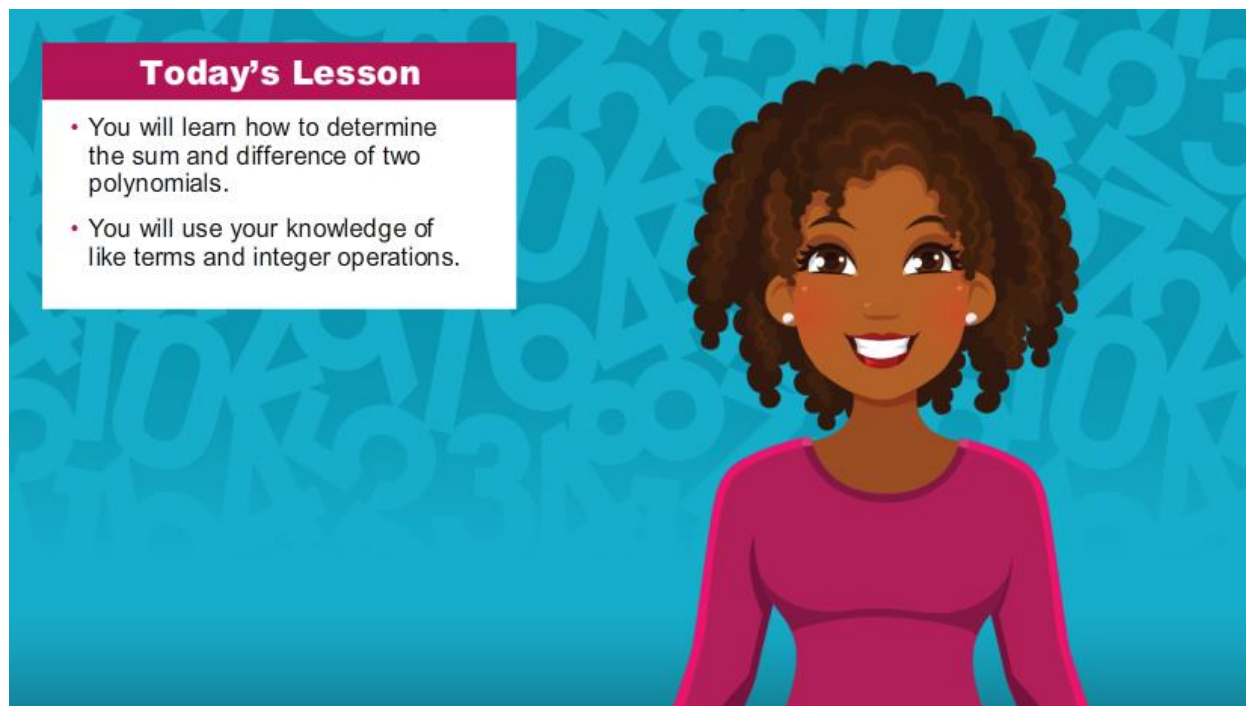


Module 3: Adding and Subtracting Polynomials

Topic 1 Content: Finding Sums and Differences of Polynomials

Introduction



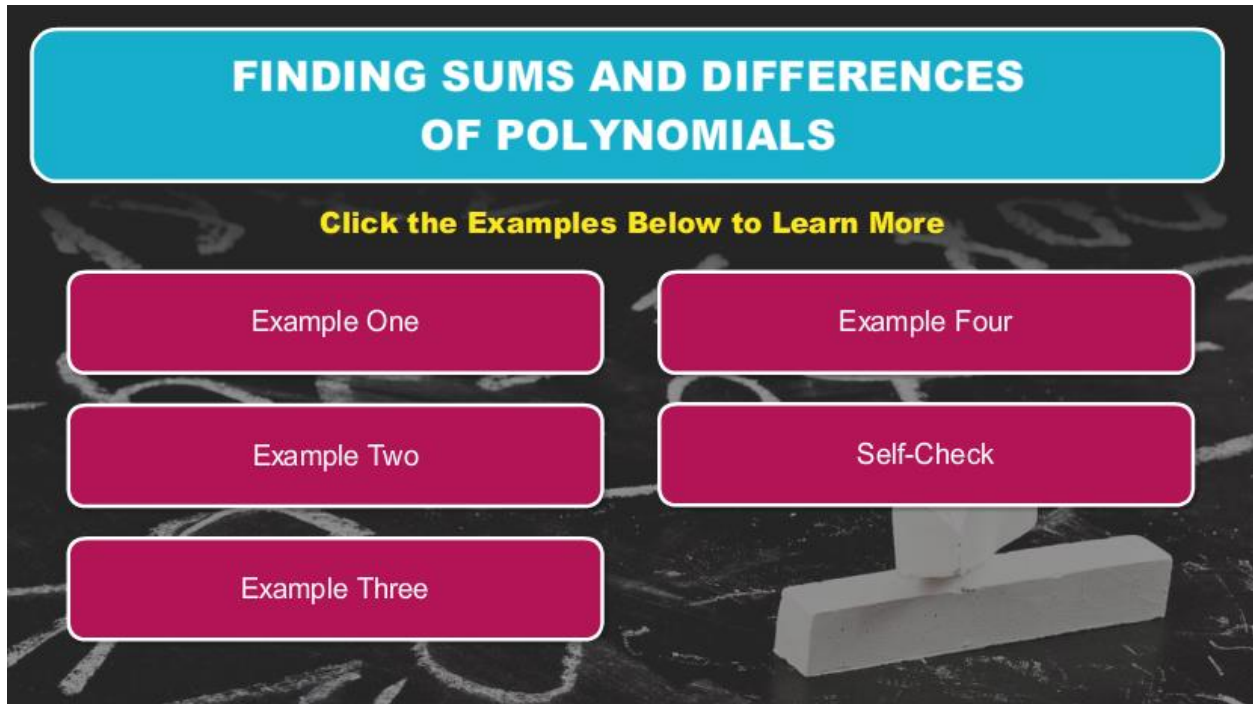
Today's Lesson

- You will learn how to determine the sum and difference of two polynomials.
- You will use your knowledge of like terms and integer operations.

I'm so glad you could join me for this lesson in Algebra I. In this lesson you, will learn how to determine the sum and difference of two polynomials. Your knowledge of like terms and integer operations will be useful tools during this lesson. Let's get started!

Module 3: Adding and Subtracting Polynomials
Topic 1 Content: Finding Sums and Differences of Polynomials

Finding Sums and Differences of Polynomials



The image shows a digital interface with a dark background featuring faint chalkboard patterns. At the top, a light blue rounded rectangle contains the title "FINDING SUMS AND DIFFERENCES OF POLYNOMIALS" in white, bold, uppercase letters. Below this, a yellow text prompt reads "Click the Examples Below to Learn More". Five magenta rounded rectangles are arranged in two columns: the left column contains "Example One", "Example Two", and "Example Three"; the right column contains "Example Four" and "Self-Check". A white 3D eraser is positioned in the bottom right corner of the interface.

