5.2 Skill Builder

Modelling Integers

One ▢ represents +1.

One ■ represents −1.

One ▢ and one ■ combine to model 0.

▢ } +1
■ } −1

We call this a **zero pair.**

We can model any integer in many ways.

Each set of tiles below models +3.

▢▢▢

▢▢▢▢
■

▢▢▢▢▢
■■

Each pair of 1 ▢ and 1 ■ makes a zero pair.

Check

1. Write the integer modelled by each set of tiles.

a) ▢▢▢▢▢
■■■

_____

b) ▢▢
■■■

_____

c) ▢
■■■■

_____

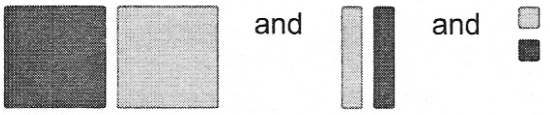
d) ▢▢▢
■■■

_____

5.2 Like Terms and Unlike Terms

FOCUS **Simplify polynomials by combining like terms.**

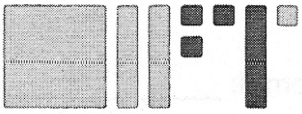
These are all zero pairs:



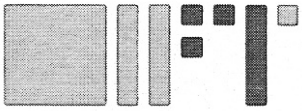
We can use zero pairs to simplify algebraic expressions.

Example 1 Combining Like Tiles and Removing Zero Pairs

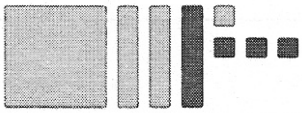
Simplify this tile model.
Write the polynomial that the remaining tiles represent.



Solution

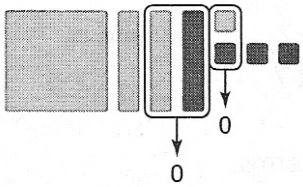


Group like tiles.

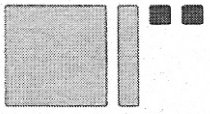


Matching tiles have the same size and shape.

Remove zero pairs.



The tiles that remain are:



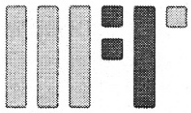
When there is only 1 of a type of tile, we omit the coefficient 1.

They represent: $x^2 + x - 2$

Check

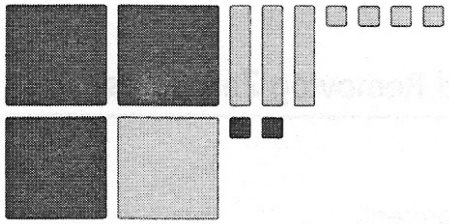
1. Simplify each tile model.
Write the polynomial that the remaining tiles represent.

a)



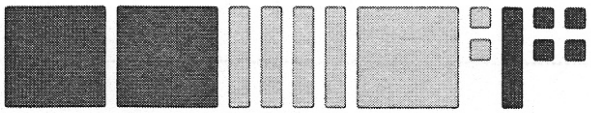
Remaining tiles: _____ Polynomial: _____

b)



Remaining tiles: _____ Polynomial: _____

c)



Remaining tiles: _____ Polynomial: _____

Terms that can be represented by matching tiles are called **like terms**.

Like terms:	x^2 and $-2x^2$	$4s$ and $-s$	6 and -2	$5w$ and w
Unlike terms:	$3s$ and s^2	$2x$ and -5	$3d^2$ and 7	

We can **simplify a polynomial** by adding the coefficients of like terms.
To simplify $-5x + 2x$, add the integers: $-5 + 2 = -3$
So, $-5x + 2x = -3x$

Example 2 Simplifying a Polynomial Symbolically

Simplify:

a) $3a + 6 + a - 4$ **b)** $-x^2 + 4x - 5 + 3x^2 - 4x + 1$

Solution

a) $3a + 6 + a - 4$
$= 3a + 1a + 6 - 4$
$= 4a + 2$

Group like terms.
Add the coefficients of like terms.

b) $-x^2 + 4x - 5 + 3x^2 - 4x + 1$
$= -x^2 + 3x^2 + 4x - 4x - 5 + 1$
$= 2x^2 + 0x - 4$
$= 2x^2 - 4$

Group like terms.
Add the coefficients of like terms.

