

Chapter 5

ALGEBRAIC EXPANSION AND SIMPLIFICATION

EXERCISE 5A

$$\begin{aligned} 1 \quad a \quad & 2(x+1) \\ & = 2 \times x + 2 \times 1 \\ & = 2x + 2 \end{aligned}$$

$$\begin{aligned} b \quad & 5(x+2) \\ & = 5 \times x + 5 \times 2 \\ & = 5x + 10 \end{aligned}$$

$$\begin{aligned} c \quad & 4(x-6) \\ & = 4(x+(-6)) \\ & = 4 \times x + 4 \times (-6) \\ & = 4x - 24 \end{aligned}$$

$$\begin{aligned} d \quad & 7(x-1) \\ & = 7(x+(-1)) \\ & = 7 \times x + 7 \times (-1) \\ & = 7x - 7 \end{aligned}$$

$$\begin{aligned} e \quad & 3(2a+b) \\ & = 3 \times 2a + 3 \times b \\ & = 6a + 3b \end{aligned}$$

$$\begin{aligned} f \quad & 6(x+3y) \\ & = 6 \times x + 6 \times 3y \\ & = 6x + 18y \end{aligned}$$

$$\begin{aligned} g \quad & 8(a-b) \\ & = 8(a+(-b)) \\ & = 8 \times a + 8 \times (-b) \\ & = 8a - 8b \end{aligned}$$

$$\begin{aligned} h \quad & 4(m^2 - n^2) \\ & = 4(m^2 + (-n^2)) \\ & = 4 \times m^2 + 4 \times (-n^2) \\ & = 4m^2 - 4n^2 \end{aligned}$$

$$\begin{aligned} i \quad & -3(x+2) \\ & = -3 \times x + -3 \times 2 \\ & = -3x - 6 \end{aligned}$$

$$\begin{aligned} j \quad & -4(2a-1) \\ & = -4(2a+(-1)) \\ & = -4 \times 2a + -4 \times (-1) \\ & = -8a + 4 \end{aligned}$$

$$\begin{aligned} k \quad & a(-a+5) \\ & = a \times (-a) + a \times 5 \\ & = -a^2 + 5a \end{aligned}$$

$$\begin{aligned} l \quad & 3b(b-4) \\ & = 3b(b+(-4)) \\ & = 3b \times b + 3b \times (-4) \\ & = 3b^2 - 12b \end{aligned}$$

$$\begin{aligned} m \quad & -(y+2) \\ & = -1(y+2) \\ & = -1 \times y + -1 \times 2 \\ & = -y - 2 \end{aligned}$$

$$\begin{aligned} n \quad & -5(x-3) \\ & = -5(x+(-3)) \\ & = -5 \times x + -5 \times (-3) \\ & = -5x + 15 \end{aligned}$$

$$\begin{aligned} o \quad & -(2-b) \\ & = -1(2+(-b)) \\ & = -1 \times 2 + -1 \times (-b) \\ & = -2 + b \end{aligned}$$

$$\begin{aligned} p \quad & -4(a-b) \\ & = -4(a+(-b)) \\ & = -4 \times a + -4 \times (-b) \\ & = -4a + 4b \end{aligned}$$

$$\begin{aligned} q \quad & x(x+y) \\ & = x \times x + x \times y \\ & = x^2 + xy \end{aligned}$$

$$\begin{aligned} r \quad & -x(-x-y) \\ & = -x(-x+(-y)) \\ & = -x \times (-x) + -x \times (-y) \\ & = x^2 + xy \end{aligned}$$

$$\begin{aligned} s \quad & a(2a-1) \\ & = a(2a+(-1)) \\ & = a \times 2a + a \times (-1) \\ & = 2a^2 - a \end{aligned}$$

$$\begin{aligned} t \quad & -3x(7-4x) \\ & = -3x(7+(-4x)) \\ & = -3x \times 7 + -3x \times (-4x) \\ & = -21x + 12x^2 \end{aligned}$$

$$\begin{aligned} 2 \quad a \quad & 4(x+y+5) \\ & = 4 \times x + 4 \times y + 4 \times 5 \\ & = 4x + 4y + 20 \end{aligned}$$

