

# POLYNOMIALS

## 1. Group like terms.

a) $5k, 5h, 7k, -3c, 2h$	b) $-5ab, 2c, -7c, 14ab, -4ab$
c) $-x^2, -2x, -x^3, 2x^2, -x$	d) $xy^2, 3x^2y, x^2y, -2xy^2, 4x^2y$
e) $4k, k^4, -4k, k^3, -2k^4, 3k$	

## 2. Simplify

a) $4c + c =$	b) $7e - 4e =$	c) $k - 2k =$
d) $3a - 5a =$	e) $4p - p =$	f) $q - 5q =$
g) $-3r - 2r =$	h) $-5q + 7q =$	i) $4c - 4c =$
j) $-3b + 2b =$	k) $4k - 2k - 3k + 6k =$	l) $-7c + 4c - c + 3c =$
m) $2a + 3a - n - 2n =$	n) $4a - 5a + 3q - 2q =$	o) $4x - 3y + x - 2y =$
p) $3k - 2y + y - 2k =$		

## 3. Find the value of each of the following if $k = -2$ , $p = 2$ , $c = -3$ .

a) $4k - 2k - k =$	b) $4c - c - 6 =$
c) $-2p - 5p + 4p =$	d) $2k - 3p - k + p =$
e) $4p^2 - p^2 - 3p^2 + c =$	f) $4p + 6p - 5k^2 =$
g) $-p - 4p - 5p - 7p + 14p =$	h) $975k^3 - p^2 - 975k^3 =$

## 4. Simplify.

a) $3(x + y) =$	b) $3(2k - 3h) =$
c) $-2(k - 3t) =$	d) $5(m - 2n) =$
e) $-4(2t - 3h) =$	f) $5(r - 4t) =$
g) $3k - (2k + 5) =$	h) $q - (7 - 2q) =$

<b>i)</b> $2t - (3t + 4) =$	<b>j)</b> $-k - (-5k + 3) =$
<b>k)</b> $a - 2b - (2a + b) =$	<b>l)</b> $3a - 2b - (-b - 2a) =$
<b>m)</b> $4c - 3d - (2c - 2d) =$	<b>n)</b> $5m - 2n - (-5m - 2n) =$
<b>o)</b> $3x - y - (y - 2x) + x =$	<b>p)</b> $4x - 3y - (2x - y) - 3x + y =$
<b>q)</b> $(2x - 3y) - (x + 5y) - 3x - y =$	<b>r)</b> $(3x + y) - (3x - y) - 4x + 5y =$
<b>s)</b> $(3t - 2v) - (-3t - v) - t + v =$	<b>t)</b> $4c - 2d - (-3c + d) - (c + d) =$
<b>u)</b> $(4a - 5b) - (-5b - 3a) - a + b =$	<b>v)</b> $4a - 2b - 3c - (5a - 2b - 3c) =$

**5. Simplify.**

<b>a)</b> $3(x + y) + 5(x + y) =$	<b>b)</b> $7(3x + 2y) - 2(x + 5y) =$
<b>c)</b> $-2(3x + 3y) + 5(2x + 5y) =$	<b>d)</b> $5(8x - 2y) - 5(2x + 3y) =$
<b>e)</b> $-(6x - 4y) - (3x - 5y) =$	<b>f)</b> $4(-5x + 6y) + 3(2x + 10y) =$
<b>g)</b> $6(-2x - y) - 4(x + y) =$	<b>h)</b> $8(4x - 5y) + 6(2x - y) =$
<b>i)</b> $9(-3x + 5y) - 7(x + 6y) =$	<b>j)</b> $10(2x - 2y) - 8(2x + 2y) =$
<b>k)</b> $-2(7x - 6y) + 3(2x + 5y) =$	<b>l)</b> $3(2x + y) - 2(x + y) + 3x =$
<b>m)</b> $4(x - 3y) + 2(3x - y) + y =$	<b>n)</b> $-3(3x + 2y) - 2(x + y) + x =$
<b>o)</b> $(3x + 2y) - (2x - 2y) + y =$	

**6. Multiply.**

<b>a)</b> $(3a)(2b) =$	<b>b)</b> $(2c)(-3c) =$	<b>c)</b> $(4m)(2m) =$
<b>d)</b> $(-3n)(-2n) =$	<b>e)</b> $(-2f)(-5f) =$	<b>f)</b> $(5p)(-3p) =$
<b>g)</b> $(4e)(-3e) =$	<b>h)</b> $(5k^2)(2k) =$	<b>i)</b> $(3a)(-2a^2) =$
<b>j)</b> $(-2c^2)(-2c^2) =$	<b>k)</b> $(-m^2)(-m^3) =$	<b>l)</b> $(-3k^3)(-2k) =$
<b>m)</b> $(4q)(4q) =$	<b>n)</b> $(5ab)(a) =$	<b>o)</b> $(3hk)(-2k) =$
<b>p)</b> $(4mn)(2mn) =$	<b>q)</b> $(5x^2)(2xy) =$	<b>r)</b> $(-5a^2)(-3b^2) =$

s) $-2(3a^2b) =$	t) $2c(-3c^2) =$	u) $(2m)(3m)(4m) =$
v) $(-3a)(2ac)(-5c) =$	w) $(3m)(-2m^2)(m^3) =$	x) $(-3a^2b)(-2ab^2)(ab) =$
y) $(5a^3)(-3a)(2a^3) =$	z) $(4a^2)(2ab)(-3b^2) =$	

