

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

$$(1 + kx)^{10}$$

where k is a non-zero constant. Write each coefficient as simply as possible.

(3)

Given that in the expansion of $(1 + kx)^{10}$ the coefficient of x^3 is 3 times the coefficient of x ,

- (b) find the possible values of k .

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(3)

$$\begin{aligned} \text{(a)} \quad (1 + kx)^{10} &= 1 + 10kx + (kx)^2 \times \frac{10 \cdot 9}{2} + (kx)^3 \times \frac{10 \cdot 9 \cdot 8}{1 \cdot 2 \cdot 3} \\ &= \underline{1 + 10kx + 45k^2x^2 + 120k^3x^3} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad \text{The data gives } 120k^3 &= 3 \times 10k \\ 4k^3 &= k \end{aligned}$$

k is non-zero so we may divide by k

$$k^2 = \frac{1}{4}$$

$$\underline{k = \pm \frac{1}{2}}$$