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8.4

① a) $(1+x)^{14}$

$^{14}C_3 \times (1)^{11} \times (x)^3 = 364x^3$

So, 364.

b) $(2+x)^{10}$

$^{10}C_3 \times (2)^7 \times (x)^3 = 15360x^3$

So, 15360.

c) $(5-x)^7$

$^7C_3 \times (5)^4 \times (-x)^3 = -21875x^3$

So, -21875.

② a) $(3-2x)^9$

$^9C_4 \times (3)^5 \times (-2x)^4 = 489888x^4$

So, 489888.

b) $(5+3x)^7$

$^7C_4 \times (5)^3 \times (3x)^4 = 354375x^4$

So, 354375.

c) $(\frac{1}{2}+8x)^{12}$

$^{12}C_4 \times (\frac{1}{2})^8 \times (8x)^4 = 7920x^4$

So, 7920.

③ a) $(3-x)(2+3x)^6$

$^6C_3 \times (2)^3 \times (3x)^3 = 4320x^3 \times 3$

$= 12960x^3$

Now find the coefficient of $x^2$ in $(2+3x)^6$ as $-x \times x^2$ will give $x^3$:

$^6C_2 \times (2)^4 \times (3x)^2 = 2160x^2 \times -1 = -2160x^2$

$12960x^3 - 2160x^3 = 10800x^3$

So, 10800.

④ $(1+\frac{2}{3}x)^6$

${}^6C_3 \times (1)^3 \times (\frac{2}{3}x)^3$

$= \frac{160}{27}x^3$

So, $\frac{160}{27}$

⑤ $(1+2x)^n$

${}^nC_2 \times (2)^2 = 60$

${}^nC_2 = 15$

$\frac{n(n-1)}{2} = 15$

$n(n-1) = 30$

$n^2 - n - 30 = 0$ → $(n>0)$

$n = 6$ or ~~$n = -5$~~

So $n = 6$

⑥ $(3+ax)^5$

${}^5C_2 \times (3)^3 \times (a)^2 = 4320$

${}^5C_2 \times a^2 = 160$

$a^2 = 16$

$a = \pm 4$

⑦ $(2-bx)^6$

${}^6C_3 \times (2)^3 \times (-b)^3 = -20$

${}^6C_3 \times -b^3 = \frac{-5}{2}$

$\sqrt[3]{\frac{1}{8}} = b^3$

$b = 0.5$

(8) a) $(2-3x)^8$

$^8C_0 \times (2)^8 = 256$

$^8C_1 \times (2)^7 \times (-3x)^1 = -3072x$

$^8C_2 \times (2)^6 \times (-3x)^2 = 16128x^2$

$^8C_3 \times (2)^5 \times (-3x)^3 = -48384x^3$

$256 - 3072x + 16128x^2 - 48384x^3 \ldots$

b) $\frac{x}{2} \times 16128x^2 = \frac{16128x^3}{2}$

$= 8064x^3$

$-48384 + 8064 = -40320$

(9) a) $(3+px)^6$

$^6C_0 \times (3)^6 = 729$

$^6C_1 \times (3)^5 \times (px)^1 = 1458px$

$^6C_2 \times (3)^4 \times (px)^2 = 1215p^2x^2$

$729 + 1458px + 1215p^2x^2 \ldots$

b) $1458p \times 5 = 1215p^2$

$7290p = 1215p^2$

$p = 6$