**7. Simplify.**

a) $3(2x^2 + 5y + 4) =$	b) $-7(2x^3 - x^2 + 5x) =$
c) $-(2x - 3x^2 - x^3) =$	d) $2x(x^2 + 5x - 1) =$
e) $-5x(x^2 - 10x + 3) =$	f) $3x^2(x^2 + 3x + 2) =$
g) $2x^2(x^2 - 2xy + y^2) =$	h) $5x^3(3x^2 + 7x - 2) =$
i) $\frac{1}{3}x(3x^2 + 6xy - 12y^2) =$	j) $(8y^3 - 3y^2x + x^2)2x =$
k) $-2xy(3x^2y^2 - 7xy^3) =$	l) $\frac{1}{2}y(4x^2 - 8xy - 2y^2) =$
m) $(5x^2y - 2xy^2 + 4y^3)3xy =$	n) $-2x^3(5x^2 + 4x - 2) =$
o) $7x^2(8x^3 - 4x + 3) =$	

**8. Write the missing factors in the brackets.**

a) $8ab = (4a)(\quad)$	b) $3dk = (\quad)(k)$
c) $9mn = (3m)(\quad)$	d) $12k^3 = (6k)(\quad)$
e) $-4pq = (\quad)(-2pq)$	f) $10d^2 = (-2d)(\quad)$

**9. Divide.**

a) $\frac{-8ab}{2a} =$	b) $\frac{16hk}{-4k} =$	c) $\frac{12m^2}{-6m} =$	d) $\frac{-10xy^2}{-5x} =$
e) $\frac{-18nt^2}{9nt} =$	f) $\frac{-12h^2t^2}{-4ht} =$	g) $\frac{a^5b^2}{a^3b} =$	h) $\frac{k^4d^4}{kd^3} =$

<b>i)</b> $\frac{x^4 y^5}{x^3 y} =$	<b>j)</b> $\frac{18a^4 b^3}{-9a^2 b} =$	<b>k)</b> $\frac{-24y^3 z^4}{-8yz} =$	<b>l)</b> $\frac{8a^4 b^2}{-4a^3 b^2} =$
<b>m)</b> $\frac{n^4 m^3}{n^4 m^3} =$	<b>n)</b> $\frac{-16a^3 b^4}{-2ab^4} =$	<b>o)</b> $\frac{-18a^3 b}{-3a^2} =$	<b>p)</b> $\frac{20a^4 b^3}{-4a^3 b} =$

**10. Find each quotient.**

<b>a)</b> $m^6 \div m^3 =$	<b>b)</b> $n^5 \div n^3 =$	<b>c)</b> $k^4 \div k =$
<b>d)</b> $a^7 \div a^3 =$	<b>e)</b> $x^5 \div x^4 =$	<b>f)</b> $c^7 \div c^2 =$
<b>g)</b> $f^8 \div f^4 =$	<b>h)</b> $p^6 \div p^2 =$	<b>i)</b> $14a^3 \div 7a =$
<b>j)</b> $16k^5 \div (-4k^3) =$	<b>k)</b> $18c^6 \div 9c^3 =$	<b>l)</b> $-12t^5 \div (-4t^2) =$
<b>m)</b> $9c^3 \div (-3c) =$	<b>n)</b> $21q^4 \div 7q^2 =$	<b>o)</b> $4a^3 \div (-2a^2) =$

**11. Find each quotient.**

<b>a)</b> $\frac{(8a^2)(-4b^2)}{-16ab} =$	<b>b)</b> $\frac{(2k^3)(-4h^2)}{4hk^3} =$	<b>c)</b> $\frac{(6m^2n)(-2mn^2)}{-12m^2n^2} =$
<b>d)</b> $\frac{(-2ax^3)(4a^3x)}{-4a^2x^2} =$	<b>e)</b> $\frac{(-3m)(-2n)(-4mn)}{-6mn} =$	

**12. Simplify.**

<b>a)</b> $\frac{3x+6}{3} =$	<b>b)</b> $\frac{18x-12}{6} =$	<b>c)</b> $\frac{30x-15}{5} =$
<b>d)</b> $\frac{6x+18}{6} =$	<b>e)</b> $\frac{33xy-22x}{11x} =$	<b>f)</b> $\frac{27x-18y+9z}{9} =$
<b>g)</b> $\frac{4x^3-10x^2+6x}{2x} =$	<b>h)</b> $\frac{x^3+4x^2+x}{x} =$	<b>i)</b> $\frac{10xy-15x^2}{5x} =$
<b>j)</b> $\frac{6x-12x^2-18x^3}{6x} =$	<b>k)</b> $\frac{9y(x^2y-2y+3)}{9y} =$	