

Tasks 01-03 - Core Algebra & Exponents

Building Your Algebraic Foundation

Problem 1: Order of Operations

Evaluate the following expressions. Show each step clearly.

- a) $5 + 3^2 \times 4 - 18 \div 3$
- b) $2 \times [6 + 3 \times (4^2 - 14)]$
- c) $\frac{3^3 - 2 \times 4}{5 - 2}$
- d) $(2 + 3)^3 - 5 \times (12 - 2 \times 4)$
- e) $\frac{4^2 + 2 \times 3}{2} - 3 \times (5 - 3)^2$

Problem 2: Exponent Laws

Simplify the following expressions completely. Express answers with positive exponents only.

- a) $(x^3)^2 \cdot x^{-4} \cdot x$
- b) $\frac{(2a^3b^2)^3}{8a^5b^4}$
- c) $\left(\frac{3x^2y}{z^2}\right)^2 \cdot \frac{z^3}{9xy^2}$
- d) $(5^3)^2 \cdot 5^{-4} \div 5^2$
- e) $\frac{(m^2n^3)^2 \cdot m^{-3}n}{m^{-1}n^4}$
- f) $\left(\frac{2x^{-2}y^3}{z^{-1}}\right)^{-2}$

Problem 3: Scientific Notation

Part A: Conversions

Convert to scientific notation:

- a) 456,000,000
- b) 0.00000789
- c) 23.45×10^5

Convert to standard form:

- d) 3.67×10^8
- e) $9.2 \times 10^{\{-5\}}$

Part B: Calculations

Perform the following calculations and express answers in scientific notation:

f) $(2.5 \times 10^6) \times (3.2 \times 10^{-3})$

g) $\frac{9.6 \times 10^8}{3.2 \times 10^5}$

h) $(4.0 \times 10^4)^2$

i) $(3.6 \times 10^9) + (2.4 \times 10^8)$

Problem 4: Absolute Value

Solve the following equations and inequalities. Express solutions using set notation or interval notation as appropriate.

a) $|3x - 6| = 9$

b) $|x - 4| < 3$

c) $|2x + 8| \geq 6$

d) $3|x - 2| - 4 = 5$

Problem 5: Basic Factorization

Factor the following expressions completely:

a) $15x^3 - 10x^2 + 5x$

b) $x^2 - 144$

c) $49x^2 - 64y^2$

d) $x^2 + 16x + 64$

e) $9x^2 - 12x + 4$

f) $8x^3 - 32x$

g) $3x^2 - 75$

h) $x^2 - 18x + 81$

Problem 6: Mixed Practice

Solve or simplify as indicated:

a) Simplify: $\frac{(3x^2)^3 \cdot x^{-4}}{27x^2}$

b) Factor: $25x^2 - 100$

c) Express 0.0000567 in scientific notation

d) Evaluate: $\frac{2^3 + 3 \times 2^2}{14 - 2 \times 3}$

e) Simplify: $(a^{-2}b^3)^{-2} \cdot (ab^{-1})^3$