

5.4 Factoring Quadratic Expressions

Factoring is rewriting an expression as the product of its factors.

Greatest Common Factor (GCF) of an Expression—the common factor with the greatest coefficient and the greatest exponent.

Find the GCF.

$$9x^2 + 3x - 18$$

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

$$7p^2 + 21$$

$$7(p^2 + 3)$$

$$4w^2 + 2w$$

$$2w(2w + 1)$$

Factor the trinomials.

$$x^2 + 12x + 32$$

$$(x + 8)(x + 4)$$

$$x^2 + 14x + 40$$

$$(x + 10)(x + 4)$$

Factor the trinomials.

$$x^2 - 6x + 8$$

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

$$x^2 - 11x + 24$$

$$(x - 8)(x - 3)$$

Factor the trinomials.

$$x^2 - 14x - 32$$

$$(x - 16)(x + 2)$$

$$x^2 + 4x - 5$$

$$(x + 5)(x - 1)$$

Factor the Difference of 2 Squares

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

$$12x^2 - 64$$

$$(11x - 8)(11x + 8)$$

$$49x^2 - 100$$

$$(7x + 10)(7x - 10)$$

Factor the trinomials.

$$2x^2 + 11x + 12$$

$$2(12) = 24$$

$$\begin{array}{r} \cdot 24 \\ 8 \quad 3 \\ \hline +11 \end{array}$$

	x	4
2x	2x ²	8x
3	3x	12

$$(2x+3)(x+4)$$

$$2x^2 - 7x + 6$$

$$2(6)$$

$$\begin{array}{r} 12 \\ -3 \quad -4 \\ \hline -7 \end{array}$$

	2x	-3
x	2x ²	-3x
-2	-4x	6

$$(2x-3)(x-2)$$

Factor the trinomials.

$$2x^2 + 7x - 9$$

$$\begin{array}{r} -18 \\ 9 \quad -2 \\ \hline 7 \end{array}$$

	2x	9
x	2x ²	9x
-1	-2x	-9

$$(2x+9)(x-1)$$

$$3x^2 - 16x - 12$$

$$\begin{array}{r} -36 \\ -18 \quad 2 \\ \hline -16 \end{array}$$

	3x	2
x	3x ²	2x
-6	-18x	-12

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

Factoring Perfect Square Trinomials

$$a^2 \pm 2ab + b^2 = (a \pm b)^2$$

$$64x^2 - 16x + 1$$

$$(8x - 1)^2$$

$$25x^2 + 90x + 81$$

$$(5x + 9)^2$$

Factor Completely* (Check for a GCF first) $16x^8 - 97x^4 + 81$

$$4x^2 - 52x + 144$$

$$4(x^2 - 13x + 36)$$

$$4(x-4)(x-9)$$

$$\begin{array}{r}
 \begin{array}{r} 1296 \\ -16 \end{array} \\
 \begin{array}{r} -81 \\ -97 \end{array}
 \end{array}$$

x^4	-1
$16x^8$	$-16x^4$
$-81x^4$	81

$$\begin{aligned}
 &(16x^4 - 81)(x^4 - 1) \\
 &(4x^2 - 9)(4x^2 + 9)(x^2 + 1)(x^2 - 1) \\
 &(2x - 3)(2x + 3)(4x^2 + 9)(x^2 + 1)(x + 1)(x - 1)
 \end{aligned}$$

Factor Completely (Check for a GCF first)

$$10x^2 + 46x + 52$$

$$2(5x^2 + 23x + 26)$$

$$\begin{array}{r}
 \begin{array}{r} 130 \\ 13 \end{array} \\
 \begin{array}{r} 10 \\ 23 \end{array}
 \end{array}$$

x	2
$5x^2$	$10x$
$13x$	26

$$2(5x + 13)(x + 2)$$

$$3w^2 - 42w + 147$$

$$3(w^2 - 14w + 49)$$

$$3(w - 7)^2$$

Factor Completely (Check for a GCF first)

$$4c^4 - 256c^2$$

$$4c^2(c^2 - 64)$$

$$4c^2(c+8)(c-8)$$

$$6(x+5)^2 - 5(x+5) + 1$$

$$6(x^2 + 10x + 25) - 5(x + 5) + 1$$

$$6x^2 + 60x + 150 - 5x - 25 + 1$$

$$6x^2 + 55x + 126$$

$$\begin{array}{r}
 \begin{array}{r} 756 \\ 27 \end{array} \\
 \begin{array}{r} 28 \\ 55 \end{array}
 \end{array}$$

$2x$	9
$3x$	$6x^2$
14	$27x$
	126

$$(3x + 14)(2x + 9)$$

homework:

page 259 # 1, 7, 13, 19, 25, 31, 37, 51-65