$$\begin{aligned} b \quad & 2(3a-5b+1) \\ & = 2(3a+(-5b)+1) \\ & = 2 \times 3a + 2 \times (-5b) + 2 \times 1 \\ & = 6a - 10b + 2 \end{aligned}$$

$$\begin{aligned} c \quad & 3x(x-2y+3) \\ & = 3x(x+(-2y)+3) \\ & = 3x \times x + 3x \times (-2y) + 3x \times 3 \\ & = 3x^2 - 6xy + 9x \end{aligned}$$

$$\begin{aligned} d \quad & -2(a-3b+5c) \\ & = -2(a+(-3b)+5c) \\ & = -2 \times a + -2 \times (-3b) + -2 \times 5c \\ & = -2a + 6b - 10c \end{aligned}$$

$$\begin{aligned}
 \mathbf{e} \quad & 6x(x^2 + 5x - 10) \\
 &= 6x(x^2 + 5x + -10) \\
 &= 6x \times x^2 + 6x \times 5x + 6x \times -10 \\
 &= 6x^3 + 30x^2 - 60x
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{f} \quad & 4n(n^2 - 2n - 8) \\
 &= 4n(n^2 + -2n + -8) \\
 &= 4n \times n^2 + 4n \times -2n + 4n \times -8 \\
 &= 4n^3 - 8n^2 - 32n
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{3} \quad \mathbf{a} \quad & 2 + 3(x+1) \\
 &= 2 + 3 \times x + 3 \times 1 \\
 &= 2 + 3x + 3 \\
 &= 3x + 5
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{b} \quad & 15 - 2(x+5) \\
 &= 15 + -2 \times x + -2 \times 5 \\
 &= 15 - 2x - 10 \\
 &= -2x + 5
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{c} \quad & 4(x-1) + 7 \\
 &= 4 \times x + 4 \times -1 + 7 \\
 &= 4x - 4 + 7 \\
 &= 4x + 3
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{d} \quad & 6(x-2) - 8x \\
 &= 6 \times x + 6 \times -2 - 8x \\
 &= 6x - 12 - 8x \\
 &= -2x - 12
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{e} \quad & a(a-2) + 2a \\
 &= a \times a + a \times -2 + 2a \\
 &= a^2 - 2a + 2a \\
 &= a^2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{f} \quad & 3m(4-m) + m^2 \\
 &= 3m \times 4 + 3m \times -m + m^2 \\
 &= 12m - 3m^2 + m^2 \\
 &= 12m - 2m^2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{g} \quad & 3a(b-a) + 4a^2 \\
 &= 3a \times b + 3a \times -a + 4a^2 \\
 &= 3ab - 3a^2 + 4a^2 \\
 &= 3ab + a^2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{h} \quad & 5b - 2b(b-2) \\
 &= 5b + -2b \times b + -2b \times -2 \\
 &= 5b - 2b^2 + 4b \\
 &= -2b^2 + 9b
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{i} \quad & 6a^2 - 3a(a+4) \\
 &= 6a^2 + -3a \times a + -3a \times 4 \\
 &= 6a^2 - 3a^2 - 12a \\
 &= 3a^2 - 12a
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{4} \quad \mathbf{a} \quad & 2(x-3) + 3(x+4) \\
 &= 2 \times x + 2 \times -3 + 3 \times x + 3 \times 4 \\
 &= 2x - 6 + 3x + 12 \\
 &= 5x + 6
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{b} \quad & 4b + (a-b) \\
 &= 4b + 1(a-b) \\
 &= 4b + 1 \times a + 1 \times -b \\
 &= 4b + a - b \\
 &= a + 3b
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{c} \quad & 4b - (a-b) \\
 &= 4b - 1(a-b) \\
 &= 4b + -1 \times a + -1 \times -b \\
 &= 4b - a + b \\
 &= -a + 5b
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{d} \quad & 3(x+2) + 5(4-x) \\
 &= 3 \times x + 3 \times 2 + 5 \times 4 + 5 \times -x \\
 &= 3x + 6 + 20 - 5x \\
 &= -2x + 26
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{e} \quad & 6(m-2) - 3(2m+1) \\
 &= 6 \times m + 6 \times -2 + -3 \times 2m + -3 \times 1 \\
 &= 6m - 12 - 6m - 3 \\
 &= -15
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{f} \quad & 7n - 5(3-2n) \\
 &= 7n + -5(3-2n) \\
 &= 7n + -5 \times 3 + -5 \times -2n \\
 &= 7n - 15 + 10n \\
 &= 17n - 15
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{g} \quad & 5(y-x) + 6(x-y) \\
 &= 5 \times y + 5 \times -x + 6 \times x + 6 \times -y \\
 &= 5y - 5x + 6x - 6y \\
 &= x - y
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{h} \quad & a(a+2) + 5(a-3) \\
 &= a \times a + a \times 2 + 5 \times a + 5 \times -3 \\
 &= a^2 + 2a + 5a - 15 \\
 &= a^2 + 7a - 15
 \end{aligned}$$