We omit a term when its coefficient is 0.

Check

1. Simplify each polynomial.

a) $5d + 2 + 3d - 1$
$= 5d + 3d + 2 - 1$
$= \_\_\_\_d + \_\_\_\_$

Group like terms.
Add the coefficients of like terms:
$5 + 3 = \_\_\_\_$ and $2 + (-1) = \_\_\_\_$

b) $2a^2 - 3a + 5a^2 + 7a$
$= \_\_\_\_\_$
$= \_\_\_\_\_$

Group like terms.
Add the coefficients of like terms:
$\_\_\_\_ + \_\_\_\_ = \_\_\_\_$ and $\_\_\_\_ + \_\_\_\_ = \_\_\_\_$

c) $-x^2 + 4x - 5 + 2x^2 + x + 3$
$= \_\_\_\_\_$
$\_\_\_\_\_$
$\_\_\_\_\_$

We omit the coefficient when it is 1.

d) $2x^2 + 6x + 7 - 2x^2 + 7x - 11$
$= \_\_\_\_\_$
$\_\_\_\_\_$
$\_\_\_\_\_$

Practice

1. What is the coefficient of each term?

a) $2x^2$ _____ **b)** $6w$ _____ **c)** $-3x$ _____

d) $7t$ _____ **e)** b _____ **f)** $-s$ _____

2. a) Which of these terms are like $3z^2$?

$5z$ $-z^2$ -9 $-6z$ $2z^2$ -11 $-4z^2$

$3z^2$ has variable _____ and exponent _____.

Find all terms with the same variable and exponent: _____

b) Which of these terms are like $-5x$?

$-4x$ $-3x^2$ -2 $7x$ $5x^2$ 8 $-x$ $-5t$

$-5x$ has variable _____ and exponent _____.

Find all terms with the same variable and exponent: _____

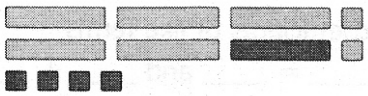
3. Simplify each tile model.

Write the polynomial that the remaining tiles represent.

a)

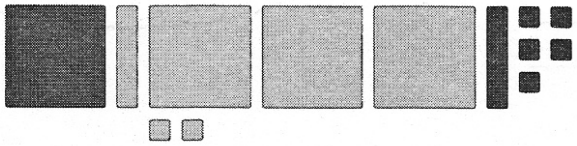
Remaining tiles: _____ Polynomial: _____

b)



Remaining tiles: _____ Polynomial: _____

c)



Remaining tiles: _____ Polynomial: _____

4. Add integers to combine like terms.

a) $-3c + 5c$

$-3 + 5 =$ _____

$-3c + 5c =$ _____

b) $4s - s$

$4 + (-1) =$ _____

$4s - s =$ _____

c) $-2x^2 + 7x^2$

_____ + _____ = _____

_____

d) $8e^2 - 8e^2$

_____

_____

5. Simplify each polynomial.

a) $5m + 7 - 2m + 1$

Group like terms.

Add the coefficients of like terms.

= _____

= _____

b) $7c^2 - 6c - 4c^2 + c$

Group like terms.

Add the coefficients of like terms.

= _____

= _____

c) $11 - 9v + v^2 + 2 - v$

= _____

= _____

_____

We usually write a polynomial so the exponents of the variable decrease from left to right.

d) $-7f^2 + 12f - 2 \; -3f^2 - 3f + 5$

= _____

= _____

A polynomial in simplified form is equal to the original polynomial.

6. Identify and explain any errors you find.

a) $3x + 2 = 5x$

_____

_____

b) $5s + 3s = 8s^2$

_____

_____

_____

_____

c) $x^2 - x^2 = 0$

_____

_____