Exercises: Algebra

Exercises

1. In each of the following expresssions, 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 expresssions, 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) $2^x = 32$: $x = 5$