$$\begin{aligned}
 \text{i} \quad & x(x+5) - 3(x-4) \\
 &= \overbrace{x(x+5)} + \overbrace{-3(x-4)} \\
 &= x \times x + x \times 5 + -3 \times x + -3 \times -4 \\
 &= x^2 + 5x - 3x + 12 \\
 &= x^2 + 2x + 12
 \end{aligned}$$

$$\begin{aligned}
 \text{k} \quad & -a^2 - a(a-1) \\
 &= -a^2 + \overbrace{-a(a-1)} \\
 &= -a^2 + -a \times a + -a \times -1 \\
 &= -a^2 - a^2 + a \\
 &= -2a^2 + a
 \end{aligned}$$

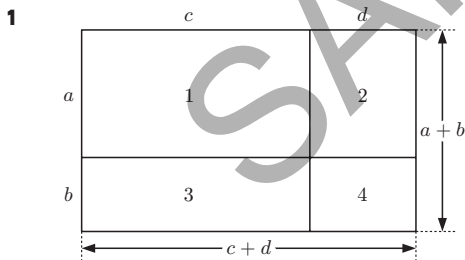
$$\begin{aligned}
 \text{m} \quad & -3(x-6) - (2-x) \\
 &= \overbrace{-3(x-6)} + \overbrace{-1(2-x)} \\
 &= -3 \times x + -3 \times -6 + -1 \times 2 + -1 \times -x \\
 &= -3x + 18 - 2 + x \\
 &= -2x + 16
 \end{aligned}$$

$$\begin{aligned}
 \text{o} \quad & 2x(x-5) - 3x(2-x) \\
 &= \overbrace{2x(x-5)} + \overbrace{-3x(2-x)} \\
 &= 2x \times x + 2x \times -5 + -3x \times 2 + -3x \times -x \\
 &= 2x^2 - 10x - 6x + 3x^2 \\
 &= 5x^2 - 16x
 \end{aligned}$$

$$\begin{aligned}
 \text{j} \quad & a^2 + a(\overbrace{a+3}) \\
 &= a^2 + a \times a + a \times 3 \\
 &= a^2 + a^2 + 3a \\
 &= 2a^2 + 3a
 \end{aligned}$$

$$\begin{aligned}
 \text{l} \quad & x(x+y) - y(x+y) \\
 &= \overbrace{x(x+y)} + \overbrace{-y(x+y)} \\
 &= x \times x + x \times y + -y \times x + -y \times y \\
 &= x^2 + xy - xy - y^2 \\
 &= x^2 - y^2
 \end{aligned}$$

$$\begin{aligned}
 \text{n} \quad & 4(3x-2) - (3x+1) \\
 &= \overbrace{4(3x-2)} + \overbrace{-1(3x+1)} \\
 &= 4 \times 3x + 4 \times -2 + -1 \times 3x + -1 \times 1 \\
 &= 12x - 8 - 3x - 1 \\
 &= 9x - 9
 \end{aligned}$$

EXERCISE 5B


- a** Area of rectangle 1
 $= a \times c$
 $= ac$
- b** Area of rectangle 2
 $= a \times d$
 $= ad$
- c** Area of rectangle 3
 $= b \times c$
 $= bc$
- d** Area of rectangle 4
 $= b \times d$
 $= bd$
- e** Area of whole rectangle $= (a+b) \times (c+d)$
 $= (a+b)(c+d)$

Since the area of the whole rectangle = rectangle 1 + rectangle 2 + rectangle 3 + rectangle 4,
 $(a+b)(c+d) = ac + ad + bc + bd$.

