

**EXERCISE 3C**

- 1 a  $x^3 + 3x^2 + 3x + 1$       b  $x^3 + 9x^2 + 27x + 27$   
 c  $x^3 + 15x^2 + 75x + 125$       d  $x^3 + 3x^2y + 3xy^2 + y^3$   
 e  $x^3 - 3x^2 + 3x - 1$       f  $x^3 - 15x^2 + 75x - 125$   
 g  $x^3 - 12x^2 + 48x - 64$       h  $x^3 - 3x^2y + 3xy^2 - y^3$   
 i  $8 + 12y + 6y^2 + y^3$       j  $8x^3 + 12x^2 + 6x + 1$   
 k  $27x^3 + 27x^2 + 9x + 1$   
 l  $8y^3 + 36xy^2 + 54x^2y + 27x^3$   
 m  $8 - 12y + 6y^2 - y^3$       n  $8x^3 - 12x^2 + 6x - 1$   
 o  $27x^3 - 27x^2 + 9x - 1$   
 p  $8y^3 - 36xy^2 + 54x^2y - 27x^3$

- 3 a  $x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$   
 b  $x^4 + 4x^3 + 6x^2 + 4x + 1$   
 c  $x^4 + 8x^3 + 24x^2 + 32x + 16$   
 d  $x^4 + 12x^3 + 54x^2 + 108x + 81$   
 e  $x^4 - 4x^3y + 6x^2y^2 - 4xy^3 + y^4$   
 f  $x^4 - 4x^3 + 6x^2 - 4x + 1$   
 g  $x^4 - 8x^3 + 24x^2 - 32x + 16$   
 h  $16x^4 - 32x^3 + 24x^2 - 8x + 1$

- 4 a  $\begin{matrix} 1 & 5 & 10 & 10 & 5 & 1 \\ 1 & 6 & 15 & 20 & 15 & 6 & 1 \end{matrix}$

We start and finish each row with a 1. The other entries are obtained by adding the two adjacent numbers in the row above.

- b i  $a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$   
 ii  $a^5 - 5a^4b + 10a^3b^2 - 10a^2b^3 + 5ab^4 - b^5$   
 iii  $a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + b^6$   
 iv  $a^6 - 6a^5b + 15a^4b^2 - 20a^3b^3 + 15a^2b^4 - 6ab^5 + b^6$   
 c i  $x^5 - 10x^4 + 40x^3 - 80x^2 + 80x - 32$   
 ii When  $x = 1$ ,  $(x - 2)^5 = (-1)^5 = -1$

$$\begin{aligned} \text{and } 1^5 - 10 \times 1^4 + 40 \times 1^3 - 80 \times 1^2 + 80 \times 1 - 32 \\ = 1 - 10 + 40 - 80 + 80 - 32 \\ = -1 \quad \checkmark \end{aligned}$$