8	**(a)**		Arithmetic sequence with $a = 9300$ $a_{10} = a + 9d = 9300 + 9d = 3900$ $d = -600$ $a_{20} = a + 19d = 9300 - 19 \times 600 = -2100$ [So 20th term is negative]	**M1** **A1** **A1** **[3]**	**3.1a** **1.1b** **2.1**	Using formula for term of AP with values substituted soi Allow for -2100 without comment	eg d = 600 stated but later subtracted Also allow for earlier negative term found and comment that 20th is less
8	**(b)**		S is increasing as long as the extra terms are positive First negative term when $a_n < 0$ $9300 - 600(n-1) < 0 \Rightarrow \frac{9300}{600} < n - 1 \Rightarrow n > 16.5$ So maximum sum after 16 terms $S_{16} = \frac{16}{2}\left(2 \times 9300 - 600(16-1)\right) = 76\,800$	**M1** **A1** **M1** **A1** **[4]**	**3.1a** **2.2a** **1.1a** **1.1b**	Attempt to find first negative term with 9300 and their d Allow $n > 16$ or $n \geq 17$ oe Using sum with their n and their d cao	(or last positive term) Also allow M1A1 for establishing $a_{16} = 300$ and $a_{17} = -300$
			Alternative solution $S = \frac{n}{2}\left(2 \times 9300 - 600(n-1)\right)\left[= 9600n - 300n^2\right]$ [To find max S treating S and n as continuous] $\frac{\mathrm{d}S}{\mathrm{d}n} = 9600 - 600n = 0$ Max sum when $n = 16$ $S_{16} = \frac{16}{2}\left(2 \times 9300 - 600(16-1)\right) = 76800$	**M1** **M1** **A1** **A1**		Using the sum formula with 9300 and their d substituted Setting derivative to zero and solve Allow for $n = 16$ Cao	Also allow M1 for other methods for finding the max A1 for n = 16 eg M1A1 for $S_n = k - 300(n-16)^2$
			Second alternative solution $S_{15} = 76\,500$ $S_{16} = 76\,800$ $S_{17} = 76\,500$ max total is 76800	**M1** **M1** **A1** **A1**		Using the sum formula with 9300 and their d to find at least two totals Evaluating S_{15}, S_{16} and S_{17} Award for S_{16} as maximum identified from correct working Cao	Allow BC FT their d: three consecutive totals around their maximum eg $d = -540$ needs 17th, 18th, 19th totals