Q	Marking instructions	AO	Marks	Typical solution
9(a)(i)	Obtains $1+(-1)(3x)+\dfrac{(-1)(-2)(3x)^2}{2!}$ OE with at least two terms correct	1.1a	M1	$(1+3x)^{-1} \approx 1+(-1)(3x)+\dfrac{(-1)(-2)(3x)^2}{2!}$ $=1-3x+9x^2$
	Obtains $1-3x+9x^2$	1.1b	A1	
	Subtotal		**2**	

Q	Marking instructions	AO	Marks	Typical solution
9(a)(ii)	Writes fraction as $(2-3x)^{-1}$ PI by $\dfrac{1}{2}+\dfrac{3}{4}x+\dfrac{9}{8}x^2$	1.1b	B1	
	Factorises to obtain the form $2^{-1}(1-Ax)^{-1}$ PI by $\dfrac{1}{2}+\dfrac{3}{4}x+\dfrac{9}{8}x^2$	1.1a	M1	$\dfrac{1}{2-3x}=(2-3x)^{-1}$ $=2^{-1}\left(1+\left(-\dfrac{3x}{2}\right)\right)^{-1}$
	Expands $\left(1-\dfrac{3x}{2}\right)^{-1}$ to obtain $1+(-1)\left(\pm\dfrac{3x}{2}\right)+\dfrac{(-1)(-2)}{2!}\left(\pm\dfrac{3x}{2}\right)^2$ OE Condone one sign error	1.1a	M1	$\approx\dfrac{1}{2}\left(1+(-1)\left(-\dfrac{3x}{2}\right)+\dfrac{(-1)(-2)}{2!}\left(-\dfrac{3x}{2}\right)^2\right)$ $\dfrac{1}{2-3x}\approx\dfrac{1}{2}+\dfrac{3}{4}x+\dfrac{9}{8}x^2$
	Completes a correct argument to show $\dfrac{1}{2-3x}\approx\dfrac{1}{2}+\dfrac{3}{4}x+\dfrac{9}{8}x^2$	2.1	R1	$\dfrac{1}{2}$, $\dfrac{3}{4}x$ and $\dfrac{9}{8}x^2$ form a geometric sequence with common ratio $\dfrac{3}{2}x$
	States that the common ratio is $\dfrac{3}{2}x$	2.2a	B1	
	Subtotal		**5**	

Q	Marking instructions	AO	Marks	Typical solution
9(b)	Uses a valid method to find P or Q Substitution of $x=-\frac{1}{3}$ or $x=\frac{2}{3}$ Or Rearranging and substitution or comparison of coefficients	1.1a	M1	$\frac{36x}{(1+3x)(2-3x)}=\frac{P}{(2-3x)}+\frac{Q}{(1+3x)}$ $36x=P(1+3x)+Q(2-3x)$ Let $x=-\frac{1}{3}$ $\Rightarrow -12=3Q$ $Q=-4$ $x=\frac{2}{3}$ $\Rightarrow 24=3P$ $P=8$
	Obtains $P=8$	1.1b	A1	
	Obtains $Q=-4$	1.1b	A1	
	Subtotal		**3**	

Q	Marking instructions	AO	Marks	Typical solution
9(c)(i)	Multiplies their P by their expansion in (a)(ii) and multiplies their Q by their expansion in (a)(i) Condone a sign error Or Multiplies their $\frac{P}{3}$ by their expansion in (a)(ii) and multiplies their $\frac{Q}{3}$ by their expansion in (a)(i) Condone a sign error Or Writes the product of $12x$ or $36x$ with their three-term expansion in (a)(i) and their three-term expansion in (a)(ii) Condone a sign error	3.1a	M1	$\frac{8}{(2-3x)}-\frac{4}{(1+3x)}$ $\approx 8\left(\frac{1}{2}+\frac{3}{4}x+\frac{9}{8}x^2\right)-4\left(1-3x+9x^2\right)$ $=18x-27x^2$ $\therefore \frac{12x}{(1+3x)(2-3x)}\approx 6x-9x^2$
	Obtains $6x-9x^2$	1.1b	A1	
	Subtotal		**2**	

Q	Marking instructions	AO	Marks	Typical solution
9(c)(ii)	Deduces $\lvert x\rvert<\frac{1}{3}$ ACF	2.2a	R1	$\lvert x\rvert<\frac{1}{3}$
	Subtotal		**1**	

	Question 9 Total		**13**	