Expansion

Exercise

Solution 1:

1. $2a(-3a^2)$
   $= -6a^3$
2. $(-4ab)(6a^2b)$
   $= -24a^3b^2$
3. $(2m)(3m + n)$
   $= (2m \times 3m) + (2m \times n) = 6m^2 + 2mn$
4. $(-4n)(6n + 5m)$
   $= (-4n \times 6n) + (-4n \times 5m) = -24n^2 – 20mn$
5. $(5a + 3b)(6a – 2b)$
   $= 5a(6a – 2b) + 3b(6a – 2b) = 30a^2 – 10ab + 18ab – 6b^2 = 30a^2 + 8ab – 6b^2$
6. $(2x + 3y)(6x – 2y)$
   $= 2x(6x – 2y) + 3y(6x – 2y) = 12x^2 – 4xy + 18xy – 6y^2 = 12x^2 + 14xy – 6y^2$
7. $(6xy + 1)(2xy – 3)$
   $= 6xy(2xy – 3) + 1(2xy – 3) = 12x^2y^2 – 18xy + 2xy – 3 = 12x^2y^2 – 16xy – 3$
8. $(a – 2b)(2a – b)$
   $= a(2a – b) – 2b(2a – b) = 2a^2 – ab – 4ab + 2b^2 = 2a^2 – 5ab + 2b^2$

Solution 2:

1. $(a + 5)^2 = (a)^2 + 2(a)(5) + (5)^2$
   $= a^2 + 10a + 25$
2. $(m – 7)^2 = (m)^2 – 2(m)(7) + (7)^2$
   $= m^2 – 14m + 49$
3. $(3m + 2n)^2 = (3m)^2 + 2(3m)(2n) + (2n)^2$
   $= 9m^2 + 12mn + 4n^2$
4. $(4xy – 3)^2 = (4xy)^2 – 2(4xy)(3) + (3)^2$
   $= 16x^2y^2 – 24xy + 9$
5. $(5ab + 3c)^2 = (5ab)^2 + 2(5ab)(3c) + (3c)^2$
   $= 25a^2b^2 + 30abc + 9c^2$
6. $(4b^2 + 3)^2 = (4b^2)^2 + 2(4b^2)(3) + (3)^2$

$= 16b^4 + 24b^2 + 9$

7. $(2x - 7)^2 = (2x)^2 - 2(2x)(7) + (7)^2$
   $= 4x^2 - 28x + 49$
8. $(5 - 3mn)^2 = (5)^2 - 2(5)(3mn) + (3mn)^2$
   $= 25 - 30mn + 9m^2n^2$

Solution 3:

1. $(x - 7)(x + 7) = (x)^2 - (7)^2 = x^2 - 49$
2. $(2a + 3b)(2a - 3b) = (2a)^2 - (3b)^2 = 4a^2 - 9b^2$
3. $(2m + 5)(2m - 5) = (2m)^2 - (5)^2 = 4m^2 - 25$
4. $(2mn + 3)(2mn - 3) = (2mn)^2 - (3)^2 = 4m^2n^2 - 9$

Solution 4:

1. $(a + 3)(a + 2)$
   $= (a)^2 + (3 + 2)(a) + (3)(2) = a^2 + 5a + 6$
2. $(m - 2)(m - 5)$
   $= (m)^2 + (-2 - 5)(m) + (-2)(-5) = m^2 - 7m + 10$
3. $(x - 9)(x + 2)$
   $= (x)^2 + (-9 + 2)(x) + (-9)(2) = x^2 + (-7)(x) - 18 = x^2 - 7x - 18$
4. $(x + 6y)(x - 2y)$
   $= (x)^2 + (6y - 2y)(x) + (6y)(-2y) = x^2 + (4y)(x) - 12y^2 = x^2 + 4xy - 12y^2$
5. $(5x - 2y)(5x - 4y)$
   $= (5x)^2 + (-2y - 4y)(5x) + (-2y)(-4y) = 25x^2 + (-6y)(5x) + 8y^2 = 25x^2 - 30xy + 8y^2$
6. $(2m + 3n)(2m + 5n)$
   $= (2m)^2 + (3n + 5n)(2m) + (3n)(5n) = 4m^2 + (8n)(2m) + 15n^2 = 4m^2 + 16mn + 15n^2$
7. $(xy - 7)(xy + 4)$
   $= (xy)^2 + (-7 + 4)(xy) + (-7)(4) = x^2y^2 - 3xy - 28$
8. $(x^2 - 5)(x^2 + 3)$
   $= (x^2)^2 + (-5 + 3)(x^2) + (-5)(3) = x^4 - 2x^2 - 15$