2

a $(x+2)(x+5)$
 $= x \times x + x \times 5 + 2 \times x + 2 \times 5$
 $= x^2 + 5x + 2x + 10$
 $= x^2 + 7x + 10$

c $(x-3)(x+7)$
 $= x \times x + x \times 7 + -3 \times x + -3 \times 7$
 $= x^2 + 7x - 3x - 21$
 $= x^2 + 4x - 21$

b $(x+4)(x-6)$
 $= x \times x + x \times -6 + 4 \times x + 4 \times -6$
 $= x^2 - 6x + 4x - 24$
 $= x^2 - 2x - 24$

d $(x+5)(x-5)$
 $= x \times x + x \times -5 + 5 \times x + 5 \times -5$
 $= x^2 - 5x + 5x - 25$
 $= x^2 - 25$

$$\begin{aligned}
 \mathbf{e} \quad & (x-8)(x+2) \\
 & = x \times x + x \times 2 + -8 \times x + -8 \times 2 \\
 & = x^2 + 2x - 8x - 16 \\
 & = x^2 - 6x - 16
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{f} \quad & (3x+2)(4x+1) \\
 & = 3x \times 4x + 3x \times 1 + 2 \times 4x + 2 \times 1 \\
 & = 12x^2 + 3x + 8x + 2 \\
 & = 12x^2 + 11x + 2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{g} \quad & (1-3x)(2x+1) \\
 & = 1 \times 2x + 1 \times 1 + -3x \times 2x + -3x \times 1 \\
 & = 2x + 1 - 6x^2 - 3x \\
 & = -6x^2 - x + 1
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{h} \quad & (6-x)(2x+5) \\
 & = 6 \times 2x + 6 \times 5 + -x \times 2x + -x \times 5 \\
 & = 12x + 30 - 2x^2 - 5x \\
 & = -2x^2 + 7x + 30
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{i} \quad & (4x-3)(1+3x) \\
 & = 4x \times 1 + 4x \times 3x + -3 \times 1 + -3 \times 3x \\
 & = 4x + 12x^2 - 3 - 9x \\
 & = 12x^2 - 5x - 3
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{j} \quad & (4-x)(4+5x) \\
 & = 4 \times 4 + 4 \times 5x + -x \times 4 + -x \times 5x \\
 & = 16 + 20x - 4x - 5x^2 \\
 & = -5x^2 + 16x + 16
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{k} \quad & (8-x)(2x+5) \\
 & = 8 \times 2x + 8 \times 5 + -x \times 2x + -x \times 5 \\
 & = 16x + 40 - 2x^2 - 5x \\
 & = -2x^2 + 11x + 40
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{l} \quad & (3x+2)(3x+2) \\
 & = 3x \times 3x + 3x \times 2 + 2 \times 3x + 2 \times 2 \\
 & = 9x^2 + 6x + 6x + 4 \\
 & = 9x^2 + 12x + 4
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{3} \quad \mathbf{a} \quad & (x+2)(x-2) \\
 & = x^2 - 2x + 2x - 4 \\
 & = x^2 - 4
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{b} \quad & (a+4)(a-4) \\
 & = a^2 - 4a + 4a - 16 \\
 & = a^2 - 16
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{c} \quad & (6+x)(6-x) \\
 & = 36 - 6x + 6x - x^2 \\
 & = 36 - x^2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{d} \quad & (3x+1)(3x-1) \\
 & = 9x^2 - 3x + 3x - 1 \\
 & = 9x^2 - 1
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{e} \quad & (5a+2)(5a-2) \\
 & = 25a^2 - 10a + 10a - 4 \\
 & = 25a^2 - 4
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{f} \quad & (7a-3)(7a+3) \\
 & = 49a^2 + 21a - 21a - 9 \\
 & = 49a^2 - 9
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{4} \quad \mathbf{a} \quad & (x+3)^2 \\
 & = (x+3)(x+3) \\
 & = x^2 + 3x + 3x + 9 \\
 & = x^2 + 6x + 9
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{b} \quad & (x-4)^2 \\
 & = (x-4)(x-4) \\
 & = x^2 - 4x - 4x + 16 \\
 & = x^2 - 8x + 16
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{c} \quad & (1-x)^2 \\
 & = (1-x)(1-x) \\
 & = 1 - x - x + x^2 \\
 & = 1 - 2x + x^2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{d} \quad & (2+x)^2 \\
 & = (2+x)(2+x) \\
 & = 4 + 2x + 2x + x^2 \\
 & = 4 + 4x + x^2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{e} \quad & (2x-1)^2 \\
 & = (2x-1)(2x-1) \\
 & = 4x^2 - 2x - 2x + 1 \\
 & = 4x^2 - 4x + 1
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{f} \quad & (2-3x)^2 \\
 & = (2-3x)(2-3x) \\
 & = 4 - 6x - 6x + 9x^2 \\
 & = 4 - 12x + 9x^2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{g} \quad & (3-5x)^2 \\
 & = (3-5x)(3-5x) \\
 & = 9 - 15x - 15x + 25x^2 \\
 & = 9 - 30x + 25x^2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{h} \quad & (2x-y)^2 \\
 & = (2x-y)(2x-y) \\
 & = 4x^2 - 2xy - 2xy + y^2 \\
 & = 4x^2 - 4xy + y^2
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{5} \quad \mathbf{a} \quad & (x+5)(x+1) + 2(x-2) \\
 & = x^2 + x + 5x + 5 + 2x - 4 \\
 & = x^2 + 8x + 1
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{b} \quad & 4(x+2) + (x-3)(x+6) \\
 & = 4x + 8 + x^2 + 6x - 3x - 18 \\
 & = x^2 + 7x - 10
 \end{aligned}$$

