Question Number	Scheme	Marks
1	$f(x)=ax^3+3x^2-8x+2$	
	Sets $f(2)=3\Rightarrow 8a+12-16+2=3$	M1
	$\Rightarrow 8a=5\Rightarrow a=\frac{5}{8}$	M1A1
		(3)
		(3 marks)

M1: Attempts to set $f(2)=3$. The values embedded and the expression set equal to 3 is sufficient. May be implied by further work. If 2 embedded in the expression is not seen, condone slips in their evaluation provided there is still evidence that the intention was to substitute in 2.
May also be seen as $\left(f(2)-3=\right)\ a(2)^3+3(2)^2-8(2)-1=0$

M1: Solves a linear equation in a arising from setting $f(\pm 2)=\pm 3$. Condone slips in their rearrangement proceeding to $a=...$ (May be implied by further work).

A1: $a=\frac{5}{8}$ or exact equivalent

Answers of $a=\frac{5}{8}$ may appear with very little or no working, possibly via trial and improvement. If so, then marks can only be allocated if evidence is shown.

e.g. $f(x)=\frac{5}{8}\times x^3+3x^2-8x+2\Rightarrow\ f(2)=5+3(2)^2-8(2)+2=3\Rightarrow$ dividing by $(x-2)$ gives a remainder of 3

More difficult alternative methods may be seen:

Alt I: e.g. algebraic division (note they may also divide ax^3+3x^2-8x-1 by $(x-2)$ and set the remainder equal to 0)

$$\begin{array}{r|l} & ax^2+(3+2a)x+(-2+4a) \\ \hline x-2 & ax^3\quad +3x^2\quad -8x\quad +2 \\ & ax^3\quad -2ax^2 \\ & \quad (3+2a)x^2\quad -8x \\ & \quad (3+2a)x^2+(-6-4a)x \\ & \qquad\qquad (-2+4a)x\quad +2 \\ & \qquad\qquad (-2+4a)x\quad +4-8a \\ & \qquad\qquad\qquad\quad -2+8a\Rightarrow -2+8a=3\Rightarrow a=\frac{5}{8} \end{array}$$

M1: Divides the cubic by $(x-2)$, leading to a quadratic quotient where both the coefficient of x and the constant term are in terms of a. They should then have a linear remainder in a which is then set equal to 3

M1: Solves an equation resulting from setting a linear remainder in a equal to ± 3. It is dependent on the first method mark via this route.

A1: Completely correct with $a=\frac{5}{8}$

Alt II: You may also see a grid or an attempt at factorisation of ax^3+3x^2-8x-1 via inspection

M1: For an attempt at factorising e.g. $ax^3+3x^2-8x-1=(x-2)\left(ax^2+bx+\frac{1}{2}\right)$

M1: Forms two correct simultaneous equations and proceeds to find a value for *a*. Condoning slips in their solving.

$x^2: 3=-2a+b$

$x: -8=\frac{1}{2}-2b \Rightarrow b=\frac{17}{4} \Rightarrow a=\frac{3-\frac{17}{4}}{-2}=\frac{5}{8}$

A1: Completely correct with $a=\frac{5}{8}$

Question Number	Scheme	Marks
2	$\left(\frac{3}{8}+4x\right)^{12}$	
	Term in x^7 is $^{12}C_7\left(\frac{3}{8}\right)^5\left(4x\right)^7$ or coefficient of x^7 is $^{12}C_7\left(\frac{3}{8}\right)^5 4^7$	M1 A1
	Coefficient is 96228	A1
		(3)
		(3 marks)

Note that you do not need to see x^7 in their solution

M1: Combines a correct binomial coefficient with $\left(\frac{3}{8}\right)^5$ and either $\left(4x\right)^7$, 4^7 or x^7

Look for the binomial coefficient of the form e.g. $\binom{12}{7}$, $^{12}C_7$ or 792 o.e. Condone $\binom{12}{5}$ or $^{12}C_5$.

May be implied by further work.

Alternatively $\left(\frac{3}{8}+4x\right)^{12}=\left(\frac{3}{8}\right)^{12}\left(1+\frac{32}{3}x\right)^{12}\Rightarrow\left(\frac{3}{8}\right)^{12}\times\frac{12\times11\times10\times9\times8\times7\times6}{7!}\times\left(\frac{32}{3}x\right)^7$

Condone invisible brackets for this mark. e.g. $^{12}C_7\times\frac{3}{8}^5\times4x^7$

A1: Correct unsimplified term or coefficient e.g. $^{12}C_7\left(\frac{3}{8}\right)^5\times4^7$ or e.g. $\frac{12!}{5!7!}\left(\frac{3}{8}\right)^5\times4^7$. Invisible brackets may be implied by further work. Do not be concerned by the presence or absence of x^7

Note $^{12}C_7\left(\frac{3}{8}\right)^5\left(4x\right)^7$ or $^{12}C_5\left(\frac{3}{8}\right)^5\left(4x\right)^7$ scores M1A1 (may be seen as part of a list or several terms found in the expansion)

A1: For 96228 but condone 96 228 x^7 isw once a correct answer is seen. The term or coefficient must be identified if they have more than one term. A correct answer on its own with no incorrect working seen can score full marks.

Note: $\left(^{12}C_7\left(\frac{3}{8}\right)^5\times4x^7=23.493...\right)\approx23.5$ will score M1A0A0 (where they multiply by 4 instead of 4^7)