

Combining and Multiplying Polynomials

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

Name: _____ Date: _____ Class: _____

These 20 problems train standards A-APR.A.1 and A-SSE.A.2. The first problems name the parts of a polynomial and combine like terms. Later problems multiply binomials, use the special products and recognize structure.

The last six problems apply polynomials to areas, revenue and mental arithmetic.

Standards: A-APR.A.1, A-SSE.A.2 · **Level:** Grade 9 Algebra 1

Problem 1 Standard Form and Degree (easy)

Write $7x - 4x^3 + 2$ in standard form. State its degree and leading coefficient.

Problem 2 Name Each Polynomial (easy)

Classify each polynomial by number of terms and state its degree.

- a. $9x^4$
- b. $x^2 - 6$
- c. $2x^3 + x - 8$

Problem 3 Evaluate a Polynomial (easy)

Evaluate $P(x) = x^2 - 3x + 5$ at $x = -2$.

Problem 4 Add Two Trinomials (easy)

Simplify $(4x^2 + 3x - 1) + (x^2 - 6x + 9)$.

Problem 5 Subtract Two Trinomials (easy)

Simplify $(7x^2 - 2x + 6) - (3x^2 + 5x - 1)$.

Problem 6 Multiply Monomials (easy)

Multiply.

- a. $(3x^2)(-5x^4)$
- b. $(6a^3b)(-2ab^4)$

Problem 7 Distribute a Monomial (medium)

Multiply $4x(2x^2 - 3x + 7)$.

Problem 8 Multiply Two Binomials (medium)

Multiply $(x + 8)(x - 3)$.

Problem 9 Binomials with Coefficients (medium)

Multiply $(6x - 7)(4x + 9)$.

Problem 10 Trinomial Times Binomial (medium)

Multiply $(x^2 - 4x + 6)(x + 3)$. Use the box to organize the products.

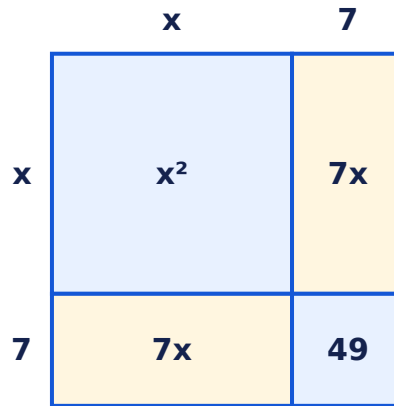
	x^2	$-4x$	6
x			
3			

Columns: x^2 , $-4x$, 6. Rows: x and 3.

Problem 11 Square a Binomial (medium)

Expand.

- a. $(x + 7)^2$ (the square shows the area)
- b. $(3x - 2)^2$



A square with side $x + 7$.

Problem 12 Difference of Squares (medium)

Multiply $(9k + 11)(9k - 11)$.

Problem 13 Three Polynomials at Once (medium)

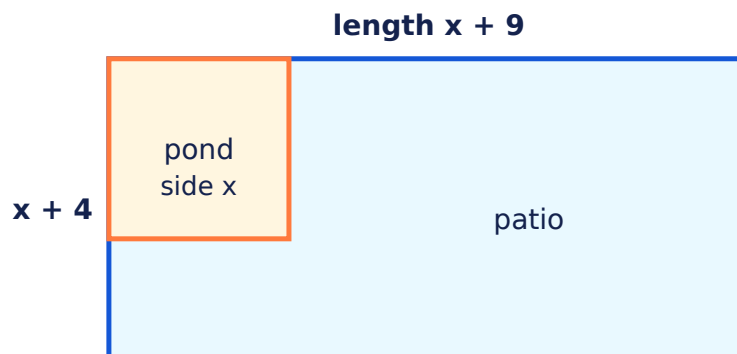
Simplify $(5x^2 - 3x + 8) - (2x^2 + x - 6) + (x^2 - 4)$.

Problem 14 Closure Check (hard)

Multiply $(2x + 1)(x^2 - 3)$. Is the product a polynomial? State its degree and explain how degrees relate here.

Problem 15 Patio with a Pond (hard)

A rectangular patio is $x + 9$ feet long and $x + 4$ feet wide. A square pond with side x feet sits in one corner. Write the area of the patio not covered by the pond as a polynomial in simplest form.



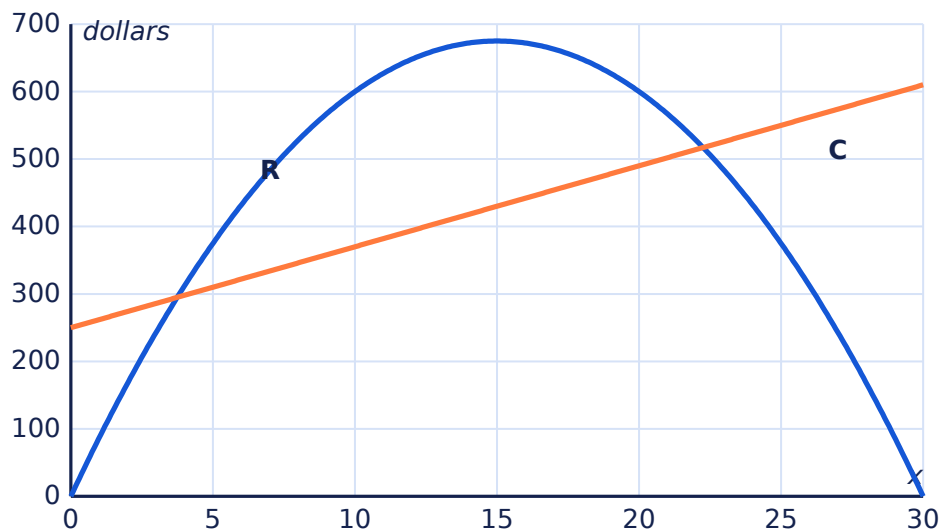
A patio with a square pond in one corner.

Problem 16 Ticket Revenue (hard)

A theater sells $(30 + 5x)$ tickets at a price of $(40 - 2x)$ dollars, where x is the number of \$1 price changes. Write the revenue as a polynomial in standard form, then evaluate it for $x = 3$.

Problem 17 Profit from Revenue and Cost (hard)

A club sells x bracelets. Revenue is $R(x) = -3x^2 + 90x$ dollars and cost is $C(x) = 12x + 250$ dollars. Write the profit polynomial $P(x) = R(x) - C(x)$ and find the profit for $x = 10$.



Revenue R is the arch; cost C is the line.

Problem 18 Cube of a Binomial (hard)

Expand $(x + 2)^3$ by writing it as $(x + 2)(x + 2)^2$ and multiplying.

Problem 19 Arithmetic with Special Products (hard)

Use a special product, not a calculator, to find 47×53 and 62^2 .

Problem 20 Find the Error (hard)

A student wrote $(x - 4)^2 = x^2 - 16$ and $(x + 3)(x - 3) = x^2 - 6x - 9$. Decide which statements are wrong, explain each error and give the correct expansions.