

Advanced Algebra

Unit 7 Binomial Expansion Assignment #6 Higher Challenge

For the following problems:

a) Find the coefficient of the given term

b) Find the constant term

Remember there could be no solution if you do not get an integer answer.

1) $(x^2 + \frac{4}{x})^{12}$

$(x^2)^{12}$ $(x^2)^{11} \frac{4}{x}$ $(x^2)^{10} (\frac{4}{x})^2$
 $(x^2)^9 (\frac{4}{x})^3$

2) $(x^2 + \frac{6}{x})^{14}$

$(x^2)^{14}$ $(x^2)^{13} (\frac{6}{x})$ $(x^2)^{12} (\frac{6}{x})^2$
 $(x^2)^{11} (\frac{6}{x})^3$ $(x^2)^{10} (\frac{6}{x})^4$
 $(x^2)^9 (\frac{6}{x})^5$ $(x^2)^8 (\frac{6}{x})^6$

Find the coefficient of x^{15}

Find the coefficient of x^{10}

Final answer

$C_{12}^3 \cdot 4^3$

Final answer

$C_{14}^6 \cdot 6^6 \cdot x^{10}$

Find the constant term

Find the constant term

$(x^2)^8 (\frac{4}{x})^4$ $(x^2)^7 (\frac{4}{x})^4$
 $(x^2)^4 (\frac{4}{x})^8$

$(x^2)^7 (\frac{6}{x})^7$
 $(x^2)^6 (\frac{6}{x})^8$

Final answer

$C_{12}^8 \cdot 4^8$

Final answer

None

$$3) \left(x^2 + \frac{12}{x}\right)^{10}$$

Find the coefficient of x^5

Final answer
 ${}_{10}C_5 \cdot 12^5$

$$x^{20} + {}_{10}C_1 x^{18} \left(\frac{12}{x}\right) + x^{16} + x^{14} + x^{12} + \left(x^{10} \left(\frac{12}{x}\right)^5\right)$$

Find the constant term

This gives me x^5

Final answer
 Never

$$20 - 3r = 0$$

Never

$$4) \left(x^2 + \frac{9}{x}\right)^7$$

Find the coefficient of x^2

Final answer
 ${}_{7}C_4 \cdot 9^4$

Find the constant term

$$14 - 3r = 2$$

$$-3r = -12$$

$$r = 4$$

Final answer
 Never

$$14 - 3r = 0$$

$$5) \left(x^3 + \frac{12}{x}\right)^8$$

Find the coefficient of x^{12}

Final answer
 ${}_{8}C_3 \cdot 12^3$

$${}_{8}C_r (x^3)^{8-r} \left(\frac{12}{x}\right)^r$$

$$24 - 3r - r = 12$$

$$24 - 4r = 12$$

$$r = 3$$

Find the constant term

$${}_{8}C_6 \cdot 12^6$$

$$24 - 4r = 0$$

$$r = 6$$

$$6) \left(x^3 + \frac{10}{x^2}\right)^9$$

Find the coefficient of x^7

Final answer
 ${}_{9}C_5 \cdot 10^5$

$${}_{9}C_r (x^3)^{9-r} \left(\frac{10}{x^2}\right)^r$$

$$27 - 3r - 2r = 7$$

$$27 - 5r = 7$$

$$-5r = -20$$

$$r = 5$$

Find the constant term

$$27 - 5r = 0$$

Never