

Question			Answer	Marks	AO	Guidance
5			DR $u = x + 1$ $du = dx$ $\int_{x=c}^{x=c+4} \left(\frac{1}{u} - \frac{1}{u^2} \right) du$ $\left[\ln u + \frac{1}{u} \right]_{x=c}^{x=c+4}$ $\ln(c+5) + \frac{1}{c+5} - \ln(c+1) - \frac{1}{c+1}$ Attempting to solve either <i>their</i> $\frac{c+5}{c+1} = 3$ or <i>their</i> $\frac{1}{c+5} - \frac{1}{c+1} = -\frac{1}{3}$ oe $c = 1$ and checking their solution in other equation Or solve both and get same answer	M1 M1 M1 A1 M1 A1	1.1 1.1 1.1 2.1 3.1a 1.1	oe soi here or at any point before first A mark This mark is for using the substitution, ignore limits and use of du for this mark. So may see no du but do not award if dx . Condone $\int \frac{u-1}{u^2} du$. This mark is for attempt to integrate their expression and must involve $\ln u$ or a power of u Ignore limits for this mark. oe. Correct integral in terms of c Condone recovery of missing brackets www If they ignore the instruction and use a different integration method to perform substitution they can have a SC1 if they get to the correct answer. Also the final M1A1 are still available
				[6]		

Q5. This is another DR question. There are 4 marks to get to the integrated expression and 2 marks for finding and checking the value of c.

The first M1 is for $du = dx$ or equivalent (e.g $du/dx = 1$)

The second M1 is for forming the integral. We will allow the absence of du for this mark but sight of dx loses the mark.

The third M1 is for attempting to integrate *their* expression and we must see either a $\ln u$ term OR a power of u term.

The A1 is for the correct answer (allow unsimplified terms e.g. $\ln(c+4+1)$) and is dependent on the three M marks. Condone missing brackets for e.g. $\ln c+4$ if recovered.

The next M1 is for setting up an equation to find c using either *their* $\ln \text{fraction} = 3$ OR *their* other fraction(s) = $\frac{-1}{3}$ which may be unsimplified).

The final A1 is for correctly finding $c = 1$ AND checking their solution in the other equation or solving the other equation to also get $c = 1$.

Candidates may do it using a different integration method (e.g. integration by parts). Although this is a valid method of integration it is not what the question asks for – ‘Using the substitution...’ so this is penalized. The first three M marks are lost. Give SC1 for the correct integral answer and the final M1A1 are still available.