Click the examples below to learn more.

- Example One
- Example Two
- Example Three
- Example Four
- Self-Check

Module 3: Adding and Subtracting Polynomials

Topic 1 Content: Finding Sums and Differences of Polynomials

Example 1

EXAMPLE 1

Simplify the expression $(5x^2 - 2x + 1) + (7x^2 + x - 3)$

$$(5x^2 - 2x + 1) + (7x^2 + x - 3)$$

$$(5x^2 + 7x^2) + (-2x + x) + (1 - 3)$$

The Associative Property of Addition states that you can regroup terms while adding.

Simplify the expression below.

$$(5x^2 - 2x + 1) + (7x^2 + x - 3)$$

In this example, you will learn how to determine the sum by adding horizontally. Begin by identifying the like terms. Remember: Like terms include the same variable, raised to the same power.

$$(5x^2 - 2x + 1) + (7x^2 + x - 3)$$

Recall that the Associative Property of Addition states that you can regroup terms while adding. So, group the like terms together.

$$(5x^2 + 7x^2) + (-2x + x) + (1 - 3)$$

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Example 1 (continued)

EXAMPLE 1

Simplify the expression $(5x^2 - 2x + 1) + (7x^2 + x - 3)$

$$(5x^2 - 2x + 1) + (7x^2 + x - 3)$$
$$(5x^2 + 7x^2) + (-2x + x) + (1 - 3)$$
$$12x^2 \qquad -x \qquad -2$$
$$12x^2 - x - 2$$

Menu

Then simplify each group.

$$(5x^2 + 7x^2) + (-2x + x) + (1 - 3)$$
$$12x^2 \qquad -x \qquad -2$$

Your work is complete. The sum is $12x^2 - x - 2$.

