

## EXERCISE 3F

- 1 a  $(x+1)(x+2)$  b  $(x+2)(x+3)$  c  $(x+2)(x-3)$   
 d  $(x-2)(x+5)$  e  $(x-3)(x+7)$  f  $(x+4)^2$   
 g  $(x-7)^2$  h  $(x-4)(x+7)$  i  $(x-3)(x-8)$   
 j  $(x+4)(x+11)$  k  $(x+7)(x-8)$  l  $(x-9)^2$   
 m  $(x+4)(x-8)$  n  $(x-5)(x+9)$   
 o  $(x+8)(x-12)$  p  $(x-8)(x+12)$
- 2 a  $2(x+1)(x+4)$  b  $3(x-1)(x-6)$   
 c  $2(x+3)(x+4)$  d  $5(x+2)(x-8)$   
 e  $4(x+1)(x-3)$  f  $3(x-3)(x-11)$   
 g  $2(x+9)(x-10)$  h  $3(x+2)(x-4)$   
 i  $2(x+4)(x+5)$  j  $x(x+1)(x-8)$   
 k  $4(x-3)^2$  l  $3(x-3)(x+9)$   
 m  $2(x-10)(x-12)$  n  $x(x+4)(x-7)$   
 o  $x^2(x+1)^2$
- 3 a  $-(x-6)(x+9)$  b  $-(x+2)(x+5)$   
 c  $-(x+3)(x+7)$  d  $-(x-1)(x-3)$   
 e  $-(x-2)^2$  f  $-(x-1)(x+3)$
- 4 a  $-(x+6)(x-8)$  b  $-(x-3)^2$   
 c  $-3(x-3)(x-7)$  d  $-2(x+7)(x-9)$   
 e  $-2(x-5)^2$  f  $-x(x+1)(x-2)$
- 5 As  $b = m + n$ ,  $-b = -m - n$   
 Since  $c = mn$ ,  $x^2 - bx + c = x^2 - mx - nx + mn$   
 $= (x-m)(x-n)$

## EXERCISE 3G

- 1 a i  $3x^2 + 7x + 2$  ii  $3x^2 + 7x + 2$   
 $= 3x^2 + 6x + x + 2$   $= 3x^2 + x + 6x + 2$   
 $= 3x(x+2) + 1(x+2)$   $= x(3x+1) + 2(3x+1)$   
 $= (x+2)(3x+1)$   $= (3x+1)(x+2)$
- b Yes, as  $ab = ba$ .
- 2 a  $(2x+3)(x+1)$  b  $(2x+9)(x+2)$   
 c  $(7x+2)(x+1)$  d  $(3x+1)(x+4)$   
 e  $(3x+2)(x+2)$  f  $(3x+7)(x+3)$   
 g  $(4x+1)(2x+3)$  h  $(7x+1)(3x+2)$   
 i  $(3x+1)(2x+1)$  j  $(6x+1)(x+3)$   
 k  $(5x+1)(2x+3)$  l  $(7x+1)(2x+5)$
- 3 a i  $(2x+3)(2x-1)$  ii  $(2x-1)(2x+3)$  b yes
- 4 a  $(2x+1)(x-5)$  b  $(3x-1)(x+2)$   
 c  $(3x+1)(x-2)$  d  $(2x-1)(x+2)$   
 e  $(2x+5)(x-1)$  f  $(5x-3)(x-1)$   
 g  $(11x+2)(x-1)$  h  $(2x+3)(x-3)$   
 i  $(3x-2)(x-5)$  j  $(5x+2)(x-3)$   
 k  $(3x-2)(x+4)$  l  $(2x-1)(x+9)$   
 m  $(2x-3)(x+6)$  n  $(5x+2)(3x-1)$   
 o  $(21x+1)(x-3)$
- 5 a  $-(3x+7)(x-2)$  b  $-(5x-1)(x-2)$   
 c  $-(4x-3)(x+3)$  d  $-(3x-2)^2$   
 e  $-(4x+1)(2x+3)$  f  $-(6x+1)(2x-3)$
- 6 a  $(3x+5)^2 - (2x-3)^2$   
 $= 9x^2 + 30x + 25 - [4x^2 - 12x + 9]$   
 $= 9x^2 + 30x + 25 - 4x^2 + 12x - 9$   
 $= 5x^2 + 42x + 16$

