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)

Question Number	Scheme	Marks
3(a)	Attempts $\left(8-3\right)^2+\left(5--7\right)^2=...$	M1
	Writes $\left(x-3\right)^2+\left(y-5\right)^2=k$	M1
	$\left(x-3\right)^2+\left(y-5\right)^2=169$	A1
		(3)
(b)	Attempts $d^2+\left(2\sqrt{22}\right)^2=169\Rightarrow d=...$	M1
	States or uses $\left(y=\right)\ 5+d$	dM1
	$y=14$	A1
		(3)
		(6 marks)

(a)

M1: Attempts to find the radius or radius ^{2}. Must proceed to find a value. Condone a sign slip if attempting $5--7$ if this is seen as $5-7$ o.e. May be implied by 13 or 169. Do not be concerned with the labelling of the expression or value as r or r^2

M1: Writes the equation of the circle in the form $\left(x-3\right)^2+\left(y-5\right)^2=k$, where $k>0$, o.e.

e.g. $x^2+y^2-6x-10y+c=0$ where $c<0$

Invisible brackets may be implied by further work. Condone $\left(x-3\right)^2+\left(y-5\right)^2=r^2$ where no attempt has been made to find the radius or radius^2

A1: $\left(x-3\right)^2+\left(y-5\right)^2=169$ o.e. e.g. $x^2+y^2-6x-10y-135=0$ isw once a correct unsimplified equation for C is found. Condone $\left(x-3\right)^2+\left(y-5\right)^2=13^2$. A correct equation scores M1M1A1 but it must be seen in (a).

(b) **Note that** $(3+2\sqrt{22},\ 14)$ **as the final answer is A0**

M1: Attempts Pythagoras' theorem with "13" (as the hypotenuse) and $2\sqrt{22}$ to find d. Not just d^2 (See diagram)

dM1: States or uses the equation for MN, $\left(y=\right)\ 5+d$ but also condone stating/using $\left(y=\right)\ 5-d$ (may be implied by their value for y)

A1: $y=14$ only (Must be exactly 14 e.g. $13.99...=14$ is A0). **Further work leading to a different equation of a line is A0.**

