
Factorising Exercises

Question 1

Factorise each of the following expressions.

(a) $15x + 25$

(e) $9x^2y^2 + 3xy$

(b) $3x^2 - 9x$

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

(c) $4xy + 40x^2$

(g) $2x + 3y$

(d) $7x^2yz - 8y$

(h) $16x^2y^2 - 8x^2y + 9y$

Question 2 (Simple Factorisation into double brackets)

Factorise each of the following expressions.

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

(h) $x^2 + 3x - 10$

(b) $x^2 + 5x + 6$

(i) $x^2 + 4x - 5$

(c) $x^2 + 10x + 21$

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

(d) $x^2 + 8x + 16$

(k) $x^2 - 7x + 10$

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

(l) $x^2 - 5x - 6$

(f) $x^2 + 9x + 20$

(m) $x^2 - 4x + 4$

(g) $x^2 + 13x + 30$

(n) $x^2 - 11x + 24$

Question 3 (More Factorisation into double brackets)

Factorise each of the following expressions by first factoring out the highest common factor.

(a) $3x^2 + 9x + 6$

(e) $2x^2 + 16x + 14$

(b) $4x^2 + 20x + 24$

(f) $3x^2 + 18x + 15$

(c) $5x^2 + 35x + 50$

(g) $5x^2 + 65x + 150$

(d) $7x^2 + 56x + 112$

(h) $11x^2 + 33x - 110$

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

(l) $3x^4 + 18x^3 + 15x^2$

(j) $x^3 + 5x^2 + 6x$

(m) $x^7 - 4x^6 + 4x^5$

(k) $2x^3 + 14x^2 + 24x$

(n) $4x^{10} + 20x^9 + 24x^8$

Question 4 (The Difference of Two Squares)

Use the *difference of two squares* identity to factorise each of the following;

(a) $x^2 - 4$

(e) $x^2 - 100$

(i) $49 - x^2$

(b) $x^2 - 9$

(f) $4x^2 - 9$

(j) $9 - x^2$

(c) $x^2 - 25$

(g) $64x^2 - 16$

(k) $4 - 25x^2$

(d) $x^2 - 1$

(h) $81x^2 - 36$

(l) $-16 + 49x^2$

Question 5 (More Differences of Two Squares)

Factorise each of the following by first taking out the highest common factor and then using the *difference of two squares* identity.

(a) $3x^2 - 27$

(e) $3x^2 - 300$

(i) $50 - 2x^2$

(b) $2x^2 - 18$

(f) $13x^2 - 52$

(j) $72 - 2x^2$

(c) $7x^2 - 28$

(g) $128x^2 - 32$

(k) $40 - 250x^2$

(d) $2x^2 - 2$

(h) $81x^2 - 36$

(l) $-48 + 147x^2$

Polynomials Questions

Question 6 (Warming Up)

Write each of the following polynomials in order of decreasing power.

(a) $x + x^2 + x^5 + x^3$

(d) $6x - 4 + 6x^2$

(g) $5 - 10x$

(b) $2x^4 + x^5 + 3x^2$

(e) $5 - 6x + 7x^5 - 6x^2$

(h) $14x - 7x^5 + x^2 - 13x^{10}$

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

(f) $-17 - x^2 - 9x^7$

(i) $4x^2 + 5x - 17x - 7x^5$

Question 7 (Coefficients)

For each of the following polynomials (which are the same as above), state the coefficient of x^2 .

(a) $x + x^2 + x^5 + x^3$

(d) $6x - 4 + 6x^2$

(g) $5 - 10x$

(b) $2x^4 + x^5 + 3x^2$

(e) $5 - 6x + 7x^5 - 6x^2$

(h) $14x - 7x^5 + x^2 - 13x^{10}$

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

(f) $-17 - x^2 - 9x^7$

(i) $4x^2 + 5x - 17x - 7x^5$

Question 8 (Adding and Subtracting Polynomials)

Simplify each of the following, so that your answer is a polynomial written in order of decreasing powers.

(a) $(4x^3 + 6x^2 + 2x + 4) + (3x^3 + 2x^2 + 5x + 7)$

(b) $(5x^2 + 4x + 2) + (6x^2 - 3x - 1)$

(c) $(3x^2 + 4x - 8) + (2x^2 - 5x - 12)$

(d) $(6x^3 + 2x^2 - 9) + (4x^2 + 2x)$

(e) $(4x^2 + 12x + 4) - (2x^2 + 3x + 2)$

(f) $(6x^3 + 5x + 3) - (3x^2 - 2x + 2)$

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

(h) $(4x + 5x^3) - (-10x^3 - 9x - 1)$

(i) $2(x^2 + 5x + 3) + 3(2x^2 + 2x + 5)$

(j) $6(x^2 + x + 7) + 3(3x^2 + 3x + 3)$

(k) $7(4x^3 + 2x^2 + 7x + 5) + 3(x^3 + x + 8x^2 + 3)$

(l) $4(3x^2 + 3x + 4) - 5(x^2 + 2x + 2)$

(m) $3(x^2 - 2x + 4) - 6(x^2 + 7x - 5)$

(n) $-5(-x^3 - 10x^2 + 4x - 1) - 7(x^3 - 5x^2 - x - 12)$

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

Question 9 (Multiplying Polynomials)

Expand each of the following, so that your answer is a polynomial written in order of decreasing powers.

(a) $(2x + 4)(5x + 7)$

(h) $(4x + 5x^3)(-10x^3 - 9x)$

(b) $(4x + 2)(3x - 1)$

(i) $(5x + 3)(2x^2 + 2x + 5)$

(c) $(4x - 8)(5x - 12)$

(j) $(x + 7)(3x^2 + 3x + 3)$

(d) $(2x^2 + 1)(x^2 + 3)$

(k) $(7x + 5)(x^3 + x + 8x^2 + 3)$

(e) $(4x^2 + 12x)(2x^2 + 2)$

(l) $(3x^2 + 3x + 4)(x^2 + 2x + 2)$

(f) $(5x + 3)(3x^2 - 2x)$

(m) $(x^2 - 2x + 4)(x^2 + 7x - 5)$

(g) $(5x - 7x^4)(3x^2 - 5x^4)$

(n) $(-x^3 - 10x^2 + 4x - 1)(x^3 - 5x^2 - x - 12)$