

El Camino College
Mathematics 43
Arithmetic and Algebraic Expressions Gateway - Help Sheet

This sheet is to provide you with further information as you work toward achieving 90% proficiency on this gateway. As you look through the key ideas below, try to create a realistic picture of what you understand and what you don't — the first attempt at the gateway should help you with this. While preparing for the second attempt, if necessary, you should take full advantage of working with your peers, seeking help from other students, tutors in the Math Study Center, your SI coach and your instructor. The use of calculators will be prohibited for this gateway.

1. Multiply or divide rational numbers. Reduce your answer, if possible.

Example: $(-\frac{18}{21}) \div \frac{15}{28} = (-\frac{18}{21}) \times \frac{28}{15} = \left(-\frac{2 \times 3 \times 3}{3 \times 7}\right) \times \frac{2 \times 2 \times 7}{3 \times 5} = -\frac{2 \times 2 \times 2}{5} = -\frac{8}{5}$

Practice:

a) $(-\frac{25}{27}) \times (-\frac{18}{30})$

b) $\frac{14}{44} \div (-\frac{9}{22})$

2. Add or subtract rational numbers. Reduce your answer, if possible.

Example: $(-\frac{7}{12}) + \frac{2}{9} = (-\frac{7}{12}) \times \frac{3}{3} + \frac{2}{9} \times \frac{4}{4} = -\frac{21}{36} + \frac{8}{36} = -\frac{13}{36}$

Practice:

a) $(-\frac{7}{15}) + (-\frac{9}{20})$

b) $\frac{1}{6} - \frac{7}{9}$

3. Use order of operations to evaluate the mathematical expression.

Example: $5 + 3(9 - 2)^2 = 5 + 3(7)^2 = 5 + 3(49) = 5 + 147 = 152$

Practice:

a) $15 - 24 \div 4$

b) $4 + 2(3^2 - 2 \times 4)$

c) $\frac{12 + 3(9 - 7)}{2^3 - 2(3)}$

4. Evaluate algebraic expressions with counting number inputs.

Example: Evaluate $3x^2 - 2x + 1$ when $x = 4$

$$3(4)^2 - 2(4) + 1 = 3(16) - 2(4) + 1 = 48 - 8 + 1 = 40 + 1 = 41$$

Practice:

a) Evaluate $\frac{2y^2 - 6}{y - 7}$ when $y = 9$

b) Evaluate $2xy + y$ when $x = 2$ and $y = 3$

5. Translate an English phrase to a mathematic expression with two operations.

Example: Translate: The sum of three times a number and four. $3x + 4$

Practice:

a) Translate: Three less than twice a number.

b) Translate: Twice the difference of the square of a number and six.

6. Simplify an algebraic expression by combining linear terms and using the distributive property.

Example: Simplify: $3(2x - 5) + 6 - 4x = 6x - 15 + 6 - 4x = 2x - 9$

Practice:

a) Simplify: $5x - 9 - 2(4x + 3)$

b) Simplify: $8x - 2(x - 3) - 11$

7. Add or subtract polynomials.

Example: Simplify: $(4x^2 + 3x - 7) - (5x^2 + 3) + (6 - 9x) = -x^2 - 6x - 4$

Practice:

a) Simplify: $(3x - 4x^2) + (x^2 - 2) - (5x^2 + 9)$

b) Simplify: $(4x^2y + 3xy - 5xy^2) - (2xy + 7y^2x - 11yx^2)$

8. Multiply polynomials.

Example: Multiply: $(3x - 5)(2x + 3) = 6x^2 + 9x - 10x - 15 = 6x^2 - x - 15$

Practice:

Multiply: $(x^2 - 4x + 7)(x - 2)$

9. Simplify expressions containing powers.

Example: Simplify: $2x^2(4x^4)^3 = 128x^{14}$

Practice:

a) $\frac{1}{2}y(2x^3y)^5$

b) $\frac{(2x^3y)^5}{x^8y}$

10. Factor out the greatest common factor:

Example: Factor $6x^3 - 3x^2 + 3x = 3x(2x^2 - x + 1)$

Practice:

Factor: $6a^3 - 14a^2$