UNPACKING the TEKS | $\circledS$ A.10(A), A.10(B), A.10(D)

A **polynomial** is an expression that contains two or more terms. For example, $3x^2 + 6y - 7$ is a polynomial. Its terms are $3x^2$, $6y$, and -7. A term can be a constant or an algebraic term containing a **variable**. An algebraic term may contain a **coefficient** (the number before the variable) and an **exponent** (such as the exponent 2 in $3x^2$).

You can perform operations, such as addition, subtraction, and multiplication, on polynomials.

▶ **Words to Know**

polynomial

variable

coefficient

exponent

like terms

Distributive Property

GUIDED PRACTICE

To add and subtract polynomials, combine **like terms**. Like terms have the same variable and exponent. For example, $2x$ and $-4x$ are like terms, but $2x$ and x^2 are not like terms. Adding $2x$ and $-4x$ results in $-2x$. Adding $2x$ and x^2 results in $x^2 + 2x$.

Problem 1	Add $2x - 5$ and $4x + 3$.

▶ **Step 1**   **Collect like terms.**

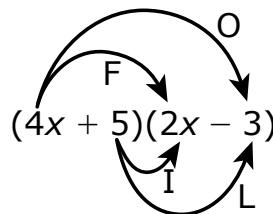$$(2x - 5) + (4x + 3) = (2x + 4x) + (-5 + 3)$$

▶ **Step 2**   **Add or subtract to combine like terms.**

$$(2x + 4x) + (-5 + 3) = \underline{\hspace{2cm}}$$

Solution	$(2x - 5) + (4x + 3) = \underline{\hspace{2cm}}$

To multiply polynomials, use the **Distributive Property**. To multiply binomials, remember the acronym **FOIL:** Multiply the **F**irst terms in each binomial, then the **O**uter terms, then the **I**nner terms, and then the **L**ast terms.

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

Problem 2 — Simplify $(-2y)(3y^2 - 4)$.

▶ **Step 1**   Use the Distributive Property.

$(-2y)(3y^2 - 4) = (-2y)(3y^2) + (-2y)(\underline{\hspace{2cm}})$

▶ **Step 2**   Simplify $(-2y)(3y^2)$.

$(-2y)(3y^2) = (-2)(3)(y)(y^2) = \underline{\hspace{2cm}}$

▶ **Step 3**   Simplify $(-2y)(-4)$.

$(-2y)(-4) = (-2)(-4)(y) = \underline{\hspace{2cm}}$

Solution $(-2y)(3y^2 - 4) = \underline{\hspace{2cm}}$

Problem 3 — Simplify $(4x + 5)(2x - 3)$.

▶ **Step 1**   Use FOIL. Multiply the first term in each binomial.

$(4x)(2x) = \underline{\hspace{2cm}}$

▶ **Step 2**   Multiply the outer terms: the first term in the first binomial by the second term in the second binomial.

$(4x)(-3) = \underline{\hspace{2cm}}$

▶ **Step 3**   Multiply the inner terms: the second term in the first binomial by the first term in the second binomial.

$(5)(2x) = \underline{\hspace{2cm}}$

▶ **Step 4**   Multiply the last term in each binomial.

$(5)(-3) = \underline{\hspace{2cm}}$

▶ **Step 5**   Add the products and combine like terms.

Solution   So $(4x + 5)(2x - 3) = \underline{\hspace{2cm}}$

SHORT RESPONSE QUESTIONS

1. Write $2x^2(x - 2) + 4x(x + 2) - 2(x - 3)$ as a simplified polynomial. Show or explain your work.

2. The length of a rectangular garden is $4x + 3$ and its width is $3x - 1$.

   Part A What is the area of the garden? Show or explain your work.

   Part B What is the perimeter of the garden? Show or explain your work.

★ PRACTICE

DIRECTIONS Read and answer each question carefully.

1 The distance from Point A to Point B is $5x^2 + 3$ miles. The distance from Point B to Point C is $10 - 2x^2$ miles. The distance from Point C to Point D is 4 miles.

If Mike walks from Point A to Point B, then to Point C, and finally to Point D, which expression represents the total distance he travels in miles?

Ⓐ $3x^2 - 3$ Ⓒ $7x^2 + 7$

Ⓑ $3x^2 + 17$ Ⓓ $-10x^4 + 120$

2 Which of the following expressions is equivalent to $(y + 3) - (-3y - 5)$?

Ⓐ $4y + 8$ Ⓒ $-2y - 2$

Ⓑ $2y + 8$ Ⓓ $4y - 2$

3 The time it takes to wash one window on a building is represented by $4a^2 - 5$.

Which expression shows the time it takes to wash the windows on the building if there are $3a$ windows?

