UNIT 3 - LESSON 6

READY, SET, GO! Name Period Date

READY

Topic: Recognizing special products

Multiply.

1. $(x+5)(x+5)$
   $= x^2+10x+25$

2. $(x-3)(x-3)$
   $= x^2-6x+9$

3. $(a+b)(a+b)$
   $= a^2+2ab+b^2$

4. In problems 1 – 3 the answers are called **perfect square trinomials.** What about these answers makes them be a **perfect square trinomial**?
   • They come from a factor being squared
   • The product is a trinomial ~ 1st & 3rd terms are perfect squares ~ middle term is twice the product of their square roots ~ 1st operation is same as factor ~ 2nd operation is always +

5. $(x+8)(x-8)$
   $= x^2-64$

6. $(x+\sqrt{3})(x-\sqrt{3})$
   $= x^2-3$

7. $(x+b)(x-b)$
   $= x^2-b^2$

8. The products in problems 5 – 7 end up being binomials, and they are called the **difference of two squares**. What about these answers makes them be the **difference of two squares**?
   • The product is a binomial ~ both terms are perfect squares ~ the operation is subtraction

   Why don't they have a middle term like the problems in 1 – 3?
   • The middle terms were opposites that canceled each other out when added

9. $(x-3)(x^2+3x+9)$
   $= x^3-27$

10. $(x+10)(x^2-10x+100)$
    $= x^3+1000$

11. $(a+b)(a^2-ab+b^2)$
    $= a^3+b^3$

12. The work in problems 9 – 11 makes them feel like the answers are going to have a lot of terms. What happens in the work of the problem that makes the answers be binomials?
    • Two sets of terms were opposites that canceled each other out when added

    These answers are called the **difference of two cubes** (#9) and the **sum of two cubes** (#10 and #11.) What about these answers makes them be the **sum or difference of two cubes**?
    • The product is a binomial ~ both terms are perfect cubes ~ the operation can be + or −

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mathematics vision project

SET

Topic: Determining values of polynomials at zero and at $\pm\infty$. (End behavior)

State the y-intercept, the degree, and the end behavior for each of the given polynomials.

13. $f(x) = x^5 + 7x^4 - 9x^3 + x^2 - 13x + 8$

y- intercept: (0,8)

Degree: 5

End behavior:

As $x \to -\infty$, $f(x) \to$ -∞

As $x \to +\infty$, $f(x) \to$ ∞

14. $g(x) = 3x^4 + x^3 + 5x^2 - x - 15$

y- intercept: (0,-15)

Degree: 4

End behavior:

As $x \to -\infty$, $g(x) \to$ ∞

As $x \to +\infty$, $g(x) \to$ ∞

15. $h(x) = -7x^9 + x^2$

y- intercept: (0,0)

Degree: 9

End behavior:

As $x \to -\infty$, $h(x) \to$ ∞

As $x \to +\infty$, $h(x) \to$ -∞

16. $p(x) = 5x^2 - 18x + 4$

y- intercept: (0,4)

Degree: 2

End behavior:

As $x \to -\infty$, $p(x) \to$ ∞

As $x \to +\infty$, $p(x) \to$ ∞

*Sum or Diff. of Cubes

17. $q(x) = x^3 - 94x^2 - x - 20$

Even degree- leading coeff. neg.

y- intercept: (0,-20)

Degree: 3

End behavior:

As $x \to -\infty$, $q(x) \to$ -∞

As $x \to +\infty$, $q(x) \to$ ∞

18. $y = -4x + 12$

y- intercept: (0,12)

Degree: 1

End behavior:

As $x \to -\infty$, $y \to$ ∞

As $x \to +\infty$, $y \to$ -∞

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GO

Topic: Factoring polynomials

Factor the following. Make your thinking visible.

19. $x^2 + 3x - 18$
$= (x+6)(x-3)$

20. $2x^2 - 13x + 20$
$= (2x-5)(x-4)$

21. $5x^2 + 29x + 20$
$= (5x+4)(x+5)$

22. $16x^4 - 81$
$= (4x^2+9)(4x^2-9)$
$= (4x^2+9)(2x+3)(2x-3)$

23. $25x^2 + 30x + 9$
$= (5x+3)(5x+3)$
or $(5x+3)^2$

24. $x^2 - 16$
$= (x+4)(x-4)$

*Sum or Diff. of Cubes

25. $x^3 + 27$
$= (x+3)(x^2-3x+9)$

26. $49x^2 - 36$
$= (7x+6)(7x-6)$

27. $x^3 - 1$
$= (x-1)(x^2+x+1)$

28. $64x^2 - 240x + 225$
$= (8x-15)(8x-15)$
$= (8x-15)^2$

Higher degree