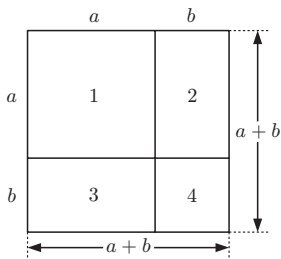
$$\begin{aligned}
 \mathbf{c} \quad & (2a+5)(a-6) + a(a+7) \\
 & = 2a^2 - 12a + 5a - 30 + a^2 + 7a \\
 & = 3a^2 - 30
 \end{aligned}$$

$$\begin{aligned}
 \mathbf{d} \quad & (3x+5)(2x-3) - x(x+3) \\
 & = 6x^2 - 9x + 10x - 15 - x^2 - 3x \\
 & = 5x^2 - 2x - 15
 \end{aligned}$$

$$\begin{array}{ll}
 \mathbf{e} & (2x+3)(x+2) + (x+6)(x-5) \\
 & = 2x^2 + 4x + 3x + 6 + x^2 - 5x + 6x - 30 \\
 & = 3x^2 + 8x - 24 \\
 \mathbf{f} & (y+7)(y-4) - (y+1)(y+3) \\
 & = y^2 - 4y + 7y - 28 - (y^2 + 3y + y + 3) \\
 & = y^2 - 4y + 7y - 28 - y^2 - 3y - y - 3 \\
 & = -y - 31 \\
 \mathbf{g} & (k+2)(k-5) - (2k+1)(k-3) \\
 & = k^2 - 5k + 2k - 10 - (2k^2 - 6k + k - 3) \\
 & = k^2 - 5k + 2k - 10 - 2k^2 + 6k - k + 3 \\
 & = -k^2 + 2k - 7 \\
 \mathbf{h} & (x+2)(x-2) + (x+6)(x-6) \\
 & = x^2 - 2x + 2x - 4 + x^2 - 6x + 6x - 36 \\
 & = 2x^2 - 40
 \end{array}$$

