Question Number	Scheme	Notes	Marks
3(a)	$\sum_{r=1}^{n}(2r-3)(3r+2)=\sum_{r=1}^{n}6r^2-5r-6=6\times\frac{1}{6}n(n+1)(2n+1)-\frac{5}{2}n(n+1)-6n$ M1: Expands to a quadratic and uses at least one of the standard formulae correctly for that term. If quadratic has two terms in r must correctly use the formula twice if scoring for using the sum of r A1: Correct expression - no need to simplify it		**M1 A1**
	$=n\left[(n+1)(2n+1)-\frac{5}{2}(n+1)-6\right]$ or $=\frac{n}{2}\left[2(n+1)(2n+1)-5(n+1)-12\right]$	Completes an attempt to factorise out n or $\frac{1}{2}n$. May expand completely first. Sign/coefficient errors only. Requires an expression of the correct form i.e., 3TC with no contant ± 2TQ with noconstant ± kn	**dM1**
	$=\frac{1}{2}n\left[2\left(2n^2+3n+1\right)-5n-5-12\right]$ $=\frac{1}{2}n\left(4n^2+n-15\right)$	Correct expression in this form. Not just values for the constants unless $\frac{1}{2}n\left(an^2+bn+c\right)$ is seen in the work	**A1**
	Alternative for the last 2 marks - expands expression and given form and compares coefficients: $6\times\frac{1}{6}n(n+1)(2n+1)-\frac{5}{2}n(n+1)-6n=2n^3+3n^2+n-\frac{5}{2}n^2-\frac{5}{2}n-6n=2n^3+\frac{1}{2}n^2-\frac{15}{2}n$ $\frac{1}{2}n\left(an^2+bn+c\right)=\frac{1}{2}an^3+\frac{1}{2}bn^2+\frac{1}{2}cn$ $\Rightarrow a=4,\ b=1,\ c=-15$ **d**M1: Expands both sides. LHS must have been of the form 3TC with no contant ± 2TQ with noconstant ± kn and must achieve 2 3TCs with no constants A1: Correct values. $\frac{1}{2}n\left(an^2+bn+c\right)$ must be explicitly seen in the work.		
			(4)
(b)	$21\times38+23\times41+\ldots+97\times152$ $=\frac{1}{2}\times50\left(4\times50^2+50-15\right)-\frac{1}{2}\times11\left(4\times11^2+11-15\right)$ Attempts $\sum_{r=1}^{50}(2r-3)(3r+2)-\sum_{r=1}^{11}(2r-3)(3r+2)$ **explicitly** using their result from part (a) and obtains a numerical expression. Allow slips but it must clearly be an attempt at f(50) - f(11). There must be evidence of use of the formula for both summations so accept e.g., $\frac{1}{2}\times501750-\frac{1}{2}\times5280$ as a minimum but **not** $250875-2640$		**M1**
	= 248 235	Correct answer from correct work	**A1**
			(2)
			(Total 6 marks)