

1. Simplify to lowest terms using only positive exponents.

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

(g) $\frac{4x^2(yz)^2}{2(x^2y)^3z}$

(k) $(-2xy^2z^3)^3$

(b) $\left(\frac{1}{2}xy^3\right)^2(-8x^3y)$

(h) $\frac{(2x^2yz^4)^3}{(4x^2y^3z^3)^2}$

(l) $3(2a^2bc^3)^2bc^2$

(c) $\frac{2xy^3z^2}{4x^2yz}$

(i) $\left(\frac{24[x(yz)^2]^2}{60x^2(y^2z)^2}\right)^3$

(m) $(3x^{2n})^2$

(d) $\frac{1}{3x^{-2}}$

(j) $\left[(2x^2)^2\right]^3$

(n) $(2x^ay^{b+3}c^2)^2$

(e) $\frac{x^{-2}}{x^{-5}}$

(o) $\left(2a\left[b(cd^3)^{-1}\right]^3\right)^{-2}$

(f) $\frac{3x}{\left(\frac{2}{x^{-3}}\right)^{-2}}$

(p) $\left[2(3ab^2)^2c\right]^2$

(q) $(x^{-2}y^3z^{-3})^{-2}(x^{-1}yz^{-2})^3$

2. Represent each value using scientific notation.

(a) 0.0003

(c) -0.00215

(e) -63

(b) 2,598,960

(d) 27,000,000

(f) 0.000000078

3. Represent each value using decimal notation.

(a) 2.7×10^6

(b) -7.4×10^{-2}

(c) 3×10^4

(d) 3.45×10^{-5}

4. Simplify each expression to lowest terms and represent the value using decimal notation.

(a) $\frac{27,000,000}{3,000,000,000}$

(d) $\frac{6.4 \times 10^{-3}}{8 \times 10^2}$

(g) $\frac{1.25 \times 10^{-6}}{2.5 \times 10^{-2}}$

(b) $(3 \times 10^4)(2 \times 10^{-2})$

(e) $(4 \times 10^3)(3 \times 10^{-5})$

(h) $\frac{0.000216}{0.000006}$

(c) $\frac{2.7 \times 10^6}{3 \times 10^4}$

(f) $\frac{8.1 \times 10^4}{2.7 \times 10^{-4}}$

(i) $(4 \times 10^2)(1.25 \times 10^{-1})$

5. State the degree of each monomial.

(a) x

(f) 7

(k) $\frac{3}{7}$

(b) $2x^3$

(g) $\frac{2}{5}x$

(l) π

(c) $-4xy$

(h) $3x^my^n$

(m) $-9x^3y^2zw^5$

(d) $\frac{2}{3}x^2yz^3$

(i) $6xyz$

(n) xyzwv

(e) $7x^3y^2z^4$

(j) $4x^5y^3z^4$

(o) $\frac{x^2yz^3w}{3}$

6. State the degree, the leading coefficient, and the constant term for each polynomial.

(a) $2x^5 - 9x^4 + 11x^3 + 2x + 4$

(d) $\frac{2}{3} - 10x$

(g) π

(b) $4x^2 - 9x^6 + 14x - 22 + 7x^8$

(h) $9y - 10y^2 + 25y^3$

(c) $-5x^7 + 4x^2 + 3x - 2$

(e) $-2x^3 + 3x^2 - 3x + 4$

(i) $p + 5p^2 + 6p^3$

(f) $9 - 2x^2 - 3x^4 + 7x^5$

(j) $14a^2 + 15a - 9$

7. Identify the polynomials, if any. Explain why the other expressions are not polynomials.

(a) $x^3 - \sqrt{3x} + 9$

(d) $\frac{2x^2 + 3x - 4}{4x^2 + 6x - 8}$

(b) $\frac{4}{x}$

(e) $3^{2x^2 + 8x - 11}$

(c) $x^2 + 5x - 2 + 3x^{-1} + 2x^4$

(f) $\sqrt{3x^4 - 7x^2 + 4}$

8. Identify the polynomial functions, if any. For the polynomial functions, state the leading coefficient, the degree, and the constant term. Classify the remaining functions.

(a) $f(x) = -5x^7 + 4x^2 + 3x - 2$

(e) $k(x) = \frac{4}{x}$

(i) $p(x) = 3^{2x^2 + 8x - 11}$

(b) $g(x) = \frac{2}{3} - 10x$

(f) $l(x) = x^2 + 5x - 2 + 3x^{-1} + 2x^4$

(j) $q(y) = 9y - 10y^2 + 25y^3$

(c) $h(x) = x^3 - \sqrt{3x} + 9$

(g) $m(x) = \frac{2x^2 + 3x - 4}{4x^2 - 6x - 8}$

(k) $r(p) = p + 5p^2 + 6p^3$

(d) $j(x) = -2x^3 + 3x^2 - 3x + 4$

(h) $n(x) = 9 - 2x^2 - 3x^4 + 7x^5$

(l) $s(a) = 14a^2 + 15a - 9$

9. Determine the indicated function value.

(a) $f(x) = -\frac{1}{2}x^3 + \frac{1}{4}x^2 + 3x - 2$, $f(2)$

(e) $g(x) = \frac{2}{3} - 10x$, $g(9)$

(b) $j(x) = -2x^3 + 3x^2 - 3x + 4$, $j(1)$

(f) $m(x) = 2x^2 + 3x - 4$, $m(2)$

(c) $s(a) = 14a^2 + 15a - 9$, $s(0)$

(g) $n(x) = 4x^2 + 6x - 7$, $n(-1)$

(d) $q(y) = 9y - 10y^2 + 25y^3$, $q(0)$

(h) $p(x) = \pi$, $p(19)$

10. Perform the indicated operation and simplify to lowest terms.

(a) $(5x^3 - 7x^2 + 3) - (x^3 + 2x^2 - x + 8)$

(f) $3(2z + x) - 5(2x + 3y - 7z)$

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

(g) $5(7x + 2y) - 4(7x - 2y)$

(c) $4x^2 - 7 - 4(3x^3 + 2x^2 - 5x + 1)$

(h) $2(2x^3 + 7x^2 - 4) - 3(7 + 8x - x^3)$

(d) $-2(2z + y) + 3(3z - 4y)$

(i) $3(9xy - z) - (3xy + 7zy) - 8(2xy - z)$

(e) $2(8x^2 - 8x + 2) - 2(3x^3 - 7x^2 - x + 8)$

(j) $4(3x^2 + y^2 - 2z^2) - 9(7x^2 - 2y^2)$

(k) $(5xy + 4) + (4 - 5xy)$

11. Perform the indicated operation and simplify to lowest terms.

(a) $(x - 2)(x + 3)$

(e) $(2x + 3)(x + 3)$

(i) $(x - 3)^2$

(b) $(x + 2)(x - 3)$

(f) $(2x + 3)(x - 3)$

(j) $(2x + 3)^2$

(c) $(x - 4)(x - 7)$

(g) $(2x - 1)(2x + 1)$

(k) $(2x - 3)^2$

(d) $(x + 4)(x + 7)$

(h) $(x + 3)^2$

(l) $(2x - 7)(3x + 4)$