EXERCISE 5C

$$\begin{array}{llll}
 \mathbf{1} \quad \mathbf{a} & (x+3)(x-3) & \mathbf{b} & (x-3)(x+3) & \mathbf{c} & (3+x)(3-x) & \mathbf{d} & (3-x)(3+x) \\
 & = x^2 - 3^2 & & = x^2 - 3^2 & & = 3^2 - x^2 & & = 3^2 - x^2 \\
 & = x^2 - 9 & & = x^2 - 9 & & = 9 - x^2 & & = 9 - x^2 \\
 \mathbf{e} & (x+2)(x-2) & \mathbf{f} & (2-x)(2+x) & \mathbf{g} & (x+6)(x-6) & \mathbf{h} & (a+4)(a-4) \\
 & = x^2 - 2^2 & & = 2^2 - x^2 & & = x^2 - 6^2 & & = a^2 - 4^2 \\
 & = x^2 - 4 & & = 4 - x^2 & & = x^2 - 36 & & = a^2 - 16 \\
 \mathbf{i} & (b-1)(b+1) & \mathbf{j} & (p-q)(p+q) & \mathbf{k} & (5+n)(5-n) & \mathbf{l} & (7-y)(7+y) \\
 & = b^2 - 1^2 & & = p^2 - q^2 & & = 5^2 - n^2 & & = 7^2 - y^2 \\
 & = b^2 - 1 & & & & = 25 - n^2 & & = 49 - y^2 \\
 \mathbf{2} \quad \mathbf{a} & (2x+1)(2x-1) & \mathbf{b} & (5x+2)(5x-2) & \mathbf{c} & (4a+3)(4a-3) \\
 & = (2x)^2 - 1^2 & & = (5x)^2 - 2^2 & & = (4a)^2 - 3^2 \\
 & = 4x^2 - 1 & & = 25x^2 - 4 & & = 16a^2 - 9 \\
 \mathbf{d} & (3b+5)(3b-5) & \mathbf{e} & (4x+1)(4x-1) & \mathbf{f} & (1-4x)(1+4x) \\
 & = (3b)^2 - 5^2 & & = (4x)^2 - 1^2 & & = 1^2 - (4x)^2 \\
 & = 9b^2 - 25 & & = 16x^2 - 1 & & = 1 - 16x^2 \\
 \mathbf{g} & (7-2y)(7+2y) & \mathbf{h} & (3-2x)(3+2x) & \mathbf{i} & (3x+2)(3x-2) \\
 & = 7^2 - (2y)^2 & & = 3^2 - (2x)^2 & & = (3x)^2 - 2^2 \\
 & = 49 - 4y^2 & & = 9 - 4x^2 & & = 9x^2 - 4 \\
 \mathbf{3} \quad \mathbf{a} & (3a+b)(3a-b) & \mathbf{b} & (a-3b)(a+3b) & \mathbf{c} & (6x+y)(6x-y) \\
 & = (3a)^2 - b^2 & & = a^2 - (3b)^2 & & = (6x)^2 - y^2 \\
 & = 9a^2 - b^2 & & = a^2 - 9b^2 & & = 36x^2 - y^2 \\
 \mathbf{d} & (5x+2y)(5x-2y) & \mathbf{e} & (4x+5y)(4x-5y) & \mathbf{f} & (2x-7y)(2x+7y) \\
 & = (5x)^2 - (2y)^2 & & = (4x)^2 - (5y)^2 & & = (2x)^2 - (7y)^2 \\
 & = 25x^2 - 4y^2 & & = 16x^2 - 25y^2 & & = 4x^2 - 49y^2
 \end{array}$$

EXERCISE 5D
1


$$\begin{array}{ll}
 \mathbf{a} & \text{Area of square 1} \\
 & = a \times a \\
 & = a^2 \\
 \mathbf{b} & \text{Area of rectangle 2} \\
 & = a \times b \\
 & = ab \\
 \mathbf{c} & \text{Area of rectangle 3} \\
 & = b \times a \\
 & = ab \\
 \mathbf{d} & \text{Area of square 4} \\
 & = b \times b \\
 & = b^2 \\
 \mathbf{e} & \text{Area of the overall square} = (a+b) \times (a+b) \\
 & = (a+b)^2
 \end{array}$$