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Example 2

EXAMPLE 2

Simplify the expression $(-4x^2 + 3x + 2) + (6x^2 + 4)$

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

Click each of the terms above to identify the like terms.

Simplify the expression below.

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

In this example, you will learn how to find the sum by adding vertically.

Begin by identifying the like terms.

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Example 2 (continued)

EXAMPLE 2

Simplify the expression $(-4x^2 + 3x + 2) + (6x^2 + 4)$

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

Recall that like terms include the same variable(s),
raised to the same power.

$-4x^2$ and $6x^2$ are like terms.
There are no other terms like $3x$.
 2 and 4 are like terms.

Next

Recall that like terms include the same variables raised to the same power.

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

The terms $-4x^2$ and $6x^2$ are like terms.
There are no other terms like $3x$.
The terms 2 and 4 are like terms.

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Example 2 (continued)

EXAMPLE 2

Simplify the expression $(-4x^2 + 3x + 2) + (6x^2 + 4)$

$$\begin{array}{r} (-4x^2 + 3x + 2) + (6x^2 + 4) \\ -4x^2 + 3x + 2 \\ + 6x^2 \qquad \qquad + 4 \\ \hline 2x^2 + 3x + 6 \end{array}$$

[Menu](#)

Now that you have identified the like terms, line them up vertically. Then, find the sum.

$$\begin{array}{r} -4x^2 + 3x + 2 \\ + 6x^2 \qquad \qquad + 4 \\ \hline 2x^2 + 3x + 6 \end{array}$$

Your work is complete. The sum is $2x^2 + 3x + 6$.

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Example 3

EXAMPLE 3

Simplify the expression $(3x^2 - 5x) - (x^2 + 2x)$

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

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

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

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

$$2x^2 \qquad -7x$$

$2x^2 - 7x$

[Menu](#)

Simplify the expression below.

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

$(3x^2 - 5x) - (x^2 + 2x)$ In this example, you must find the difference of two binomials.

$(3x^2 - 5x) + (-x^2 - 2x)$ Recall that subtraction is the same as adding the opposite. So, instead of subtracting the quantity $(x^2 + 2x)$, add the quantity $(-x^2 - 2x)$. One way to think about this is that the subtraction problem becomes an addition problem. And each term in the second binomial becomes its opposite.

$(3x^2 - 5x) + (-x^2 - 2x)$ Now, you can determine the sum of the binomials. In this example, you will use the regrouping method. Identify the like terms.

$(3x^2 - x^2) + (-5x - 2x)$ Then group the like terms together. Now, simplify each group.

$$2x^2 \qquad -7x$$

Now, simplify each group.

$$2x^2 - 7x$$

Your work is complete. The difference of the two binomials is $2x^2 - 7x$.

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Example 4

EXAMPLE 4

Simplify the expression $(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$

$$(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$$

Which of the following is equivalent to the expression above?

$$(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$$

$$(8x^2 + 7x + 2) + (7x^2 - 4x - 7)$$

$$(8x^2 + 7x + 2) - (-7x^2 + 4x + 7)$$

Simplify the expression below.

$$(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$$

To determine the difference of the trinomials, rely on the fact that subtraction is equivalent to adding the opposite.

Which of the following expressions is equivalent to $(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$?

A) $(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$

B) $(8x^2 + 7x + 2) + (7x^2 - 4x - 7)$

C) $(8x^2 + 7x + 2) - (-7x^2 + 4x + 7)$

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Example 4 (continued)

EXAMPLE 4

Simplify the expression $(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$

$$(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$$

$$(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$$

$$(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$$

To subtract the second polynomial from the first,
you must add its opposite. Therefore,
 $(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$ is equivalent to $(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$.

Next

To subtract the second polynomial from the first, you must add its opposite. Therefore,

$(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$ is equivalent to $(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$.

