

## NOTE CATCHER (TEACHER GUIDE)

Use the following, as needed, to help facilitate the discussion for **slides 15–19**.

### Clue #1

Students are expected to use the first clue to write a definition of polynomial expression based on the video they access from the given QR code or going to [k20.ou.edu/Polynomials](https://k20.ou.edu/Polynomials). If students need additional help writing their own definition, highlight the following information by breaking down terms and having a class discussion around:

- What is a polynomial expression?
  - “Poly-” means “many,” and “-nomial” means “term;” therefore, *polynomial* means *many terms*.
  - A polynomial expression is an expression with many terms, where the terms have variables with whole number exponents. A polynomial expression with one term is known as a monomial expression.
- What is a term?
  - A term is a number, a variable, or a product of number(s) and variable(s) that is generally separated by addition or subtraction signs.
- What is an expression?
  - An expression is a term or a group of terms separated by plus or minus signs. An expression does not have an equal sign (or inequality sign); it is only one side of an equation.

### Clue #2

Students are expected to use the second clue to write the steps for simplifying polynomials by adding or subtracting and identify the most important thing to remember when subtracting polynomials based on the videos they access from the given QR codes or going to [k20.ou.edu/PolynomialSteps](https://k20.ou.edu/PolynomialSteps) and then [k20.ou.edu/PolynomialSubtract](https://k20.ou.edu/PolynomialSubtract). The following are key understandings to discuss:

- 1) When adding and simplifying polynomials, we begin by removing the parentheses.
  - Why do we remove parentheses?
    - Because we are multiplying each term inside parentheses with a positive one when adding or negative one when subtracting (distributive property).

2) Then we identify like terms.

- What characteristics help to identify like terms?
  - **Needs the same variable(s) to the same power(s).** Pay attention to the exponents of the terms. Like terms have the same variable(s) raised to the same power(s).
    - Is  $x^3y^2$  the same as  $x^2y^3$ ? Why or what not?
      - No, because the same variable is not raised to the same power, so they are not like terms.
  - **The term takes the sign.** For example, in the expression  $5x - x^2$ , the subtraction in front of  $x^2$  makes that second term “negative  $x^2$ .”
- What are some strategies to label/indicate like terms?
  - Put the same shape around like terms; underline like terms with same number of lines; use coloring tools to color like terms with the same color; or use any identifying marking to determine terms that have same variable raised to same power.

3) After identifying the like terms, we add or combine the like terms.

- Is there a difference between “adding like terms” and “combining like terms?”
  - Adding and combining like terms means the same thing. (Subtracting like terms does not.)

4) Lastly, write the final answer in standard form.

- What is the standard form of a polynomial?
  - Write the terms of the polynomial with the term containing the largest exponent first, followed by the remaining terms in descending-order of power (from highest power to the lowest).

Be sure to also discuss:

- What is the most important thing to remember about subtracting polynomials?
  - Change signs of the second polynomial correctly by distributing the negative one to all terms OR add the opposite of every term within the second expression.
- How are adding and subtracting polynomial expressions similar? How are they different?
  - **Similar:** The steps are the same; you need to distribute something to remove parentheses. And once the parentheses are gone, you combine like terms and write the final answer in standard form.
  - **Different:** The difference is that when you subtract polynomials, you are not distributing a positive one to remove the parentheses, so the signs change for

that second expression. In other words, when subtracting, a negative one is distributed to each term within the second expression, changing the sign. Alternatively, that first step could be different by adding the opposite of every term within the second expression.

### Clue #3

Students are expected to use the third clue to take notes on the two methods for adding polynomials: the horizontal method and the vertical method, based on the video they access from the given QR code or going to [k20.ou.edu/AddingMethods](https://k20.ou.edu/AddingMethods). Then students are to try to find the sum of the given polynomials on their Note Catcher using their preferred method.

### Clue #4

Students are expected to use the fourth clue to take notes on the two methods for subtracting polynomials: the horizontal method and the vertical method, based on the videos they access from the given QR codes or going to [k20.ou.edu/SubHorizontal](https://k20.ou.edu/SubHorizontal) and then [k20.ou.edu/SubVertical](https://k20.ou.edu/SubVertical). Then students are to try to find the difference of the given polynomials on their Note Catcher using their preferred method.