Ⓐ $12a^2 - 15a$ Ⓒ $7a^3 - 15a^3$

Ⓑ $12a^2 - 15$ Ⓓ $12a^3 - 15a$

4 What is the product of $(2x^2 - 3x + 1)$ and $(-4x)$?

Ⓐ $-8x^3 - 12x^2 - 4x$

Ⓑ $-8x^3 + 12x^2 - 4x$

Ⓒ $4x^2 - 4x$

Ⓓ $-8x^3 - 12x^2 + 4x$

5 Which expression is equivalent to $y^2(2y + 3) + 3y(y - 5)$?

Ⓐ $2y^3 - 15$ Ⓒ $2y^3 + 15y$

Ⓑ $2y^3 + 6y^2 - 15y$ Ⓓ $2y^3 + 15$

6 Judy bought a pair of jeans for x dollars and a T-shirt for \$10. The sales tax was 7%. Judy wrote the expression below to represent the total amount she paid.

$$x + 10 + 0.07(x + 10)$$

Which expression is equivalent to Judy's expression?

Ⓐ $0.07x + 0.7$ Ⓒ $1.07x + 10.7$

Ⓑ $1.07x + 20$ Ⓓ $x + 10.7$

7 Which expression is equivalent to $(3x - 2)(2x + 7)$?

Ⓐ $6x^2 + 25x - 14$

Ⓑ $6x^2 + 17x + 14$

Ⓒ $6x^2 - 17x - 14$

Ⓓ $6x^2 + 17x - 14$

8 The lengths of the sides of a triangle are represented by $2x^2 + 3$, $x^2 + 2x$, and $5x - 8$.

What is the perimeter of the triangle?

Ⓐ $3x^2 + 7x - 5$

Ⓑ $3x^2 + 7x + 5$

Ⓒ $8x^2 + 2x - 5$

Ⓓ $3x^2 + 2x - 5$

★ ASSESSMENT

DIRECTIONS Read and answer each question carefully.

1 Which of the following expressions are equivalent to $(2x + 3)(x^2 - 7)$?
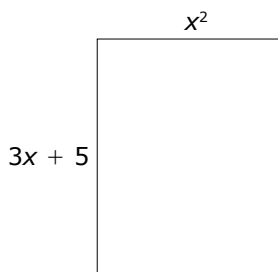
Select **TWO** correct answers.

Ⓐ $2x^3 - 21$

Ⓑ $2x^3 + 3x^2 - 21$

Ⓒ $2x^3 - 11x^2 - 21$

Ⓓ $2x^3 + 3x^2 - 14x - 21$

Ⓔ $(2x + 3)(x^2) - (2x + 3)(7)$

2 The time it took Mark to walk to the store is represented by $4t + 1$. The time it took him to walk home is represented by $1 - 2t$.

Which expression represents the total time it took Mark to walk to the store and back twice?

Ⓐ $4t$ Ⓒ $4t + 4$

Ⓑ $8t$ Ⓓ $-4t + 4$

3 A rectangle has the side lengths shown.

x^2

$3x + 5$

What is the area of the rectangle?

Ⓐ $3x^3 + x^2 + 5$ Ⓒ $3x^3 + 5x^2$

Ⓑ $x + 3x + 5$ Ⓓ $3x^3 + 5x$

4 The sum of $6y - 1$ and a second expression is $4y + 1$.

Which of the following could be the second expression?

Circle the correct answer from each drop-down menu to complete the statement.

The second expression could be

$-2y$
$10y$
$-2y + 2$
$2y - 2$

partially because

$-1 + 1 = 0$
$-1 + -1 = -2$
$6 - 4 = -2$

.

5 Mouse 1 ran through a maze in $3c^2 - 9$ seconds. Mouse 2 ran through the same maze in $5c^2 + 7c + 1$ seconds.

Which expression represents how much longer Mouse 2 took to complete the maze?

Ⓐ $2c^2 - 8$

Ⓑ $2c^2 + 7c + 10$

Ⓒ $2c^2 + 7c - 8$

Ⓓ $-8c^2 - 7c - 10$

6 Keira simplifies the following expression.

$$7x^2 - 6x(5x + 3)$$

In Keira's simplified expression, what is the coefficient of x^2?

Write your answer in the box.