7.7 Factor Special Products

Essential Question: How do you factor special products?

Special Products - what were they again???

$(a + b)(a - b) =$ $(a-b)^2$ We called this product Diff. of Squares

$(a+b)^2 =$ $a^2+2ab+b^2$ This product is called a perfect square trinomial.

$(a - b)^2 =$ $a^2-2ab+b^2$ This product is called a perfect square trinomial.

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Core Vocabulary

Previous
polynomial
trinomial

What You Will Learn

- Factor the difference of two squares.
- Factor perfect square trinomials.
- Use factoring to solve real-life problems.

Core Concept: Difference of Two Squares Pattern

Algebra

$$a^2 - b^2 = (a + b)(a - b)$$

Example

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

$a=$ $b=$ a b

Things to consider for Difference of Squares: $a^2 - b^2$

1st: it must be a difference —

(9th grade - difference is fancy math jargon for MINUS!

(from Mr F.)

2nd: it can only be two terms binomial

3rd: each term must be a perfect square $(\ )^2$

For example: x^2 - 81 meets the criteria, x^2 - 83 does not.

What would x^2 - 81 factor to? $x^2 - 81 =$ $a^2 - b^2$ $(x)^2 - (9)^2$ $a=x$ $b=9$

$(a+b)(a-b) = (x+9)(x-9)$ $(x-9)^2$ $x^2 - 18x + 81$

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Examples: Factor. $a^2 - b^2 = (a+b)(a-b)$

(a) x^2 - 25

$a=x$ $b=5$

$(x+5)(x-5)$

(b) $4z^2$ - 1

$a=2z$ $b=1$

$(2z+1)(2z-1)$

Use a special product pattern to evaluate the expression.

(c) 54^2 - 48^2

$a=54$ $b=48$

$(54+48)(54-48)$

$(102)(6) = 612$

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Your Turn to Factor:

a. $x^2 - 64$

$a = x \quad b = 8$

$(x+8)(x-8)$

OR

$(x-8)(x+8)$

b. $25b^2 - 36$

$a = 5b \quad b = 6$

$(5b+6)(5b-6)$

c. $144 - d^2$

$a = 12 \quad b = d$

$(12+d)(12-d)$

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a) $\frac{1}{9}m^2 - v^2$

$a = \frac{1}{3}m \quad b = v$

$\left(\frac{1}{3}m+v\right)\left(\frac{1}{3}m-v\right)$

b) $\frac{4}{25}m^2 - \frac{9}{16}v^2$

$a = \frac{2}{5}m \quad b = \frac{3}{4}v$

$\left(\frac{2}{5}m+\frac{3}{4}v\right)\left(\frac{2}{5}m-\frac{3}{4}v\right)$

See if you can completely factor this one: $x^4 - y^4$

$(x^2+y^2)(x^2-y^2)$

$a = x^2 \quad b = y^2$

$a = x \quad b = y$

$(x^2+y^2)(x+y)(x-y)$

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FACTORING PERFECT SQUARE TRINOMIALS:

Realize you can reverse foil these trinomials but sometimes it is quicker if you realize that the first term and last term are perfect squares and the middle term is the product doubled (of the roots of the 1st and 3rd term), then it is a P.S.T. Let's see what that means.

Factor each polynomial.

a. $n^2 + 8n + 16$

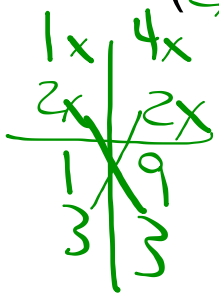
$(n)^2 + 2(4)(n) + (4)^2$

$(a+b)^2$

$(n+4)^2$

b. $4x^2 - 12x + 9$

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



$(2x-3)^2$

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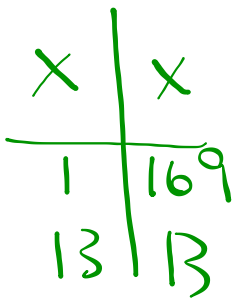
Factor each polynomial.

a. $x^2 + 26x + 169$

$13+13$ 13^2

$(x+13)^2$



b. $9x^2 - 24x + 16$

$(3x)^2$ $12x$ $12x$ $(4)^2$

$(3x-4)^2$

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Solve $x^2 + \frac{2}{3}x + \frac{1}{9} = 0.$

(x^2) $\frac{1}{3}+\frac{1}{3}$ $\left(\frac{1}{3}\right)^2$

$\sqrt{\left(x+\frac{1}{3}\right)^2} = \sqrt{0}$

$x + \frac{1}{3} = 0$

$x = -\frac{1}{3}$

To solve a quadratic equation:

1) set = 0 in descending order

2) factor it

3) ZPP

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(-1/3)²+(2/3)(1▶
          .4444444444
(-1/3)²+(2/3)(-1▶
                    0
```

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Real-World Problem

A bird picks up a stone and drops it while flying. The function $y = 49 - 16t^2$ represents the height y (in feet) of the stone t seconds after it is dropped. The stone hits the top of a 13-foot-tall building. After how many seconds does the stone hit the building?

$y = 13 \quad x = ?$

$13 = 49 - 16t^2$

$0 = 36 - 16t^2$

$a = 6 \quad b = (4t)$

$(6+4t)(6-4t) = 0$

$6+4t = 0 \quad 6-4t = 0$

$t = -\frac{6}{4}, \frac{6}{4}$ $\frac{3}{2}$ secs

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Assign p 401

A: 2, 8, 14, 20, 22, 24, 26, 32, 34, 36, 40, 42, 46, 48, 52, 56

B: 2 – 12(e), 16 – 18(e), 24 – 32 (e), 36 – 42 (e), 50 – 56 (e)

C: 2 – 25, 27 – 33(o), 48, 50, 54

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