Solution 5:

1. $62^2 = (60 + 2)^2$
   $= (60)^2 + 2(60)(2) + (2)^2 = 3600 + 240 + 4 = 3844$
2. 57^2
   $= (60 - 3)^2 = (60)^2 - 2(60)(3) + (3)^2 = 3600 - 360 + 9 = 3249$
3. 43×37
   $= (40 + 3)(40 - 3) = (40)^2 - (3)^2 = 1600 - 9 = 1591$
4. 97×103
   $= (100 - 3)(100 + 3) = (100)^2 - (3)^2 = 10000 - 9 = 9991$
5. 16×22
   $= (20 - 4)(20 + 2) = (20)^2 + (-4 + 2)(20) + (-4)(2) = 400 + (-2)(20) - 8 = 400 - 40 - 8 = 352$

Practice 1

Solution 1:

1st monomial→ 2nd monomial ↓	2x	-5y	$3a^2$	-4xy	mn
2x	$4x^2$	-10xy	$2x \times 3a^2 = 6xa^2$	$2x \times -4xy = -8x^2y$	$2x \times mn = 2xmn$
$3y^2$	$3y^2 \times 2x = 6xy^2$	$3y^2 \times -5y = -15y^3$	$9a^2y^2$	$3y^2 \times -4xy = -12xy^3$	$3y^2 \times mn = 3y^2mn$
-2a	$-2a \times 2x = -4ax$	$-2a \times -5y = 10ay$	$-2a \times 3a^2 = -6a^3$	8axy	$-2a \times mn = -2amn$
3mn	$3mn \times 2x = 6mnx$	$3mn \times -5y$ -15mny	$3mn \times 3a^2 = 9a^2mn$	$3mn \times (-4xy) = -12xymn$	$3mn \times mn = 3m^2n^2$
5xy	$5xy \times 2x = 10x^2y$	$5xy \times -5y = -25xy^2$	$5xy \times 3a^2 = 15a^2xy$	$-20x^2y^2$	$5xy \times mn = 5xymn$

Solution 2:

1. $2a(3x + 5y)$
   $= (2a \times 3x) + (2a \times 5y) = 6ax + 10ay$
2. $3x^2(5x – 4y)$
   $= (3x^2 \times 5x) – (3x^2 \times 4y) = 15x^3 – 12x^2y$
3. $5a(6a + 3b)$
   $= (5a \times 6a) + (5a \times 3b) = 30a^2 + 15ab$
4. $(-6y)(5x – 7y^2)$
   $= [(-6y) \times (5x)] - [(-6y) \times (7y^2)] = -30xy + 42y^3$
5. $(-10a)(5a^2 + b)$
   $= [(-10a) \times (5a^2)] + [(-10a) \times (b)] = -50a^3 – 10ab$
6. $(-3ab)(2a + 3b)$
   $= [(-3ab) \times (2a)] + [(-3ab) \times (3b)] = -6a^2b – 9ab^2$
7. $(6x^3y^3 – 1)(-2x^2)$
   $= [(6x^3y^3) \times (-2x^2) – [(1) \times (-2x^2)] = -12x^5y^3 + 2x^2$
8. $2ab(3ab – 1)$
   $= (2ab \times 3ab) – (2ab \times 1) = 6a^2b^2 – 2ab$

Solution 3:

