

Unit 2: Algebraic Expressions

Section 2.1: Some Vocabulary

Section 2.2: Like Terms

Section 2.3: The Distributive Property

Section 2.4: Simplifying Algebraic Expressions

Section 2.5: Applications

KEY TERMS AND CONCEPTS	
Look for the following terms and concepts as you work through the Media Lesson. In the space below, explain the meaning of each of these concepts and terms <i>in your own words</i> . Provide examples that are not identical to those in the Media Lesson.	
Term	
Constant Term	
Factors	
Coefficient	

Like Terms

Combining Like Terms

Distributive Property

Simplifying an
Algebraic Expression

Perimeter

Profit

Name: _____

Date: _____


Unit 2: Media Lesson

Section 2.1: Some Vocabulary

Definitions

Terms: Parts of an algebraic expression separated by addition or subtraction symbols.

Constant Term: A number with no variable factors. A term whose value never changes.

 **Example 1:** Consider the algebraic expression $4x^5 + 3x^4 - 22x^2 - x + 17$

a. List the terms. _____

b. Identify the constant term. _____


Definitions

Factors: Numbers or variables that are multiplied together

Coefficient: The number that multiplies the variable.


 **Example 2:** Complete the table below.

	$-4m$	$-x$	$\frac{1}{2}bh$	$\frac{2r}{5}$
List the Factors				
Identify the Coefficient				

 **Example 3:** Consider the algebraic expression $5y^4 - 8y^3 + y^2 - \frac{y}{4} - 7$

- How many terms are there? _____
- Identify the constant term. _____
- What is the coefficient of the first term? _____
- What is the coefficient of the second term? _____
- What is the coefficient of the third term? _____
- List the **factors** of the fourth term. _____

Section 2.1 – You Try

 Consider the algebraic expression $2m^3 + m^2 - 2m - 8$

- How many terms are there? _____
- Identify the constant term. _____
- What is the coefficient of the first term? _____
- What is the coefficient of the second term? _____
- List the **factors** of the third term. _____

Section 2.2: Like Terms

Definition

Terms whose variable factors (letters *and* exponents) are exactly the same are called LIKE TERMS.

Identify the Like Terms



Example 1: Identify the like terms in each of the following expressions

$$3a - 6a + 10a - a$$

$$5x - 10y + 6z - 3x$$

$$7n + 3n^2 - 2n^3 + 8n^2 + n - n^3$$

Combine Like Terms



Example 2: Combine the like terms

$$3a - 6a + 10a - a$$

$$5x - 10y + 6z - 3x$$

$$7n + 3n^2 - 2n^3 + 8n^2 + n - n^3$$

Section 2.2 – You Try




Combine the like terms. Show all steps as in the media examples.


a. $3x - 4x + x - 8x$

b. $-5 + 2a^2 - 4a + a^2 + 7$


Section 2.3: The Distributive Property $a(b + c) = ab + ac$

Use the Distributive Property to Expand Each of the Following Expressions


 **Example 1:** $5(2x + 4)$

 **Example 2:** $-3(x^2 - 2x + 7)$

 **Example 3:** $-(5x^4 - 8)$

 **Example 4:** $\frac{2}{5} \left(\frac{x}{4} - \frac{1}{3} \right)$

Section 2.3 – You Try

 Use the Distributive Property to expand the algebraic expression. Show all steps as in the media examples.

a. $-5(3x^2 - 2x + 8)$

b. $\frac{2}{3}\left(6x + \frac{1}{2}\right)$

Section 2.4: Simplifying Algebraic Expressions

Steps for Simplifying Algebraic Expressions

Step 1: Simplify within parentheses

Step 2: Use distributive property to eliminate parentheses

Step 3: Combine like terms.



Example 1: Simplify the following algebraic expressions. Show all possible steps.


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

b. $3[2 - (x - 5)] - (4x - 10)$

c. $\frac{8-5x}{2}$

d. $\frac{9-3(2x-5)}{-6}$

Section 2.4 – You Try

 Simplify completely. Show all steps as in the media examples.

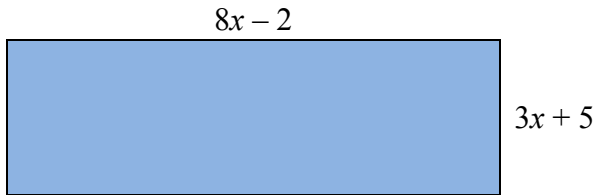
a. $2(7x^2 + 3x + 2) - (8x^2 - 7)$

b. $\frac{2(x-6)+8}{2}$

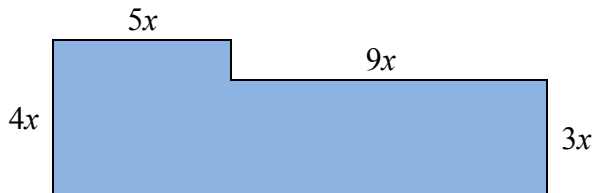
Section 2.5: Applications



Example 1: Write an algebraic expression that represents the **perimeter** of the figure shown below. Simplify completely.



