

# KEY POINTS

## Section 2.1 Reordering & Regrouping

- You can make any change to an expression, providing you do not change its value. Such changes are:
  - Reordering
  - Regrouping
  - Rewriting subtraction as addition; rewriting division as multiplication
  - Combining like terms

## Section 2.2 The Distributive Law

- The distributive law is fundamental to many algebraic transformations
- The distributive law allows us to multiply a sum by a single term
- Taking out a common factor is using the distributive law in reverse

# Warm - Up

Section 2.1

Reordering &  
Regrouping

Solve the following equations.

1.  $-11 = \frac{1}{5}s$      $\frac{1}{-11} = \frac{1}{5}s$      $\frac{1}{5} \cdot 5 = \frac{5}{1}$   
 $\frac{-11}{5} = \frac{5}{5} \cdot s$      $2. 2 = 5$      $5(-11) = \frac{15}{5} \cdot 5$   
 $-55 = 15$

2.  $(\sqrt{m})^2 = (16)^2$      $\frac{-11}{1} = \frac{1}{5}s$   
 $m = 256$

# Background

## Section 2.1 Reordering & Regrouping

Since an expression represents a calculation with numbers, the rules about how we can manipulate expressions come from the rules of arithmetic.

One rule of addition says that we can add two numbers in any order:

$$x=2$$

$$x + 1 = 1 + x$$

$$3=3$$

$$2+1=1+2$$

However, we **cannot** replace  $x - 1$  by  $1 - x$ , because they usually have different values.

$$x=5$$

$$5 - 1 = 4 \quad \text{but} \quad 1 - 5 = -4$$

$$x-1 \neq 1-x$$

# Background

## Section 2.1 Reordering & Regrouping

We can reorder and regroup addition, and reorder and regroup multiplication, without changing the value of a numerical expression.

Example of reordering:

$$3 * 5 = 5 * 3$$
$$15 = 15$$

and

$$3 + 5 = 5 + 3$$
$$8 = 8$$

Example of regrouping:

$$2 * (3 * 5) = (2 * 3) * 5$$

and

$$2 + (3 + 5) = (2 + 3) + 5$$

$$2 \cdot 15 = 6 \cdot 5$$
$$30 = 30$$

$$2 + 8 = 5 + 5$$
$$10 = 10$$

# General Rules

Section 2.1

Reordering &  
Regrouping

$ab = ba$  and  $a + b = b + a$ ;  
for all values of  $a$  and  $b$ .

Reordering

$a(bc) = (ab)c$  and  $a + (b + c) = (a + b) + c$ ;  
for all values of  $a$ ,  $b$ , and  $c$ .

Regrouping

# Examples

## Section 2.1

### Reordering & Regrouping

In each of the following, an expression is changed into an equivalent expression by reordering addition, reordering multiplication, regrouping addition, regrouping multiplication, or a combination.

Which principles are used where?

a.  $(x + 2)(3 + y) = (3 + y)(x + 2)$

Reordering

b.  $(2x)x = 2x^2$   $x(2x)$

Regrouping  
 $(2c)d = 2(cd)$

c.  $(2c)d = c(2d)$

Both

# Examples

## Section 2.1

### Reordering & Regrouping

Consider a rectangle with length  $l$  and width  $w$ . It has area  $lw$ . Triple the length and take half the width to form a new rectangle.

How does the area of the new rectangle compare to the area of the original rectangle?

original

$$L \cdot W = A$$

The new rectangle is 1.5 times larger than the original.

New

$$A = (3l) \left( \frac{1}{2}w \right)$$

$$A = (3 \cdot \frac{1}{2})(l \cdot w)$$

$$A = 1.5lw$$



# Examples

## Section 2.1 Reordering & Regrouping

To reorder and regroup correctly with subtraction, we need to remember that subtraction can be rewritten as addition.

Example:

$$3 - 5 = 3 + (-5)$$

$$3 + (-5) = -5 + 3$$

If  $x + y + z = 1$  find the value of  $(x+10) + (y-8) + (z+3)$

$$\begin{aligned} &(x+10) + (y-8) + (z+3) \\ &x+10+y-8+z+3 \\ &x+y+z \quad (+10-8+3) \\ &\underbrace{\hspace{1cm}} \quad \downarrow \\ &1 \quad + \quad 5 = \boxed{6} \end{aligned}$$



# Examples

Section 2.1  
Reordering &  
Regrouping

Combining Like Terms:

Combine like terms in each in expression:

a.  $\underline{3x^2} - 0.5x + 9x - \underline{x^2}$

$$2x^2 + 8.5x$$

$$3x^2 - x^2 - 0.5x + 9x$$

b.  $-z^3 + 5z^3 - 3$

$$4z^3 - 3$$

# Practice

Section 2.1

Regrouping &  
Reordering

Are the two expressions equivalent?

yes  
1.  $(3x)(4y)(2x)$  and  $24x^2y$

$$3(5) \cdot 4(4) \cdot 2(5) = 2400$$

$$24(5)^2(4) = 2400$$

$$3 \cdot 4 \cdot 2 \cdot x \cdot y \cdot x$$

$$24x^2y$$

# Practice

Section 2.1

Regrouping &  
Reordering

Is the attempt to combine like terms correct?

2.  $2x^2 + 3x^3 = 5x^5$

$$(2x^2)(3x^3) = 5x^5$$
$$6x^5 \neq 5x^5$$

# Practice

Section 2.1

Regrouping &  
Reordering

Write the expression in a simpler form.

3.  $(3x - 2) + (4x - 3)$

$$3x - 2 + 4x - 3$$

$$3x + 4x - 2 - 3$$

$$\boxed{7x - 5}$$

pg 32

1-19, 21, 24, 25