1. $(2x + y)(a + 3b)$
   $= 2x(a + 3b) + y(a + 3b) = 2xa + 6xb + ya + 3yb$
2. $(5x – 3)(2a + 5)$
   $= 5x(2a + 5) – 3(2a + 5) = 10ax + 25x – 6a – 15$
3. $(x – 2)(x^2 + 3)$
   $= x(x^2 + 3) – 2(x^2 + 3) = x^3 + 3x – 2x^2 – 6$
4. $(5x^2 + 3)(2x^2 + 5)$
   $= 5x^2(2x^2 + 5) + 3(2x^2 + 5) = 10x^4 + 25x^2 + 6x^2 + 15 = 10x^4 + 31x^2 + 15$
5. $(x – 3)(x – 7)$
   $= x(x – 7) – 3(x – 7) = x^2 – 7x – 3x + 21 = x^2 – 10x + 21$
6. $(2m^2 + 5)(3m + 1)$
   $= 2m^2(3m + 1) + 5(3m + 1) = 6m^3 + 2m^2 + 15m + 5$
7. $(3x + 5)(2x – 4)$
   $= 3x(2x – 4) + 5(2x – 4) = 6x^2 – 12x + 10x – 20 = 6x^2 – 2x – 20$
8. $(x – 3a)(4x + 5a)$
   $= x(4x + 5a) – 3a(4x + 5a) = 4x^2 + 5xa – 12xa – 15a^2 = 4x^2 – 7xa – 15a^2$

Practice 2

Solution 1:

1. $(x - y)^2 = x^2 - 2xy + y^2$
2. $(a + 7)^2 = a^2 + 14a + 49$
3. $(2m - n)^2 = 4m^2 - 4mn + n^2$
4. $(x + 1)^2 = x^2 + 2x + 1$
5. $(2a - 3)^2 = 4a^2 - 12a + 9$
6. $(m + 2)^2 = m^2 + 4m + 4$

Solution 2:

1. $(x + 7)^2 = (x)^2 + 2(x)(7) + (7)^2$
   $= x^2 + 14x + 49$
2. $(m - 4)^2 = (m)^2 - 2(m)(4) + (4)^2$
   $= m^2 - 8m + 16$
3. $(x + 3y)^2 = (x)^2 + 2(x)(3y) + (3y)^2$
   $= x^2 + 6xy + 9y^2$
4. $(8x + 5y)^2 = (8x)^2 + 2(8x)(5y) + (5y)^2$
   $= 64x^2 + 80xy + 25y^2$
5. $(2a - 3b)^2 = (2a)^2 - 2(2a)(3b) + (3b)^2$
   $= 4a^2 - 12ab + 9b^2$
6. $(4ab - 3xy)^2 = (4ab)^2 - 2(4ab)(3xy) + (3xy)^2$
   $= 16a^2b^2 - 24abxy + 9x^2y^2$
7. $(3xy - 7)^2 = (3xy)^2 - 2(3xy)(7) + (7)^2$
   $= 9x^2y^2 - 42xy + 49$
8. $(2xy - 3z)^2 = (2xy)^2 - 2(2xy)(3z) + (3z)^2$
   $= 4x^2y^2 - 12xyz + 9z^2$

Solution 3:

1. $(43)^2 = (40 + 3)^2 = (40)^2 + 2(40)(3) + (3)^2$
   $= 1600 + 240 + 9 = 1849$
2. $(82)^2 = (90 - 8)^2 = (90)^2 - 2(90)(8) + (8)^2$
   $= 8100 - 1440 + 64 = 6724$
3. $(67)^2 = (60 + 7)^2 = (60)^2 + 2(60)(7) + (7)^2$
   $= 3600 + 840 + 49 = 4489$
4. $(48)^2 = (50 - 2)^2 = (50)^2 - 2(50)(2) + (2)^2$
   $= 2500 - 200 + 4 = 2304$

Practice 3

Solution 1:

	Section 'A'	Section 'B'
(1)	$(m + n)(m - n)$	(d) $m^2 - n^2$
(2)	$(m + 7)(m - 7)$	(a) $m^2 - 49$
(3)	$(5 + m)(5 - m)$	(b) $25 - m^2$
(4)	$(3m - 1)(3m + 1)$	(c) $9m^2 - 1$

Solution 2:

