8.8 WB prac.

GCF

3. $\frac{16}{4}p^2 - \frac{36}{4}$

$4(4p^2 - 9)$

$4(2p+3)(2p-3)$

GCF

5. $\frac{144}{9} - \frac{9f^2}{9}$

$9(16 - f^2)$

$9(4+f)(4-f)$

Algebra 1 8.9

Factor perfect square trinomials

Solve equations involving perfect squares (square root property)

perfect square

zero product property

prime

square root property $(\ \ )^2 = (\ \ )^2$

whiteboards

$49 = 7 \cdot 7 = 7^2$

$81 = 9 \cdot 9 = 9^2$

a^2+b^2 ☹

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

$$\begin{array}{r} a+b \\ a+b \\ \hline ab+b^2 \\ a^2+ab \\ \hline a^2+2ab+b^2 \end{array}$$

a^2-b^2 ☹

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

$$\begin{array}{r} a-b \\ a-b \\ \hline -ab+b^2 \\ a^2-ab \\ \hline a^2-2ab+b^2 \end{array}$$

What is the pattern?

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

$(x+4)^2 = (x+4)(x+4) = x^2+8x+16$

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

$(x-7)^2 = x^2-14x+49$

$(x+10)^2 = x^2+20x+100$

$(x+12)^2 = x^2+24x+144$

$x^2 + 10x + 25$

$(x + 5)^2$

1st thing something squared? What?
2nd thing something squared? What?
Middle term twice their product?

$(\quad)^2$

$16x^2 + 24x + 9$

$(4x + 3)^2$

Example 1 Recognize and Factor Perfect Square Trinomials

Determine whether each trinomial is a perfect square trinomial. Write *yes* or *no*. If so, factor it.

a. $4y^2 + 12y + 9$

$(2y + 3)^2$

b. $9x^2 - 6x + 4$ not p.s.

~~$3x^2$~~

GuidedPractice

1A. $9y^2 + 24y + 16$

$(3y + 4)^2$

1B. $2a^2 + 10a + 25$

not P.S.

ConceptSummary Factoring Methods

Steps	Number of Terms	Examples
Step 1 Factor out the GCF.	any	$4x^3 + 2x^2 - 6x = 2x(2x^2 + x - 3)$
Step 2 Check for a difference of squares or a perfect square trinomial.	2 or 3	$9x^2 - 16 = (3x + 4)(3x - 4)$ $16x^2 + 24x + 9 = (4x + 3)^2$
Step 3 Apply the factoring patterns for $x^2 + bx + c$ or $ax^2 + bx + c$ (general trinomials), or factor by grouping. Apply x-factor (if applicable)	3 or 4	$x^2 - 8x + 12 = (x - 2)(x - 6)$ $2x^2 + 13x + 6 = (2x + 1)(x + 6)$ $12y^2 + 9y + 8y + 6$ $= (12y^2 + 9y) + (8y + 6)$ $= 3y(4y + 3) + 2(4y + 3)$ $= (4y + 3)(3y + 2)$

GCF?

prime

Example 2 Factor Completely

Factor each polynomial, if possible. If the polynomial cannot be factored, write *prime*.

a. $5x^2 - 80$

$5(x^2 - 16)$

$5(x+4)(x-4)$

0. $9x^2 - 6x - 35$

-315

1	315
3	105
5	63
7	45
21	15

$(9x^2 - 21x + 15x - 35)$

$3x \quad -7 \quad 3x \quad 5$

$3x(3x-7)+5(3x-7)$

$(3x-7)(3x+5)$

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2A. $2x^2 - 32$

$2(x^2 - 16)$

$2(x-4)(x+4)$

2B. $12x^2 + 5x - 25$

Example 3 Solve Equations with Repeated Factors

Solve $9x^2 - 48x = -64.$

$+64 \quad +64$

$9x^2 - 48x + 64 = 0$

$(3x - 8)^2 = 0$

$(3x-8)(3x-8) = 0$

$3x - 8 = 0$

$+8 \quad +8$

$\frac{3x}{3} = \frac{8}{3} \quad x = \frac{8}{3}$

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Solve each equation. Check your solutions.

3A. $a^2 + 12a + 36 = 0$

$(a + 6)^2 = 0$

$(a+6)(a+6) = 0$

$a+6=0$

$a=-6$

3B. $y^2 - \frac{4}{3}y + \frac{4}{9} = 0$

$\left(y - \frac{2}{3}\right)^2 = 0$

$\left(y-\frac{2}{3}\right)\left(y-\frac{2}{3}\right)=0$

$y=\frac{2}{3}$ $y-\frac{2}{3}=0$

$x^2 - 16 = 0$

Difference of squares (DOS)
Perfect square (PS) shortcut

$(x-4)(x+4)=0$

$x-4=0 \quad x+4=0$

$x=4 \quad x=-4$

Shortcut (±)

$x^2-16=0$

$+16 \quad +16$

$\sqrt{x^2}=\sqrt{16}$

$x=4$

$x=-4$

$x=\pm 4$

$4\cdot 4=16$

$-4\cdot -4=16$

Example 4 Use the Square Root Property

Solve each equation. Check your solutions.

a $\sqrt{(y-6)^2} = \sqrt{81}$

$y - 6 = \pm 9$

$y - 6 = 9$ $\quad$ $y - 6 = -9$

$+6 \quad +6$ $\quad$ $+6 \quad +6$

$y = 15$ $\quad$ $y = -3$

Square root property (SRP) shortcut

GuidedPractice

4A. $\sqrt{(a-10)^2} = \sqrt{121}$

4B. $(z+3)^2 = 26$

$a - 10 = \pm 11$

$a - 10 = 11$ $\quad a - 10 = -11$

p. 526

1-7 all

13-33 odd