

6.3 Pascal's Triangle - Worksheet #1

MCR3U

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SOLUTIONS.

1) Find each coefficient described.

a) coefficient of x^2 in the expansion of $(2 + x)^5$

$$3^{\text{rd}} \text{ term is } 10(2)^3(x)^2 = 80x^2$$

∴ the coefficient is 80.

c) coefficient of x in the expansion of $(x + 3)^5$

$$5^{\text{th}} \text{ term is } 5(x)^1(3)^4 = 405x$$

∴ the coefficient is 405

e) coefficient of x^3y^2 in expansion of $(x - 3y)^5$

$$3^{\text{rd}} \text{ term is } 10(x)^3(-3y)^2 = 90x^3y^2$$

∴ the coefficient is 90.

b) coefficient of x^2 in the expansion of $(x + 2)^5$

$$4^{\text{th}} \text{ term is } 10(x)^2(2)^3 = 80x^2$$

∴ the coefficient is 80.

d) coefficient of b in the expansion of $(3 + b)^4$

$$2^{\text{nd}} \text{ term is } 4(3)^3(b) = 108b$$

∴ the coefficient is 108.

f) coefficient of a^2 in the expansion of $(2a + 1)^5$

$$4^{\text{th}} \text{ term is } 10(2a)^2(1)^3 = 40a^2$$

∴ the coefficient is 40.

2) Find each term described.

a) 2nd term in expansion of $(y - 2x)^4$

$$= 4(y)^3(-2x)^1$$

$$= -8y^3x$$

b) 4th term in expansion of $(4y + x)^4$

$$= 4(4y)(x)^3$$

$$= 16yx^3$$

c) 1st term in expansion of $(a + b)^5$

$$= 1(a)^5(b)^0$$

$$= a^5$$

d) 2nd term in expansion of $(y - x)^4$

$$= 4(y)^3(-x)^1$$

$$= -4y^3x$$

3) Expand completely

a) $(2m - 1)^4$

$$= 1(2m)^4 + 4(2m)^3(-1) + 6(2m)^2(-1)^2$$

$$+ 4(2m)(-1)^3 + 1(-1)^4$$

$$= 16m^4 - 32m^3 + 24m^2 - 8m + 1$$

b) $(x - y)^3$

$$= 1(x)^3 + 3(x)^2(-y) + 3(x)(-y)^2 + 1(-y)^3$$

$$= x^3 - 3x^2y + 3xy^2 - y^3$$

$$\text{c) } (x^4 - y)^5$$

$$= 1(x^4)^5 + 5(x^4)^4(-y) + 10(x^4)^3(-y)^2 + 10(x^4)^2(-y)^3 + 5(x^4)(-y)^4 + 1(-y)^5$$

$$= x^{20} - 5x^{16}y + 10x^{12}y^2 - 10x^8y^3 + 5x^4y^4 - y^5$$

$$\text{d) } (2x^3 + 1)^5$$

$$= 1(2x^3)^5 + 5(2x^3)^4(1) + 10(2x^3)^3(1)^2 + 10(2x^3)^2(1)^3 + 5(2x^3)(1)^4 + 1(1)^5$$

$$= 32x^{15} + 80x^{12} + 80x^9 + 40x^6 + 10x^3 + 1$$

$$\text{e) } (y - x^2)^3$$

$$= 1(y)^3 + 3(y)^2(-x^2)' + 3(y)'(-x^2)^2 + 1(-x^2)^3$$

$$= y^3 - 3y^2x^2 + 3yx^4 - x^6$$

$$\text{f) } (y^3 - 4x)^3$$

$$= 1(y^3)^3 + 3(y^3)^2(-4x)' + 3(y^3)'(-4x)^2 + 1(-4x)^3$$

$$= y^9 - 12y^6x + 48y^3x^2 - 64x^3$$

Answers

1) a) 80 b) 80 c) 405 d) 108 e) 90 f) 40

2) a) $-8y^3x$ b) $16yx^3$ c) a^5 d) $-4y^3x$

3) a) $16m^4 - 32m^3 + 24m^2 - 8m + 1$ b) $x^3 - 3x^2y + 3xy^2 - y^3$

c) $x^{20} - 5x^{16}y + 10x^{12}y^2 - 10x^8y^3 + 5x^4y^4 - y^5$

d) $32x^{15} + 80x^{12} + 80x^9 + 40x^6 + 10x^3 + 1$

e) $y^3 - 3y^2x^2 + 3yx^4 - x^6$ f) $y^9 - 12y^6x + 48y^3x^2 - 64x^3$