Example 2: Write an algebraic expression that represents the **perimeter** of the figure shown below. Simplify completely.



Example 3: A clothing store is having a ‘65% off’ sale on all its merchandise. Let P represent the original price of an item at the store. Write an algebraic expression to represent the sale price of the item. Simplify your answer.



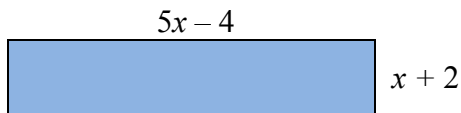
Example 4: A local courier service estimates its monthly operating costs to be \$1500 plus \$0.85 per delivery. The service generates revenue of \$6 for each delivery. Let D represent the number of deliveries in a given month. Write an algebraic expression that represents the monthly **profit** for making D deliveries per month.

Section 2.5 – You Try



Simplify completely. Show all steps as in the media examples.

- a. Write an algebraic expression that represents the perimeter of the figure shown below. Simplify completely. Show your work.



- b. Suppose sales tax in your town is currently 9%. Write an algebraic expression representing the total amount paid for an item that costs D dollars after sales tax is added to the purchase. Simplify your answer.

Name: _____

Date: _____

Unit 2: Practice Problems

Skills Practice

1. Complete the table below.

	$5t$	$-3abc$	$-y$	x	$\frac{3}{5}x$	πd	$\frac{4x}{7}$	$\frac{m}{5}$
Identify the Coefficient								

2. Consider the algebraic expression $5n^8 - n^5 + n^2 + \frac{n}{8} - 1$

- a. How many terms are there? _____
- b. Identify the constant term. _____
- c. What is the coefficient of the first term? _____
- d. What is the coefficient of the second term? _____
- e. What is the coefficient of the third term? _____
- f. List the **factors** of the fourth term. _____

3. Consider the algebraic expression $w^3 - w^2 - \frac{2w}{3} + 3$

- a. How many terms are there? _____
- b. Identify the constant term. _____
- c. What is the coefficient of the first term? _____
- d. What is the coefficient of the second term? _____
- e. What is the coefficient of the third term? _____

4. Identify and combine the Like Terms.

a. $3d - 5d + d - 7d$

b. $3x^2 + 3x^3 - 9x^2 + x - x^3$

c. $a - 2b + 4a + b - (-2b)$

d. $\frac{2}{5}r - \frac{2}{3}r + r$

5. Apply the distributive property to expand the following expressions.

a. $6(4x - 8)$

b. $-5(6w^2 - 3w + 1)$

c. $-(4y^2 + 3y - 8)$

d. $\frac{3}{4}\left(\frac{2}{5}x + \frac{7}{12}\right)$

e. $\frac{1}{3}\left(\frac{3}{4}b - 5\right)$

f. $-2\left(n^2 - 5n + \frac{1}{4}\right)$

6. Simplify by using the distributive property and combining like terms. Show all steps.

a. $(5x^2 + 3x - 6) - (3x + 6)$

b. $3(2x^2 - x + 3) + 2$

c. $2a + 3ab - 5a + 8ab + 3b$

d. $12 + 3x^2 + 4x - 2x^2 - x - 6$

e. $5(2x + 3) + 4(3x - 7)$

f. $-2(4x^2 + 3x - 2) - (x^2 - 6)$

7. Simplify completely. Show all steps.

a. $\frac{12-9x}{3}$

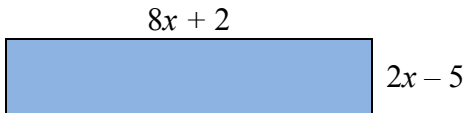
b. $\frac{21m-18}{6}$

c. $\frac{3(4a-8)+2}{2}$

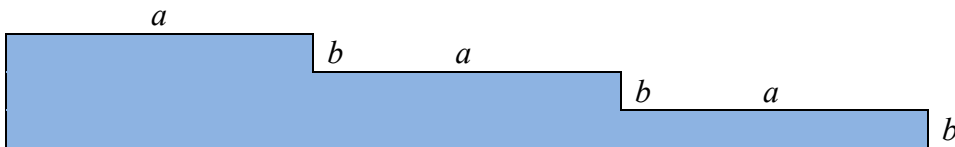
d. $\frac{3(10x-4)+6}{6} + 3x + 1$

Applications

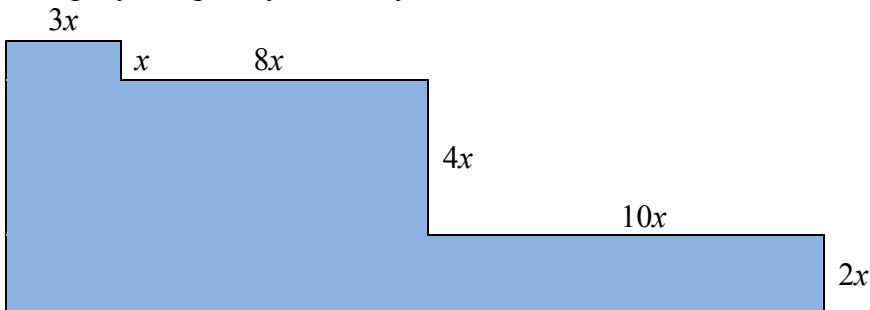
8. Write an algebraic expression that represents the perimeter of the figure shown below. Simplify completely. Show your work.



