

Exercises: Algebra

Exercises

1. In each of the following expressions, multiply out the brackets and simplify:
 - (a) $5(2 + x)$
 - (b) $x(a + b)$
 - (c) $\frac{3}{4}(a - 4b)$
 - (d) $a(a - 2) + a(a + 2)$
 - (e) $2x(y - x + 3) + 3xy$
2. Expand each of the following expressions:
 - (a) $(3x + 2y)(4x + 5y)$
 - (b) $(x - y)(2x + 3y)$
 - (c) $(2x - 3y)(x - 4y)$
 - (d) $(-3p + q)(2p - q)$
 - (e) $(a + b)(a - b)$
3. Factorise the following quadratic expressions:
 - (a) $x^2 - 5x + 4$
 - (b) $x^2 + 4x - 12$
 - (c) $x^2 - 4x - 12$
 - (d) $x^2 + 13x + 30$
 - (e) $x^2 + x - 12$
 - (f) $3x^2 + 11x - 4$
 - (g) $4x^2 - 9$
 - (h) $x^2 - x + 2$
4. Find the value of x which satisfies the following equations:
 - (a) $2x = 10$
 - (b) $2x - 5 = 15$
 - (c) $2(x - 5) = 15$
 - (d) $2(x - 5)^2 = 50$
 - (e) $8 - 2x = x + 7$
 - (f) $2^x = 32$

Solutions

1. In each of the following expressions, multiply out the brackets and simplify:

(a) $5(2 + x) = 10 + 5x$

(b) $x(a + b) = ax + bx$

(c) $\frac{3}{4}(a - 4b) = \frac{3}{4}a - 3b$

(d) $a(a - 2) + a(a + 2) = 2a^2$

(e) $2x(y - x + 3) + 3xy = 5xy - 2x^2 + 6x$

2. Expand each of the following expressions:

(a) $(3x + 2y)(4x + 5y) = 12x^2 + 23xy + 10y^2$

(b) $(x - y)(2x + 3y) = 2x^2 + xy - 3y^2$

(c) $(2x - 3y)(x - 4y) = 2x^2 - 11xy + 12y^2$

(d) $(-3p + q)(2p - q) = -6p^2 + 5pq - q^2$

(e) $(a + b)(a - b) = a^2 - b^2$

3. Factorise the following quadratic expressions:

(a) $x^2 - 5x + 4 = (x - 1)(x - 4)$

(b) $x^2 + 4x - 12 = (x + 6)(x - 2)$

(c) $x^2 - 4x - 12 = (x - 6)(x + 2)$

(d) $x^2 + 13x + 30 = (x + 3)(x + 10)$

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

(f) $3x^2 + 11x - 4 = (3x - 1)(x + 4)$

(g) $4x^2 - 9 = (2x + 3)(2x - 3)$

(h) $x^2 - x + 2 = (x - 2)(x + 1)$

4. Find the value of x which satisfies the following equations:

(a) $2x = 10$: $x = 5$

(b) $2x - 5 = 15$: $x = 10$

(c) $2(x - 5) = 15$: $x = 12.5$

(d) $2(x - 5)^2 = 50$: $x = 10$ and $x = 0$

(e) $8 - 2x = x + 7$: $x = \frac{1}{3}$

(f) $2^x = 32$: $x = 5$