

Factoring Polynomials with Patterns and Grouping

Grade 9 – Algebra 1 math · Worksheet · Standards: A-SSE.A.2, A-SSE.B.3a

Name: _____ Date: _____ Class: _____

These 20 problems train standards A-SSE.A.2 and A-SSE.B.3a. They begin with the greatest common factor and trinomials with leading coefficient 1, then move to difference of squares, perfect squares, grouping and trinomials with $a \neq 1$.

The last six problems use factoring to find zeros, to solve area and projectile problems and to see structure inside an expression.

Standards: A-SSE.A.2, A-SSE.B.3a · **Level:** Grade 9 Algebra 1

Problem 1 Take Out the GCF (easy)

Factor $12x^3 + 18x^2$.

Problem 2 GCF with Two Variables (easy)

Factor $15a^2b - 20ab^2$.

Problem 3 Positive Trinomial (easy)

Factor $x^2 + 9x + 20$.

Problem 4 Trinomial with Negative Middle (easy)

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

Problem 5 Negative Constant, Larger Positive (easy)

Factor $x^2 + 2x - 35$.

Problem 6 Negative Constant, Larger Negative (easy)

Factor $x^2 - 3x - 54$.

Problem 7 Difference of Squares (medium)

Factor $49m^2 - 100$.

Problem 8 Perfect Square Trinomials (medium)

Factor each trinomial.

a. $x^2 + 16x + 64$

b. $9y^2 - 30y + 25$

Problem 9 GCF Then Trinomial (medium)

Factor completely: $3x^2 - 18x + 24$.

Problem 10 Leading Coefficient 2 (medium)

Factor $2x^2 + 11x + 12$. The box shows the first and last products.

$2x^2$	
	12

Total area: $2x^2 + 11x + 12$.

Problem 11 Leading Coefficient 3 (medium)

Factor $3x^2 - 10x + 8$.

Problem 12 Mixed Signs with a = 6 (medium)

Factor $6x^2 + x - 15$.

Problem 13 Grouping Four Terms (medium)

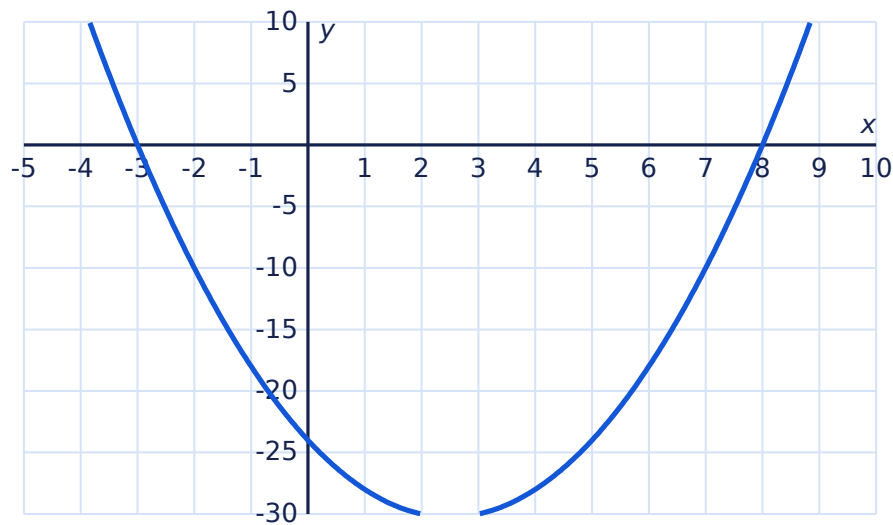
Factor $x^3 + 5x^2 + 2x + 10$ by grouping.

Problem 14 Grouping with Negatives (medium)

Factor $6x^3 - 9x^2 + 4x - 6$.

Problem 15 Solve by Factoring (hard)

Solve $x^2 - 5x - 24 = 0$ by factoring. Compare with the graph.



The graph of $y = x^2 - 5x - 24$.

Problem 16 Zeros of a Quadratic Function (hard)

Find the zeros of $f(x) = 2x^2 - 7x - 15$.

Problem 17 Missing Side of a Rectangle (hard)

A rectangular banner has area $x^2 + 13x + 42$ square feet and width $x + 6$ feet. Find its length, then its dimensions when $x = 5$.

length = ?

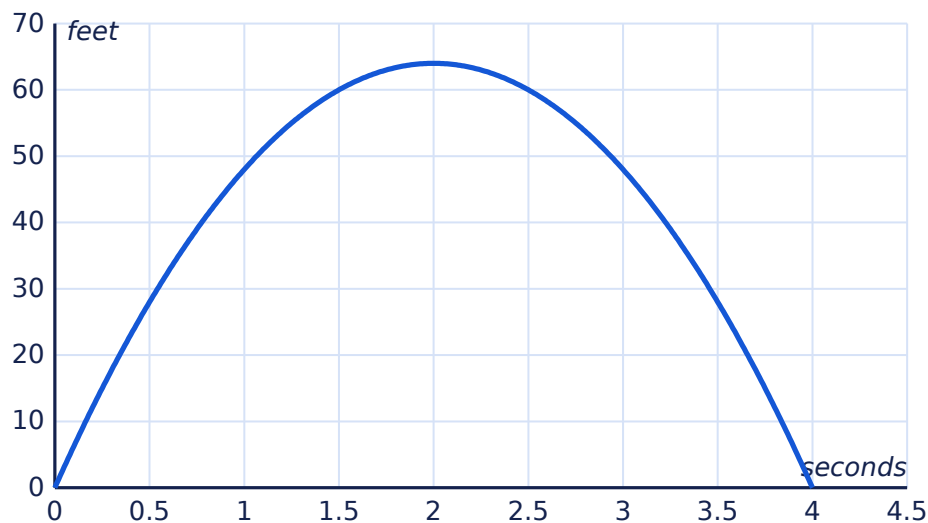
$x + 6$

Area = $x^2 + 13x + 42$

A rectangle with area $x^2 + 13x + 42$.

Problem 18 Ball in the Air (hard)

A ball is thrown so that its height after t seconds is $h(t) = -16t^2 + 64t$ feet. Factor the expression and find when the ball is at ground level.



Height of a thrown ball for the first 4 seconds.

Problem 19 Factor Completely, Two Rounds (hard)

Factor $2x^4 - 32$ completely.

Problem 20 See the Structure (hard)

Rewrite $(x + 3)^2 - 25$ as a product of two binomials. Then expand both forms to show they match.