1. $(4x + 1)(4x - 1) = (4x)^2 - (1)^2 = 16x^2 - 1$

2. $(3x - 7y)(3x + 7y) = (3x)^2 - (7y)^2 = 9x^2 - 49y^2$
3. $(6 - x)(6 + x) = (6)^2 - (x)^2 = 36 - x^2$
4. $(a + 8b)(a - 8b) = (a)^2 - (8b)^2 = a^2 - 64b^2$
5. $(11 + 3xy)(11 - 3xy) = (11)^2 - (3xy)^2 = 121 - 9x^2y^2$
6. $(2mn + 5)(2mn - 5) = (2mn)^2 - (5)^2 = 4m^2n^2 - 25$

Solution 3:

1. $41 \times 39 = (40 + 1)(40 - 1) = (40)^2 - (1)^2 = 1600 - 1 = 1599$
2. $56 \times 64 = (60 - 4)(60 + 4) = (60)^2 - (4)^2 = 3600 - 16 = 3584$
3. $73 \times 67 = (70 + 3)(70 - 3) = (70)^2 - (3)^2 = 4900 - 9 = 4891$
4. $33 \times 27 = (30 + 3)(30 - 3) = (30)^2 - (3)^2 = 900 - 9 = 891$

Practice 4

Solution 1:

1. $(y + 2)(y + 4) = y^2 + 6y + 8$
2. $= (y)^2 + (2 + 4)(y) + (2)(4)$
3. $(m + 6)(m - 2) = m^2 + 4m - 12$
4. $= (m)^2 + (6 - 2)(m) + (6)(-2)$
5. $(2a - 5)(2a + 3) = 4a^2 + (-2)(2a) - 15$
6. $= 4a^2 - 4a - 15$
7. $= (2a)^2 + (-5 + 3)(2a) + (-5)(3)$
8. $(4x - 2y)(4x + y) = 16x^2 + (-y)(4x) + (-2y^2)$
9. $= 16x^2 - 4xy - 2y^2$
10. $= (4x)^2 + (-2y + y)(4x) + (-2y)(y)$
11. $(a - 3b)(a + 2b) = a^2 + (-b)(a) - 6b^2$
12. $= a^2 - ab - 6b^2$
13. $= (a)^2 + (-3b + 2b)(a) + (-3b)(2b)$
14. $(5ab - 3)(5ab + 2) = 25a^2b^2 + (-1)(5ab) - 6$
15. $= 25a^2b^2 - 5ab - 6$
16. $= (5ab)^2 + (-3 + 2)(5ab) + (-3)(2)$
17. $(6x + 3)(6x + 5) = 36x^2 + (8)(6x) + 15$
18. $= 36x^2 + 48x + 15$
19. $= (6x)^2 + (3 + 5)(6x) + (3)(5)$
20. $(7a + 4)(7a + 3) = 49a^2 + (7)(7a) + 12$
21. $= 49a^2 + 49a + 12$
22. $= (7a)^2 + (4 + 3)(7a) + (4)(3)$

Solution 2:

1. $43 \times 42 = (40 + 3)(40 + 2) = (40)^2 + (3 + 2)(40) + (3)(2) = 1600 + (5)(40) + 6$
   $= 1600 + 200 + 6 = 1806$
2. $68 \times 73 = (70 - 2)(70 + 3) = (70)^2 + (-2 + 3)(70) + (-2)(3) = 4900 + (1)(70) - 6$
   $= 4900 + 70 - 6 = 4964$
3. $52 \times 51 = (50 + 2)(50 + 1) = (50)^2 + (2 + 1)(50) + (2)(1) = 2500 + (3)(50) + 2$
   $= 2500 + 150 + 2 = 2652$
4. $24 \times 19 = (20 + 4)(20 - 1) = (20)^2 + (4 - 1)(20) + (4)(-1) = 400 + (3)(20) - 4$
   $= 400 + 60 - 4 = 456$
5. $23 \times 18 = (20 + 3)(20 - 2) = (20)^2 + (3 - 2)(20) + (3)(-2) = 400 + (1)(20) - 6$
   $= 400 + 20 - 6 = 414$

6. $27 \times 32 = (30 - 3)(30 + 2) = (30) + (-3 + 2)(30) + (-3)(2) = 900 + (-1)(30) - 6$
   $= 900 - 30 - 6 = 864$