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Example 4 (continued)

EXAMPLE 4

Simplify the expression $(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$

$$(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$$

$$(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$$

After simplifying the expression, the result is...

$(15x^2 + 11x + 9)$

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

$(x^2 + 11x + 9)$

Now, determine the sum of the trinomials. You may choose to group the like terms together and add horizontally, or you may find the sum by aligning the like terms vertically.

After simplifying the expression the result is...

A) $15x^2 + 11x + 9$

B) $x^2 + 3x - 5$

C) $x^2 + 11x + 9$

Module 3: Adding and Subtracting Polynomials

Topic 1 Content: Finding Sums and Differences of Polynomials

Example 4 (continued)

EXAMPLE 4

Simplify the expression $(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$

$$(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$$

$$(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$$

After identifying like terms, add vertically or horizontally

Align like terms vertically.

Simplify.

$$\begin{array}{r} 8x^2 + 7x + 2 \\ -7x^2 + 4x + 7 \\ \hline x^2 + 11x + 9 \end{array}$$

View Horizontal Math

$(x^2 + 11x + 9)$

Menu

Begin by identifying like terms.

$$(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$$

If you chose to add vertically:

$$\begin{array}{r} 8x^2 + 7x + 2 \\ -7x^2 + 4x + 7 \\ \hline x^2 + 11x + 9 \end{array}$$

Align like terms vertically
Simplify

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Example 4 (continued)

EXAMPLE 4

Simplify the expression $(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$

$$(8x^2 + 7x + 2) - (7x^2 - 4x - 7)$$

$$(8x^2 + 7x + 2) + (-7x^2 + 4x + 7)$$

After identifying like terms, add vertically or horizontally

Regroup. $(8x^2 - 7x^2) + (7x + 4x) + (2 + 7)$

Simplify. $x^2 + 11x + 9$

View Vertical Math

$(x^2 + 11x + 9)$

Menu

If you chose to add horizontally:

$$\begin{array}{ccccccc}
 (8x^2 - 7x^2) & + & (7x + 4x) & + & (2 + 7) & & \text{Regroup} \\
 x^2 & & 11x & + & 9 & & \text{Simplify}
 \end{array}$$

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Self-Check 1

 **Self-Check**

Which of the following expressions is equivalent to $(2x^2 - 6x) + (x^2 - 8x + 10)$?

- ☐ $3x^2 - 2x + 10$
- ☐ $2x^2 - 14x + 10$
- ☐ $3x^2 - 14x + 10$

SUBMIT

Solve the problem in the image above to check your understanding of the content.

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Self-Check 1: Answer

Correct

That's correct! Begin by identifying like terms:

$$(2x^2 - 6x) + (x^2 - 8x + 10)$$

If you chose to add horizontally, regroup the like terms.

$$(2x^2 + x^2) + (-6x - 8x) + 10$$

Then, simplify.

$$3x^2 - 14x + 10$$

If you chose to add vertically, align the like terms vertically.

$$\begin{array}{r} 2x^2 - 6x \\ + x^2 - 8x + 10 \\ \hline 3x^2 - 14x + 10 \end{array}$$

Then, simplify.

Continue

SUBMIT

For your reference, the image above shows the correct solution to the self-check problem.

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Self-Check 2

 **Self-Check**

Which of the following expressions is equivalent to $(9x^2 - 3) - (-4x^2 + 5x - 6)$?

- ☐ $13x^2 - 8x + 6$
- ☐ $13x^2 - 5x + 3$
- ☐ $5x^2 + 5x + 3$

SUBMIT

Solve the problem in the image above to check your understanding of the content.

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Self-Check 2: Answer

Correct

That's correct! Remember that subtraction is the same as adding the opposite. Therefore,

$$(9x^2 - 3) - (-4x^2 + 5x - 6) \text{ is equivalent to } (9x^2 - 3) + (4x^2 - 5x + 6)$$

Next, identify the like terms: $(9x^2 - 3) + (4x^2 - 5x + 6)$

If you chose to add horizontally, regroup the like terms.

$$(9x^2 + 4x^2) - 5x + (-3 + 6)$$

Then, simplify.

$$13x^2 - 5x + 3$$

If you chose to add vertically, align the like terms vertically.

$$\begin{array}{r} 9x^2 - 3 \\ + 4x^2 - 5x + 6 \\ \hline 13x^2 - 5x + 3 \end{array}$$

Then, simplify.