9. Write an expression that represents the perimeter of the figure shown below. Simplify completely. Show your work.



10. Write an algebraic expression that represents the perimeter of the figure shown below. Simplify completely. Show your work.



11. Let B represent the bill for dinner at your favorite restaurant. Write an algebraic expression to represent the total amount paid for dinner if you decide to leave an 18% tip. Simplify your answer.

12. A clothing store is having a '40% off' sale on all its merchandise. Let P represent the original price of an item at the store. Write an algebraic expression to represent the sale price of the item. Simplify your answer.
13. Suppose sales tax in your town is currently 9.8%. Write an algebraic expression representing the total amount paid for an item that costs D dollars after sales tax is added to the purchase. Simplify your answer.
14. An account earns 3% interest each year. Let P represent the initial amount invested in this account. Write an algebraic expression representing balance in the account at the end of one year. Simplify your answer.
15. February is a busy time at Charlie's Chocolate Shoppe! During the week before Valentine's Day, Charlie advertises that his chocolates will be selling for \$1.50 a piece (instead of the usual \$2.00 each). The fixed costs to run the Chocolate Shoppe total \$650 for the week, and he estimates that each chocolate costs about \$0.60 to produce. Write an algebraic expression that represents Charlie's **profit** from selling n chocolates during the week before Valentine's Day. (HINT: Profit = Revenue – Costs) Simplify your answer.

Extension

16. The formula for the surface area, S , of a cylinder of radius r and height h is $S = 2\pi r^2 + 2\pi rh$. Determine the surface area of a cylinder with radius 5 inches and height 4 inches. Give the exact answer (with π) and the approximate answer, rounded to the nearest hundredth. Include appropriate units in your answer.
17. It is the day after Thanksgiving (Black Friday!), and April is standing in the very long line waiting to check out. She has two coupons, the first is for 10% off her entire purchase. The second is for \$10 off her entire purchase. Assume that *both* of the coupons can be applied to her purchase.
- Let M represent the value of the merchandise in April's cart. Write an algebraic expression to represent the amount she will pay (before tax) if she applies the \$10 off coupon before the 10% off coupon.
 - Let M represent the value of the merchandise in April's cart. Write an algebraic expression to represent the amount she will pay (before tax) if she applies the 10% off coupon before the \$10 off coupon.
 - Which coupon should be applied to her purchase first in order to save the most money?

Name: _____

Date: _____

Unit 2: Review

1. Consider the algebraic expression $6n^3 - n^2 + \frac{5n}{8} - 11$

- How many terms are there? _____
- Identify the constant term. _____
- What is the coefficient of the first term? _____
- What is the coefficient of the second term? _____
- List the **factors** of the third term. _____

2. Identify and combine the Like Terms. Write your answer in descending order.

$$5x^2 - 8x - 5x^3 - 9x^2 + x - x^3$$

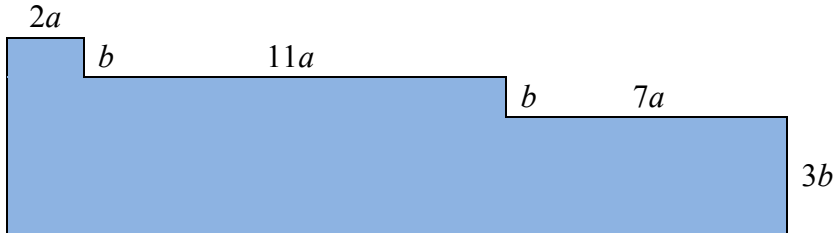
3. Simplify by using the distributive property and combining like terms. Show all steps.

$$2(5x + 3y) - (3x + 6y)$$

4. Simplify completely. Show all steps.

$$\frac{8x+2}{4}$$

5. Write an expression that represents the perimeter of the figure shown below. Simplify completely. Show your work.



6. Let b represent the bill for dinner at your favorite restaurant. Write an algebraic expression to represent the total amount paid for dinner if you decide to leave a 15% tip. Simplify your answer.
7. Leonard has started a new business making cartoon bedspreads. His monthly expenses are \$1322. Each bedspread costs \$8.50 to produce. Leonard is selling each bedspread for \$17.50. Write an algebraic expression that represents Leonard's **profit** from selling n bedspreads. Simplify your answer.
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