

$$1) \text{ coeff of } x^3 \text{ in } (2+3x)^5$$

$$\text{Term is } {}^5C_3 (2)^2 (3x)^3$$

$$= \frac{5 \cdot 4}{1 \cdot 2} \times 4 \times 27x^3$$

$$= 1080x^3$$

$$\text{coeff of } x^3 \text{ is } 1080$$

$$\text{Coeff of } x^3 \text{ in } (1-2x)^6$$

$$\text{Term is } {}^6C_3 (1)^3 (-2x)^3$$

$$= 20 \times 1 \times (-8x^3)$$

$$= -160x^3$$

$$\text{Coeff of } x^3 \text{ is } -160$$

$$2) (2-x)^3$$

$$\begin{array}{cccc} & & 1 & \\ & & 1 & 2 & 1 \\ & 1 & 3 & 3 & 1 \end{array}$$

$$2^3 + 3(2)^2(-x) + 3(2)(-x)^2 + (-x)^3$$

$$= 8 - 12x + 6x^2 - x^3$$

$$5) \text{ coeff of } x^4 \text{ in } (x+5)^6$$

$$\text{Term is } {}^6C_4 (x)^4 (5)^2$$

$$= \frac{6 \cdot 5}{1 \cdot 2} \times x^4 \times 25$$

$$= 15 \times 25 \times x^4$$

$$= 375x^4$$

$$\text{Coeff of } x^4 \text{ is } 375$$

$$3) (2+x)^4$$

$$\begin{array}{cccc} & & 1 & \\ & & 1 & 2 & 1 \\ & 1 & 3 & 3 & 1 \\ & 1 & 4 & 6 & 4 & 1 \end{array}$$

$$2^4 + 4(2)^3x + 6(2)^2x^2$$

$$+ 4(2)x^3 + x^4$$

$$= 16 + 32x + 24x^2 + 8x^3 + x^4$$

$$6) \text{ Coeff of } x^3 \text{ in } (3-2x)^5$$

$$\text{Term is } {}^5C_3 (3)^2 (-2x)^3$$

$$= \frac{5 \cdot 4}{1 \cdot 2} \times 9 \times (-8x^3)$$

$$= -720x^3$$

$$\text{Coeff of } x^3 \text{ is } -720$$

$$4) {}^6C_3 = \frac{6!}{3!3!}$$

$$= \frac{6 \cdot 5 \cdot 4}{3 \cdot 2 \cdot 1} = 20$$

7) i) $8C_3 = \frac{8!}{5!3!}$
 $= \frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} = 56$

ii) coeff of x^3 in $(1 - \frac{x}{2})^8$

Term is

$$8C_3 (1)^5 \left(-\frac{x}{2}\right)^3$$

$$= 56 \times 1 \times \left(-\frac{x^3}{8}\right)$$

$$= -7x^3$$

Coeff of x^3 is -7

8) Coeff of x^3 in $(5 - 2x)^5$

Term is

$$5C_3 (5)^2 (-2x)^3$$

$$= \frac{5 \cdot 4}{2 \cdot 1} \times 25 \times (-8x^3)$$

$$= -2000x^3$$

Coeff of x^3 is -2000

9) i) $(x^2 - 3)(x^3 + 7x + 1)$

Term in x^3 is

$$-3x^3 + 7x^3 = 4x^3$$

\therefore coeff of x^3 is 4

ii) Coeff of x^2 in $(1 + 2x)^7$

Term in x^2 is

$$7C_2 (1)^5 (2x)^2$$

$$= \frac{7 \cdot 6}{1 \cdot 2} \times 1 \times 4x^2$$

$$= 84x^2$$

Coeff of x^2 is 84

10) i) $5C_3 = \frac{5!}{3!2!} = \frac{5 \cdot 4}{2 \cdot 1}$
 $= 10$

10) ii)

Coeff of x^3 in $(1 + 2x)^5$

Term is $5C_3 (1)^2 (2x)^3$

$$= 10 \times 1 \times 8x^3$$

$$= 80x^3$$

Coeff of x^3 is 80