- b  $(5x+2)(x+8)$   
 $\{ac = 80, b = 42, \text{ split is } +40x + 2x\}$
- c  $(3x+5)^2 - (2x-3)^2$   
 $= (3x+5+2x-3)(3x+5-2x+3)$   
 $= (5x+2)(x+8)$

## EXERCISE 3H

- 1 a  $x(3x+2)$  b  $(x+9)(x-9)$   
 c  $2(p^2+4)$  d  $3(b+5)(b-5)$   
 e  $2(x+4)(x-4)$  f  $n^2(n+2)(n-2)$   
 g  $(x-9)(x+1)$  h  $(d+7)(d-1)$   
 i  $(x+9)(x-1)$  j  $4t(1+2t)$   
 k  $(2x+1)(2x+5)$  l  $2(g+5)(g-11)$   
 m  $(2a+3d)(2a-3d)$  n  $5(a+1)(a-2)$   
 o  $2(c-1)(c-3)$  p  $(x+7)(2x+3)$   
 q  $d^2(d+3)(d-1)$  r  $x(x+2)^2$
- 2 a  $7(x-5y)$  b  $2(g+2)(g-2)$   
 c  $-5x(x+2)$  d  $m(m+3p)$   
 e  $(a+3)(a+5)$  f  $(m-3)^2$   
 g  $5x(x+y-xy)$  h  $(x+2)(y+2)$   
 i  $(y+5)(y-9)$  j  $(x+5)(2x+1)$   
 k  $3(y+7)(y-7)$  l  $(6x+1)(x-5)$   
 m  $(2c+1)(2c-1)$  n  $3(x+4)(x-3)$   
 o  $2(x-3)(b+5)$  p  $(4x+3)(3x+1)$   
 q  $-2(x-1)(x-3)$  r  $(4x+1)^2$   
 s  $-2x(x-1)^2$  t  $(a+b+3)(a+b-3)$   
 u  $2(x-3)(6x-1)$

## REVIEW SET 3A

- 1 Show that the total area equals the sum of the two smaller areas.
- 2 a  $x^2 - x - 30$  b  $6x^2 + 13x - 5$  c  $18x - x^2$
- 3 a  $x(7x-4)$  b  $x(x-1)(x+6)$  c  $(x-8)(x+5)$
- 4 a  $x^3 + 4x^2 - 7x - 10$  b  $2x^3 + 5x^2 - 8x - 6$
- 5 a  $(4+3m)(4-3m)$  b  $x(x+9)(x-9)$   
 c  $(x+12)(x+2)$
- 6 a  $t^2 - 49$  b  $4y^2 - 25$  c  $4m^2 - 20mn + 25n^2$
- 7 a  $2(x+5)^2$  b  $(b+d)(2-c)$
- 8 a  $8k^3 + 36k^2 + 54k + 27$  b  $r^3 - 12r^2t + 48rt^2 - 64t^3$
- 9 a  $(x-2)(x+9)$  b  $3(x+2)(x-5)$  c  $-2(x+4)(x-8)$
- 10 a  $(4x+3)(2x+1)$  b  $(5x-3)(x-2)$   
 c  $-(3x+1)(3x-2)$
- 11 b  $3(x+2)(x+12)$   
 c  $(2x+9+x-3)(2x+9-x+3) = 3(x+2)(x+12)$
- 12 a i  $a^2 + 2ab + b^2$  ii  $a^3 + 3a^2b + 3ab^2 + b^3$   
 iii  $a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$   
 iv  $a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$   
 b i 8 ii 16 iii 32 c  $2^n$
- d From 12 a, we see that if  $a = b = 1$  in these four expansions, we obtain results of  $4 = 2^2$ ,  $8 = 2^3$ ,  $16 = 2^4$ , and  $32 = 2^5$ .  
 Letting  $a = b = 1$  in  $(a+b)^n$  we get  $(1+1)^n = 2^n$ .

## REVIEW SET 3B

- 1 a  $20x - 25$  b  $12x - 4x^2$  c  $3x^2 - 5x + 12$
- 2 a  $x^3 + 2x - 20$  b  $3b^2$