**K – Polynomials, Lesson 4, Factoring the Difference of Perfect Squares (r. 2018)**

POLYNOMIALS

Factoring the Difference of Perfect Squares

|  |  |
| --- | --- |
| **Common Core Standard** **A-SSE.2** Use the structure of an expression to identify ways to rewrite it. *For example, see  as, thus recognizing it as a difference of squares that can be factored as .* PARCC: Tasks limited to numerical and polynomial expressions in one variable. Recognize as a difference of squares and see an opportunity to rewrite it in the easier-to -evaluate form (53+47)(53-47). See an opportunity to rewrite  as (a+7)(a+2). NYSED: Does not include factoring by grouping and factoring the sum and difference of cubes.  | **Next Generation Standard****AI-A.SSE.2 Recognize** and use the structure of an expression to identify ways to rewrite it. (Shared standard with Algebra II) **e.g.,**  Note: Algebra I expressions are limited to numerical and polynomial expressions in one variable. **Use factoring techniques such as factoring out a greatest common factor, factoring the difference of two perfect squares, factoring trinomials of the form ax2+bx+c with a lead coefficient of 1, or a combination of methods to factor completely.** Factoring will not involve factoring by grouping and factoring the sum and difference of cubes.  |

**LEARNING OBJECTIVES**

Students will be able to:

1) factor the difference of perfect squares.

**Overview of Lesson**

|  |  |
| --- | --- |
| **Teacher Centered Introduction****Overview of Lesson****- activate students’ prior knowledge****- vocabulary****- learning objective(s)****- big ideas: direct instruction** **- modeling** | **Student Centered Activities****guided practice Teacher: anticipates, monitors, selects, sequences, and connects student work****- developing essential skills****- Regents exam questions****- formative assessment assignment (exit slip, explain the math, or journal entry)** |

**VOCABULARY**

Completely factor

Perfect square binomial

Square of a number

Square root of a number

**BIG IDEA**

|  |  |
| --- | --- |
| General Rule | Examples |

**DEVELOPING ESSENTIAL SKILLS**

 1. The expression  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 2. Factored, the expression  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 3. The expression  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 4. Factor completely: 

 5. Which expression is equivalent to ?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 6. If Ann correctly factors an expression that is the difference of two perfect squares, her factors could be

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 7. Which expression is equivalent to ?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 8. When  is factored completely, the result is

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 9. The expression  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 10. Which expression represents  factored completely?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 11. Which expression is equivalent to ?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 12. The expression  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 13. The expression  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 14. When  is factored, it is equivalent to . What is a value for *b*?

|  |  |  |  |
| --- | --- | --- | --- |
| a. | 50 | c. | 3 |
| b. | 10 | d. | 100 |

 15. Which expression is equivalent to ?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 16. One of the factors of  is

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 17. Factor completely: 

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 18. Written in simplest factored form, the binomial  can be expressed as

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 19. Expressed in factored form, the binomial  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

 20. What is a common factor of  and ?

|  |  |  |  |
| --- | --- | --- | --- |
| a. |  | c. |  |
| b. |  | d. |  |

**Answers**

 1. ANS: C

 2. ANS: A

 3. ANS: B

 4. ANS:

. 

5. ANS: A

 6. ANS: B

 7. ANS: C

 8. ANS: B

 9. ANS: C

 10. ANS: B

 11. ANS: B

 12. ANS: C

 13. ANS: A

 14. ANS: B

 15. ANS: C

 16. ANS: B

 17. ANS: C

 18. ANS: B

 19. ANS: B

 20. ANS: B

**REGENTS EXAM QUESTIONS (through June 2018)**

A.SSE.A.2: Difference of Perfect Squares

 348) When factored completely, the expression  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

 349) If the area of a rectangle is expressed as , then the product of the length and the width of the rectangle could be expressed as

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

 350) The expression  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

 351) Which expression is equivalent to ?

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

 352) Which expression is equivalent to ?

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

 353) Which expression is equivalent to ?

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

 354) The expression  is equivalent to

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

 355) Which expression is equivalent to ?

|  |  |  |  |
| --- | --- | --- | --- |
| 1) |  | 3) |  |
| 2) |  | 4) |  |

**SOLUTIONS**

 348) ANS: 3

Strategy: Use difference of perfect squares.

STEP 1. Factor 



STEP 2. Factor 



PTS: 2 NAT: A.SSE.A.2 TOP: Factoring Polynomials

 349) ANS: 2

Strategy: Use the distributive property to work backwards from the answer choices.

|  |  |
| --- | --- |
| a. | c. |
| b. | d. |

PTS: 2 NAT: A.SSE.A.2 TOP: Factoring Polynomials

 350) ANS: 3

Step 1. Understand the problem as a “difference of perfect squares”, because the terms  and 16 are both perfect squares and the operation is subtraction.

Step 2. Strategy: Use the pattern  to separate  into two binomials.

Step3. Execution of Strategy

 The square root of  is .

 The square of 16 is 4.

  = 

Step 4. Does it make sense? Yes. You can show that  =  using the distributive property, as follows:



PTS: 2 NAT: A.SSE.A.2 TOP: Factoring the Difference of Perfect Squares

 351) ANS: 2

Strategy 1.

Recognize that the expression  is a difference of perfect squares. Therefore,

.

Since this is not an answer choice, continue factoring, as follows:



Strategy 2.

Examine the answer choices, which begin with factors 4 and 2. Extract these factors first, as follows:

|  |  |
| --- | --- |
| Start by extracting a 4 | Start by extracting a 2 |

PTS: 2 NAT: A.SSE.A.2

 352) ANS: 2

Strategy 1: Factor



Strategy 2: Recognize that  appears to be a difference of perfect squares.

Recall that .

Eliminate any answers that do not take the form of , which leaves only one choice: 

Check:



PTS: 2 NAT: A.SSE.A.2 TOP: Factoring the Difference of Perfect Squares

KEY: quadratic

 353) ANS: 3

Note that the expression  is the difference of perfect squares.



PTS: 2 NAT: A.SSE.A.2 TOP: Factoring the Difference of Perfect Squares

KEY: higher power

 354) ANS: 3

Note that  and 36 are both perfect squares. Therefore,  is the difference of perfect squares.



PTS: 2 NAT: A.SSE.A.2 TOP: Factoring the Difference of Perfect Squares

KEY: quadratic

 355) ANS: 3

 is a difference of perfect squares. All polynomials in the form of  can be factored into .



PTS: 2 NAT: A.SSE.A.2 TOP: Factoring the Difference of Perfect Squares

KEY: higher power AI