**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**

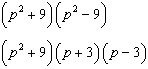
348) ANS: 3

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.

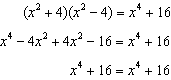
Step3. Execution of Strategy

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

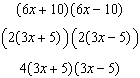
351) ANS: 2

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.

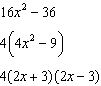
Examine the answer choices, which begin with factors 4 and 2. Extract these factors first, as follows:

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

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

352) ANS: 2

Strategy 1: Factor

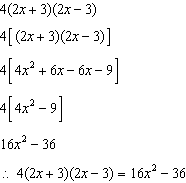


Strategy 2: Recognize that  appears to be a difference of perfect squares.

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