Continue

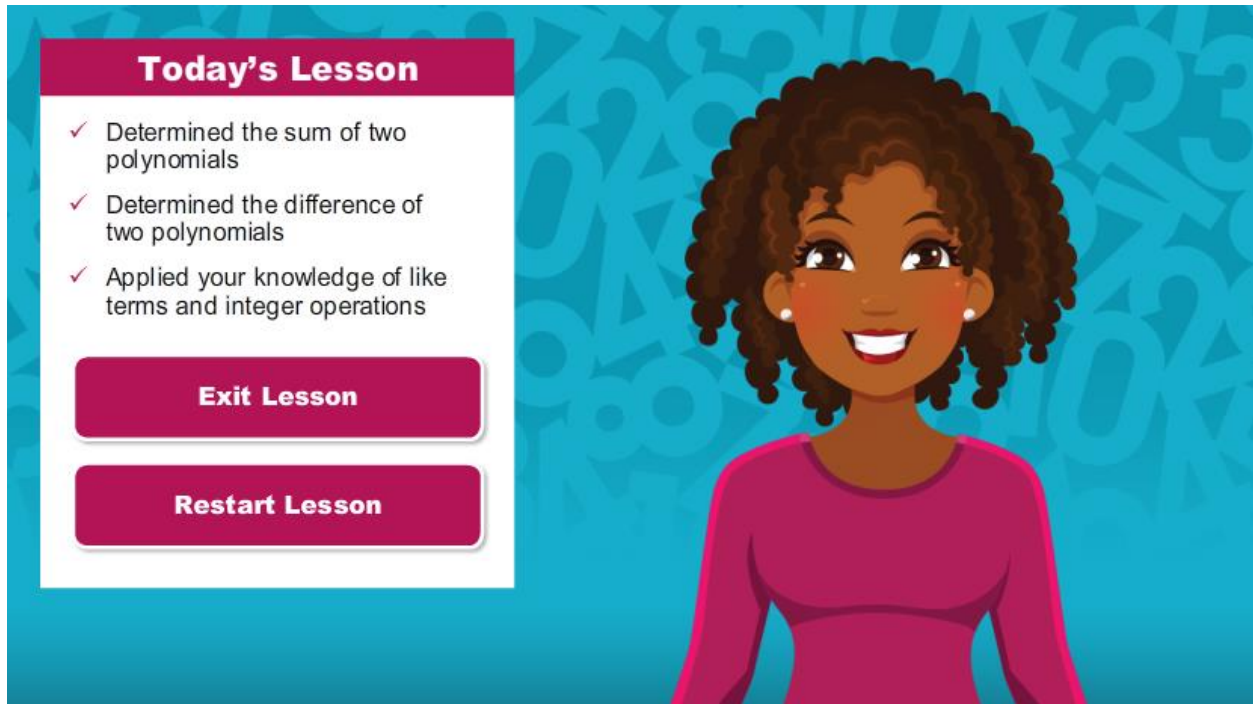
SUBMIT

For your reference, the image above shows the correct solution to the self-check problem.

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Conclusion



The image shows a digital interface for a lesson conclusion. On the left, a white box with a pink header titled "Today's Lesson" contains a checklist of three items, each preceded by a checkmark: "Determined the sum of two polynomials", "Determined the difference of two polynomials", and "Applied your knowledge of like terms and integer operations". Below the checklist are two pink buttons: "Exit Lesson" and "Restart Lesson". To the right of this box is a cartoon illustration of a smiling woman with dark skin and curly hair, wearing a pink long-sleeved shirt. The background is a solid blue color with a faint, repeating pattern of mathematical symbols like plus, minus, multiply, and divide signs.

Today's Lesson

- ✓ Determined the sum of two polynomials
- ✓ Determined the difference of two polynomials
- ✓ Applied your knowledge of like terms and integer operations

Exit Lesson

Restart Lesson

Congratulations! You have reached the conclusion of this lesson in Algebra I, where you learned how to determine the sum and difference of two polynomials. Your knowledge of like terms and integer operations were useful tools to help you successfully progress through this lesson.