Question	Scheme	Marks
2(a)	$(1+Ax)^n = 1+n(Ax)+\dfrac{n(n-1)(Ax)^2}{2}+\ldots$	B1
	$\Rightarrow nA = -\dfrac{1}{3} \qquad \dfrac{n(n-1)A^2}{2}=\dfrac{5}{36}$	M1
	$\Rightarrow A = -\dfrac{1}{3n}$	
	$\Rightarrow \dfrac{n(n-1)\left(-\dfrac{1}{3n}\right)^2}{2}=\dfrac{5}{36} \Rightarrow n=-\dfrac{2}{3} \Rightarrow A=\dfrac{1}{2}$	M1dM1A1A1 [6]
	ALT 1	
	$\Rightarrow nA = -\dfrac{1}{3} \qquad \dfrac{n(n-1)A^2}{2}=\dfrac{5}{36}$	[M1
	$\Rightarrow n = -\dfrac{1}{3A}$	
	$\Rightarrow \dfrac{-\dfrac{1}{3A}\left(-\dfrac{1}{3A}-1\right)(A)^2}{2}=\dfrac{5}{36} \Rightarrow A=\dfrac{1}{2} \Rightarrow n=-\dfrac{2}{3}$	M1dM1A1A1]
	ALT 2	
	$\Rightarrow nA = -\dfrac{1}{3} \Rightarrow \left[(nA)^2=\dfrac{1}{9}\right]$	
	$\dfrac{n(n-1)A^2}{2!}=\dfrac{5}{36} \Rightarrow \left[\dfrac{(nA)^2-A(An)}{2!}=\dfrac{5}{36}\right]$	[M1
	$\Rightarrow \dfrac{\dfrac{1}{9}-A\left(-\dfrac{1}{3}\right)}{2}=\dfrac{5}{36} \Rightarrow A=\dfrac{1}{2} \Rightarrow n=-\dfrac{2}{3}$	M1dM1A1A1]
(b)	Coefficient of $x^3 \Rightarrow \dfrac{\left(-\dfrac{2}{3}\right)\left(-\dfrac{5}{3}\right)\left(-\dfrac{8}{3}\right)\left(\dfrac{1}{2}\right)^3}{3!}=-\dfrac{5}{81}$	M1A1 [2]
		Total 8 marks

Part	Mark	Notes
(a)	B1	For the correct expansion of $(1+Ax)^n$ This can be implied by correct work in the term in x and x^2
	M1	Equates their second term to $-\frac{1}{3}$ and their third term to $\frac{5}{36}$ Allow presence of x and x^2, provided it is on **BOTH** sides. eg Allow $nAx = -\frac{1}{3}x$ and $\left[\frac{n(n-1)A^2}{2}\right]x^2 = \frac{5}{36}x^2$
	M1	Substitutes A into n to form an equation in n
	dM1	For solving **their** equation in n If they make errors in simplification to this step e.g., $\left(-\frac{1}{3n}\right)^2 \Rightarrow \left(\frac{1}{9n}\right)$ or $\left(-\frac{1}{3n}\right)^2 \Rightarrow -\left(\frac{1}{9n^2}\right)$ then this is M0 Their equation must be either a quadratic or linear if they cancel an n This is dependent on the previous M mark only.
	A1	For the correct value of n **or** A $n = -\frac{2}{3},\ A = \frac{1}{2}$ isw $n = 0$ seen. This is equivalent to cancelling n's
	A1	For the correct value of n **and** A
	ALT 1	**First two marks same as main method**
	M1	Substitutes n in terms of A into an equation in A $\dfrac{\left(-\frac{1}{3A}\right)\left(\left(-\frac{1}{3A}\right)-1\right)(A)^2}{2} = \frac{5}{36}$ **Do not** allow a substitution of $n = -\frac{1}{3}$ for this mark
	dM1	For solving **their** equation in A to find a value for A Their equation must be either a quadratic or linear if they cancel an A This is dependent on the previous M mark only.
	A1	For the correct value of n **or** A $n = -\frac{2}{3},\ A = \frac{1}{2}$
	A1	For the correct value of n **and** A
	ALT 2	**First two marks same as main method**
	M1	Substitutes nA into $\dfrac{(nA)^2 - A(An)}{2!} = \frac{5}{36}$
	dM1	Solves their equation to find a value for A provided no errors introduced. This is dependent on the previous M mark only.
	A1	For the correct value of n **or** A $n = -\frac{2}{3},\ A = \frac{1}{2}$
	A1	For the correct value of n **and** A

(b)	M1	Uses the **correct form** for the fourth term of a binomial expansion with their *A* and their *n*. You may see this in terms of *A* and *n* in part (a) Accept as a minimum, the correct power of $\left(\frac{1}{2}\right)^3$ with the correct denominator i.e. 3! Allow the presence of x^3 for this mark.
	A1	For the correct value of $-\frac{5}{81}$ If you see the correct value following the correct values of *A* and *n* with no working, award M1A1