

Question	Scheme	Marks	AOs
6(a)	3^8 or 6561 as the constant term	B1	1.1b
	$\left(3 - \frac{2x}{9}\right)^8 = \dots + {}^8C_1(3)^7\left(-\frac{2x}{9}\right) + {}^8C_2(3)^6\left(-\frac{2x}{9}\right)^2 + {}^8C_3(3)^5\left(-\frac{2x}{9}\right)^3 + \dots$ $= \dots + 8 \times (3)^7\left(-\frac{2x}{9}\right) + 28 \times (3)^6\left(-\frac{2x}{9}\right)^2 + 56(3)^5\left(-\frac{2x}{9}\right)^3$	M1 A1	1.1b 1.1b
	$= 6561 - 3888x + 1008x^2 - \frac{448}{3}x^3 + \dots$	A1	1.1b
		(4)	
(b)	Coefficient of x^2 is $\frac{1}{2} \times "1008" - \frac{1}{2} \times " - \frac{448}{3} "$	M1	3.1a
	$= \frac{1736}{3} \quad \left(\text{or } 578 \frac{2}{3}\right)$	A1	1.1b
		(2)	

(6 marks)

Notes

(a)

B1: Sight of 3^8 or 6561 as the constant term.

M1: An attempt at the binomial expansion. This can be awarded for the correct structure of the 2nd, 3rd or 4th term. The correct binomial coefficient must be associated with the correct power of 3 and the correct power of $(\pm)\frac{2x}{9}$. Condone invisible brackets

eg ${}^8C_2(3)^6 - \frac{2x^2}{9}$ for this mark.

A1: For a correct simplified or unsimplified **second** or **fourth term** (with binomial coefficients evaluated).

$$+8 \times (3)^7 \left(-\frac{2x}{9}\right) \quad \text{or} \quad +56(3)^5 \left(-\frac{2x}{9}\right)^3$$

A1: $6561 - 3888x + 1008x^2 - \frac{448}{3}x^3$ Ignore any extra terms and allow the terms to be listed.

Allow the exact equivalent to $-\frac{448}{3}$ eg $-149.\dot{3}$ but not -149.3 .

Condone x^1 and eg $+ -3888x$. Do not isw if they multiply all the terms by eg 3

Alt(a)

B1: Sight of $3^8(1+\dots)$ or 6561 as the constant term

M1: An attempt at the binomial expansion $\left(1 - \frac{2}{27}x\right)^8$. This can be awarded for the correct structure of the 2nd, 3rd or 4th term. The correct binomial coefficient must be associated with the correct power of $(\pm)\frac{2x}{27}$. Condone invisible brackets for this mark.

Score for any of:

$$8 \times -\frac{2}{27}x, \quad \frac{8 \times 7}{2} \times \left(-\frac{2}{27}x\right)^2, \quad \frac{8 \times 7 \times 6}{6} \times \left(-\frac{2}{27}x\right)^3$$

which may be implied by any of

$$-\frac{16}{27}x, \quad +\frac{112}{729}x^2, \quad -\frac{448}{19683}x^3$$

A1: For a correct simplified or unsimplified **second** or **fourth** term including being multiplied by 3^8

A1: $6561 - 3888x + 1008x^2 - \frac{448}{3}x^3$ Ignore any extra terms and allow the terms to be listed.

Allow the exact equivalent to $-\frac{448}{3}$ eg $-149.\dot{3}$ but not -149.3 .

Condone x^1 and eg $+ -3888x$

(b)

M1: Adopts a correct strategy for the required coefficient. This requires an attempt to calculate $\pm \frac{1}{2}$ their coefficient of x^2 from part (a) $\pm \frac{1}{2}$ their coefficient of x^3 from part (a).

There must be an attempt to bring these terms together to a single value. ie they cannot just circle the relevant terms in the expansion for this mark. The strategy may be implied by their answer.

Condone any appearance of x^2 or x^3 appearing in their intermediate working.

A1: $\frac{1736}{3}$ or $578\frac{2}{3}$ Do not accept $578.\dot{6}$ or $\frac{1736}{3}x^2$