1 Adding Polynomials with Algebra Tiles

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

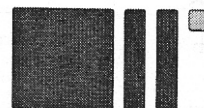
#### Solution

Model each polynomial.

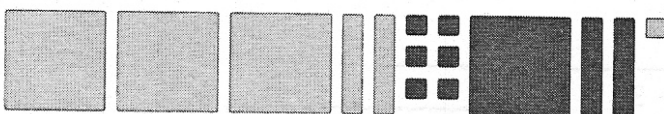
$$3s^2 + 2s - 6$$



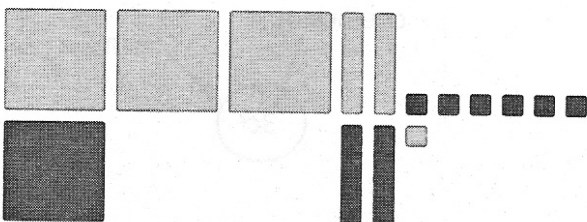
$$-s^2 - 2s + 1$$



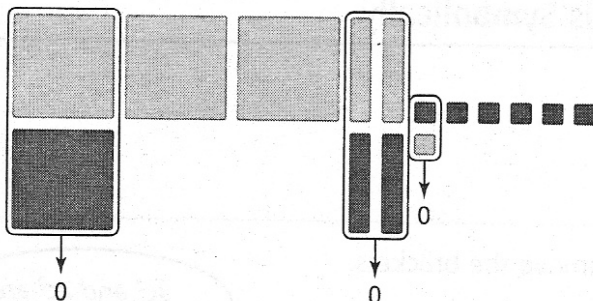
Combine the tiles.



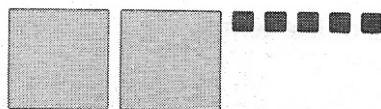
Group matching tiles.



Remove zero pairs.



The remaining tiles are:



They represent:  $2s^2 - 5$

The addition sentence is:  $(3s^2 + 2s - 6) + (-s^2 - 2s + 1) = 2s^2 - 5$

## Check

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

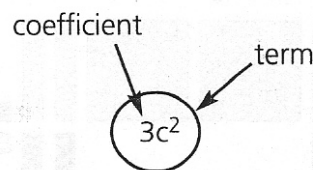
Remaining tiles: \_\_\_\_\_

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



### Example 2 Adding Polynomials Symbolically

Add:  $(3c^2 + 5c - 6) + (2c^2 - 3c + 4)$

#### Solution

$$(3c^2 + 5c - 6) + (2c^2 - 3c + 4)$$

Remove the brackets.

$$= 3c^2 + 5c - 6 + 2c^2 - 3c + 4$$

Group like terms.

$$= \underline{3c^2 + 2c^2} + \underline{5c - 3c} - \underline{6 + 4}$$

Add the coefficients of like terms.

$$= 5c^2 + 2c - 2$$

$3c^2$  and  $2c^2$  are like terms.

## Check

1. Add.

a)  $(7g - 8) + (3g + 1)$

$$= 7g - 8 + 3g + 1$$

$$= \underline{7g + 3g - 8 + 1}$$

$$= \underline{\hspace{2cm}}$$

b)  $(2a^2 - 9a) + (-5a^2 + 12a)$

$$= \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

c)  $(-c^2 + 11c - 3) + (4c^2 + 5)$

$$= \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

Remove the brackets.

Group like terms.

Add the coefficients of like terms.

$$7 + 3 = \underline{\hspace{1cm}} \text{ and } -8 + 1 = \underline{\hspace{1cm}}$$

Remove the brackets.

Group like terms.

Add the coefficients of like terms.

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ and } \underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

Recall:  $-c^2$  has coefficient  $-1$ .

We can also add 2 polynomials by aligning like terms vertically.

### Example 3 Adding Polynomials Vertically

Add:  $(2m + 9) + (3m^2 + m - 14)$

#### Solution

To add the polynomials, remove the brackets and align like terms vertically.

In  $3m^2 + m - 14$ , the term  $m$  has coefficient 1, so write  $m$  as  $1m$ .

$$\begin{array}{r} 2m + 9 \\ + 3m^2 + 1m - 14 \\ \hline \end{array}$$

$$\begin{array}{r} 2m + 9 \\ + 3m^2 + 1m - 14 \\ \hline 3m^2 + 3m - 5 \end{array}$$

$$\text{So, } (2m + 9) + (3m^2 + m - 14) = 3m^2 + 3m - 5$$

Add the coefficients of like terms.

$$\begin{array}{ccc} 0 & 2 & 9 \\ +3 & +1 & +(-14) \\ \hline 3 & 3 & -5 \end{array}$$

## Check

1. Add vertically.

a)  $(2x + 3) + (4x + 8)$

$$\begin{array}{r} 2x + 3 \\ + 4x + 8 \\ \hline \end{array}$$

b)  $(5p^2 + 12) + (-2p^2 + 3p - 7)$

$$\begin{array}{r} 5p^2 \qquad \qquad + 12 \\ + -2p^2 + 3p - 7 \\ \hline \end{array}$$

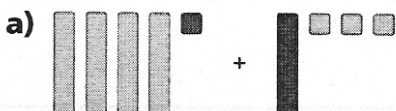
c)  $(-6b^2 - 2b + 8) + (9b - b^2 - 19)$

$$\begin{array}{r} \phantom{-6b^2 - 2b + 8} \\ \phantom{-6b^2 - 2b + 8} \\ \phantom{-6b^2 - 2b + 8} \end{array}$$

## Practice

1. Write the addition sentence modelled by each set of tiles.

Use the variable  $x$ .



\_\_\_\_\_



\_\_\_\_\_

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: \_\_\_\_\_