

Algebra - Algebraic Expressions

Name: _____

Date: _____

Concepts

- Adding Algebraic Expressions
 - Algebra - Algebraic Expressions
 - Dividing an Algebraic Expression by a Monomial
 - Factoring a Monomial
 - From Monomials to Polynomials
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 - Operations on Algebraic Expressions (theory)
 - Simplifying Algebraic Expressions
 - Subtracting algebraic expressions
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Adding Algebraic Expressions

1. A community centre in Trois-Rivières rents out two rooms. Renting the dance studio for h hours costs $18h + 40$ dollars, and renting the games room for h hours costs $25h + 15$ dollars.
- a) Write a simplified expression for the cost of renting both rooms for h hours.
 - b) Use your expression to find the cost of renting both rooms for 3 hours.

Algebra - Algebraic Expressions

2. At a bubble-tea shop a plain cup costs c dollars and each topping costs t dollars.
- a) Write an algebraic expression, in expanded form, for the cost of 3 cups that each have 2 toppings.
 - b) For the expression $7x^2 - 4x + 9$, state the number of terms, the coefficient of x , the constant term and the degree.

Dividing an Algebraic Expression by a Monomial

3. Simplify each quotient.

a) $\frac{24x^5}{6x^2}$

b) $\frac{15a^3b - 20a^2b^2}{5a^2b}$

c) A rectangular banner has an area of $36p^3q \text{ cm}^2$ and a width of $9pq \text{ cm}$. Find its length.

Factoring a Monomial

4. Answer each part.

a) Write $18x^3y$ as a product of two monomials, one of which is $6xy$.

b) A rectangle has an area of $30a^2b \text{ cm}^2$ and one side measuring $5ab \text{ cm}$. Find the other side.

c) Write $24m^4$ as a product of three monomial factors, none of which is 1.

From Monomials to Polynomials

5. For each expression below, give the number of terms, its name (monomial, binomial, trinomial, or polynomial), and its degree.

a) $7x$

b) $3a^2 - 5a$

c) 4

d) $2m^2n + m - 6$

e) $-9k^3 + k^2 - k + 1$

Multiplying Algebraic Expressions - Secondary 1 and 2

6. Expand and simplify.

a) $(4x^2)(-3xy)$

b) $5a(2a^2 - 3a + 7)$

c) A rectangular vegetable plot is $3n$ metres wide and $(2n+5)$ metres long. Write its area in expanded form.

Operations on Algebraic Expressions

7. For each statement, say whether it is true for every value of the variables. If it is true, name the property or rule that makes it work; if it is false, give a value that shows it fails and write the correct right-hand side.

a) $3x + 4y = 7xy$

b) $5a^2 \times 2a^3 = 10a^5$

c) $8m - 3m = 5m$

d) $\frac{6x + 9}{3} = 2x + 9$

e) $2(x + 5) = 2x + 10$

Simplifying Algebraic Expressions

8. Simplify each expression by collecting like terms.

a) $9x - 4 + 3x^2 - 7x + 11 - x^2$

b) $6a + 2(3a - 5) - 4$

c) $5mn + 3m - 2mn + m^2$

Subtracting algebraic expressions

9. Answer both parts.

- a) Simplify $(8x^2 + 5x - 3) - (2x^2 - 4x + 9)$.
- b) Plan A for a phone costs $35 + 8g$ dollars when g gigabytes of extra data are used; plan B costs $50 + 3g$ dollars. Write a simplified expression for how much more plan B costs than plan A, then evaluate it for $g = 2$.

Synthesis — drawing on several sheets in this topic

10. A rectangular community garden plot is $4x$ metres wide and $(3x + 7)$ metres long. In one corner stands a rectangular tool shed whose base has an area of $8x^2 \text{ m}^2$ and whose width is $4x$ metres.

- a) Write the area of the whole plot in expanded form.
- b) Find the length of the shed.
- c) Write a simplified expression for the area of the plot that the shed does *not* cover.
- d) Evaluate that area for $x = 5$.

Want the harder problems and the worked solutions?

The *Challenge Problems* set and the *Answer Keys* for Algebra - Algebraic Expressions — with the reasoning written out in full — are available at tutorinmontreal.ca.