8.

$$g(x) = (2 + ax)^8 \qquad \text{where } a \text{ is a constant}$$

Given that one of the terms in the binomial expansion of $g(x)$ is $3402x^5$

(a) find the value of a.

(4)

Using this value of a,

(b) find the constant term in the expansion of

$$\left(1 + \frac{1}{x^4}\right)(2 + ax)^8$$

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(3)

(a) The x^5 term is $2^{(8-5)}(ax)^5 \times \binom{8}{5} \leftarrow \left(\frac{8\cdot7\cdot6\cdot5\cdot4}{1\cdot2\cdot3\cdot4\cdot5} = 56\right)$

$= 2^3 a^5 x^5 \times 56$

$= 448 a^5 x^5$

This gives a from

$448a^5 = 3402$

$a^5 = \frac{3402}{448} = \frac{1701}{224}$ 7 is a factor top & botto

$= \frac{243}{32}$.

$a = \sqrt[5]{\frac{243}{32}} = \underline{\underline{\frac{3}{2}}}$ $(3^5 = 243 \text{ and } 2^5 = 32)$

There are two constant terms $\left(1 + \frac{1}{x^4}\right)\left(2^8 \ldots\ldots 2^4 a^4 x^4 \times \overset{({}^8C_4)}{70} \ldots\ldots\right)$

cancels

the two terms are $\underline{\underline{2^8}}$ and $\underline{\underline{2^4 a^4 \cdot 70}}$

So the total constant term is

$2^8 + 2^4 \times \left(\frac{3}{2}\right)^4 \times 70$

$= 2^8 + 3^4 \times 70 = 256 + 5670$

$\underline{= 5926}$