

Ex 8A

$$2e) (2x-3)^4$$

$$\begin{array}{r} 1 \quad 2 \quad 1 \\ 1 \quad 3 \quad 3 \quad 1 \\ 1 \quad 4 \quad 6 \quad 4 \quad 1 \end{array}$$

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

$$16x^4 - 96x^3 + 216x^2 - 216x + 81$$


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Ex 8B

$$\binom{n}{r} nCr = \frac{n!}{(n-r)! r!}$$

$$3d) \binom{20}{17} = \frac{20!}{17! 3!} = \frac{20 \cdot 19 \cdot 18^3}{3 \cdot 2 \cdot 1} = 1140$$

$$\binom{20}{10} = \frac{20 \cdot 19 \cdot 18 \cdot 17 \cdot 16 \cdot 15 \cdot 14 \cdot 13 \cdot 12 \cdot 11}{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

$$= 19 \times 17 \times 2 \times 2 \times 13 \times 11$$

$$= 184,756$$


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Ex 8C

$$1c) (4-x)^4$$

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

$$256 - 256x + 96x^2 - 16x^3 + x^4$$


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$$2c) (1+3x)^6 \text{ first 4 terms}$$

$$1^6 + \binom{6}{1} 1^5 (3x) + \binom{6}{2} 1^4 (3x)^2 + \binom{6}{3} 1^3 (3x)^3$$

$$1 + 18x + 15x^2 + 20x^3$$

$$1 + 18x + 135x^2 + 540x^3$$

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3c)  $(p-q)^8$  first 4 terms

$$p^8 + \binom{8}{1} p^7(-q) + \binom{8}{2} p^6(-q)^2 + \binom{8}{3} p^5(-q)^3$$

$$= p^8 - 8p^7q + 28p^6q^2 - 56p^5q^3$$

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7)  $\left(x + \frac{1}{x}\right)^5$

$$x^5 + 5x^4 \frac{1}{x} + 10x^3 \frac{1}{x^2} + 10x^2 \frac{1}{x^3} + 5x \frac{1}{x^4} + \frac{1}{x^5}$$

$$x^5 + 5x^3 + 10x + \frac{10}{x} + \frac{5}{x^3} + \frac{1}{x^5}$$

$$\left(x + \frac{1}{x}\right)^6 \quad (1 \ 6 \ 15 \ 20 \ 15 \ 6 \ 1)$$

$$x^6 + 6x^5 \frac{1}{x} + 15x^4 \frac{1}{x^2} + 20x^3 \frac{1}{x^3} + 15x^2 \frac{1}{x^4} + 6x \frac{1}{x^5} + \frac{1}{x^6}$$

$$= x^6 + 6x^4 + 15x^2 + 20 + \frac{15}{x^2} + \frac{6}{x^4} + \frac{1}{x^6}$$

Ex 8)

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

$$\begin{aligned}\text{first term in } x^3 &= \binom{8}{3}(2)^5(-\frac{1}{2}x)^3 \\ &= -56 \times 32 \times \frac{x^3}{8} \\ &= -224x^3\end{aligned}$$

$$\text{coeff} = -224$$

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l e) coeff of  $x^3$  in  $(5 + \frac{1}{4}x)^5$

$$\begin{aligned}\text{term in } x^3 &= \binom{5}{3}(5)^2(\frac{1}{4}x)^3 \\ &= 10 \times 25 \times \frac{x^3}{64} \\ &= \frac{125}{32}x^3\end{aligned}$$

$$\text{coeff} = \frac{125}{32}$$

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## Typical Exam Question

2. (a) Find the first 3 terms, in ascending powers of  $x$ , of the binomial expansion of

$$(3 + bx)^5$$

where  $b$  is a non-zero constant. Give each term in its simplest form.

(4)

Given that, in this expansion, the coefficient of  $x^2$  is twice the coefficient of  $x$ ,

- (b) find the value of  $b$ .

(2)

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a) 
$$3^5 + \binom{5}{1} 3^4 (bx) + \binom{5}{2} 3^3 (bx)^2$$
  
$$243 + 405bx + 270b^2x^2$$

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b) 
$$270b^2 = 2 \times 405b$$

$$270b = 810$$

$$b = \frac{810}{270}$$

$$b = 3$$

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## Homework

Ex 4C Q4 g, h, i

Ex 4D Q1 a, b, c, d  
Q2  
Q4

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