

5. (a) Find the first 4 terms, in ascending powers of x , of the binomial expansion of

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

giving each coefficient in simplest form.

(4)

(b) Hence find the coefficient of x in the expansion of

$$\left(3x - \frac{1}{8x^2}\right)(2 + 3x)^6$$

(3)

(a)

$$(2 + 3x)^6 = {}^6C_0(2)^6(3x)^0$$

$$+ {}^6C_1(2)^5(3x)^1$$

$$+ {}^6C_2(2)^4(3x)^2$$

$$+ {}^6C_3(2)^3(3x)^3$$

$$+ \dots$$

(1 mark)

$$= 1(64)(1) + 6(32)(3x) + 15(16)(9x^2)$$

$$+ 20(8)(27x^3) + \dots$$

(1 mark)

$$= 64 + 576x + 2160x^2 + 4320x^3 + \dots$$

(2 marks)

(b)

$$\left(3x - \frac{1}{8x^2}\right)(64 + 576x + 2160x^2 + 4320x^3 + \dots)$$

Term in x can only arise as $(3x \times 64) + \left(-\frac{1}{8x^2}\right)(4320x^3)$

(1 mark)

$$= 192x - 540x \quad (1 \text{ mark})$$

$$= \underline{\underline{-348x}} \quad (1 \text{ mark})$$