

Polynomial Expressions and Equations

Date: _____

Copy the following questions into your notebooks, then expand and simplify.

1. a) $(a^4 - a^2b^2 + b^4)(a^4 + a^2b^2 + b^4)$ b) $(a^3 - 3a^2b + 4ab^2 - b^3)(a - 2b)$
 c) $(m^2 - 8m + 6)(6m^4 - 2m^3 + 5m^2 - 3m + 1)$ d) $(x - 3)(x + 1)(x + 5)$
 e) $(x + 3)(x - 4)(x - 5)$ f) $(2x - 7)(3x - 1)(x - 4)$
 g) $(x + 3)(x + 3)(x + 3)(x + 3)$ h) $(4p^3 - 3p^2 + 8p - 4)(p^2 - 3p + 1)$
 i) $(x^2 + y^2 + z^2 - xy - yz - xz)(x + y + z)$ j) $(3x^2 - 3x + 4)(2x^3 + 2x^2 - x - 1)$

2. a) $(2x - 3)^3$ b) $(x^2 + 2x + 3)^2$
 c) $2(x - 3)^2(x + 1) - 5(x + 2)(x + 3)(x + 1)$ d) $4x(x - 1)(x + 3) - (x + 1)^2$
 e) $(x + 1)^2 - (x - 1)^2$ f) $(x + 1)(2x^3 + 3x + 4) - (x^2 - 1)(x^2 + x - 2)$
 g) $2(k + 1)(k - 1) - 3(k + 4)(k - 4)$ h) $(a - b)(a^2 + ab + b^2) + (a^2 - ab + b^2)(a + b)$

3. a) $2(3x - 4)(2x - 5) - 3(x + 3)(5x + 2) - (4x - 7)(2x + 5)$
 b) $3(2a + b)(5a - 2b) - 6(3a - 4b)^2 - (5a + 3b)(5a - 3b)$
 c) $(2m + 3)(3m^2 + 4m - 5) - (m - 2)(2m^2 + 3m - 8)$
 d) $(2x + 4y)(x - 2y + 1) - (3x - y)(5x + 3y - 4)$
 e) $(3a - 2b)(2a + 7b)^2 - (4a + 3b)^2(2a - 5b)$
 f) $3(4x - 2)(2x^2 + x + 6) - (2x - 3)(3x - 2)^2$

Copy the following questions into your notebooks, then solve.

4. a) $\frac{4m - 3}{3} = \frac{3 + m}{2}$ b) $3 - \frac{1 - 2a}{4} \geq \frac{a - 2}{8}$
 c) $2 - \frac{b + 2}{10} \leq \frac{b - 1}{5}$ d) $\frac{a + 3}{6} - \frac{a + 3}{4} = \frac{a - 1}{9}$
 e) $(x - 1)(x - 2) = (x + 3)(x + 2)$ f) $4(4y - 9) + 4 > 8(y - 1) + 17(y - 3)$
 g) $(2b - 3)(b - 2) - 2(b + 1)(b + 4) > 6 - 7b$ h) $5x - (3x - 7) + 2x - (2x - 3) \geq 14$
 i) $(x + 1)^2 + (x + 1)(x - 1) - (x + 1)(x + 2) = \left(x - \frac{1}{2}\right)\left(x + \frac{1}{2}\right)$
 j) $(y + 1)(y + 2) + (y - 1)(y - 3) > (2y - 1)(y + 1)$

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Answers:

1. a) $a^8 + a^4b^4 + b^8$ b) $a^4 - 5a^3b + 10a^2b^2 - 9ab^3 + 2b^4$
 c) $6m^6 - 50m^5 + 57m^4 - 55m^3 + 55m^2 - 26m + 6$ d) $x^3 + 3x^2 - 13x - 15$
 e) $x^3 - 6x^2 - 7x + 60$ f) $6x^3 - 47x^2 + 99x - 28$ g) $x^4 + 12x^3 + 54x^2 + 108x + 81$
 h) $4p^5 - 15p^4 + 21p^3 - 31p^2 + 20p - 4$ i) $x^3 - 3xyz + y^3 + z^3$ j) $6x^5 - x^3 + 8x^2 - x - 4$
2. a) $8x^3 - 36x^2 + 54x - 27$ b) $x^4 + 4x^3 + 10x^2 + 12x + 9$ c) $-3x^3 - 40x^2 - 49x - 12$
 d) $4x^3 + 7x^2 - 14x - 1$ e) $4x$ f) $x^4 + x^3 + 6x^2 + 8x + 2$
 g) $-k^2 + 46$ h) $2a^3$
3. a) $-11x^2 - 103x + 57$ b) $-49a^2 + 147ab - 93b^2$
 c) $4m^3 + 18m^2 + 16m - 31$ d) $-13x^2 - 4xy - 5y^2 + 14x$
 e) $-20a^3 + 108a^2b + 193ab^2 - 53b^3$ f) $6x^3 + 51x^2 + 22x - 24$
4. a) $m = 3$ b) $a \geq -8$ c) $b \geq \frac{20}{3}$ d) $a = -\frac{5}{7}$ e) $x = -\frac{1}{2}$
 f) $y < 3$ g) $b < -\frac{4}{5}$ h) $x \geq 2$ i) $x = -\frac{7}{4}$ j) $y < 3$