Since the area of the overall square = square 1 + rectangle 2 + rectangle 3 + square 4,

$$(a + b)^2 = a^2 + ab + ab + b^2$$

$$\therefore (a + b)^2 = a^2 + 2ab + b^2$$

- 2** **a** $(5 + 3)^2 = 8^2 = 64$ $5^2 + 3^2 = 25 + 9 = 34$
 $\therefore (5 + 3)^2 \neq 5^2 + 3^2$
- b** $(5 + 3)^2 = 8^2 = 64$ $5^2 + 2 \times 5 \times 3 + 3^2 = 25 + 30 + 9 = 64$
 $\therefore (5 + 3)^2 = 5^2 + 2 \times 5 \times 3 + 3^2$
- 3** **a** $(x + 2)^2 = x^2 + 2 \times x \times 2 + 2^2 = x^2 + 4x + 4$
- b** $(x + 5)^2 = x^2 + 2 \times x \times 5 + 5^2 = x^2 + 10x + 25$
- c** $(a + 4)^2 = a^2 + 2 \times a \times 4 + 4^2 = a^2 + 8a + 16$
- d** $(y + 6)^2 = y^2 + 2 \times y \times 6 + 6^2 = y^2 + 12y + 36$
- e** $(1 + b)^2 = 1^2 + 2 \times 1 \times b + b^2 = 1 + 2b + b^2$
- f** $(2 + x)^2 = 2^2 + 2 \times 2 \times x + x^2 = 4 + 4x + x^2$
- 4** **a** $(x - 4)^2 = x^2 + 2 \times x \times (-4) + (-4)^2 = x^2 - 8x + 16$
- b** $(x - 2)^2 = x^2 + 2 \times x \times (-2) + (-2)^2 = x^2 - 4x + 4$
- c** $(a - 7)^2 = a^2 + 2 \times a \times (-7) + (-7)^2 = a^2 - 14a + 49$
- d** $(b - 8)^2 = b^2 + 2 \times b \times (-8) + (-8)^2 = b^2 - 16b + 64$
- e** $(3 - x)^2 = 3^2 + 2 \times 3 \times (-x) + (-x)^2 = 9 - 6x + x^2$
- f** $(5 - y)^2 = 5^2 + 2 \times 5 \times (-y) + (-y)^2 = 25 - 10y + y^2$
- 5** **a** $(2x + 3)^2 = (2x)^2 + 2 \times 2x \times 3 + 3^2 = 4x^2 + 12x + 9$
- b** $(4a - 1)^2 = (4a)^2 + 2 \times 4a \times (-1) + (-1)^2 = 16a^2 - 8a + 1$
- c** $(3y + 5)^2 = (3y)^2 + 2 \times 3y \times 5 + 5^2 = 9y^2 + 30y + 25$
- d** $(3a - 4)^2 = (3a)^2 + 2 \times 3a \times (-4) + (-4)^2 = 9a^2 - 24a + 16$
- e** $(2x - 7)^2 = (2x)^2 + 2 \times 2x \times (-7) + (-7)^2 = 4x^2 - 28x + 49$
- f** $(8 + 3a)^2 = 8^2 + 2 \times 8 \times 3a + (3a)^2 = 64 + 48a + 9a^2$
- g** $(2 + 5b)^2 = 2^2 + 2 \times 2 \times 5b + (5b)^2 = 4 + 20b + 25b^2$
- h** $(6 - 5x)^2 = 6^2 + 2 \times 6 \times (-5x) + (-5x)^2 = 36 - 60x + 25x^2$
- i** $(4 - 5y)^2 = 4^2 + 2 \times 4 \times (-5y) + (-5y)^2 = 16 - 40y + 25y^2$
- 6** **a** $(x^2 + 3)^2 = (x^2)^2 + 2 \times x^2 \times 3 + 3^2 = x^4 + 6x^2 + 9$
- b** $(y^2 - 2)^2 = (y^2)^2 + 2 \times y^2 \times (-2) + (-2)^2 = y^4 - 4y^2 + 4$
- c** $(2a^2 + 3)^2 = (2a^2)^2 + 2 \times 2a^2 \times 3 + 3^2 = 4a^4 + 12a^2 + 9$
- d** $(1 - 4x^2)^2 = 1^2 + 2 \times 1 \times (-4x^2) + (-4x^2)^2 = 1 - 8x^2 + 16x^4$