

**10.** The first term of a geometric series is 120. The sum to infinity of the series is 480.

(a) Show that the common ratio,  $r$ , is  $\frac{3}{4}$ . **(3)**

(b) Find, to 2 decimal places, the difference between the 5th and 6th term. **(2)**

(c) Calculate the sum of the first 7 terms. **(2)**

The sum of the first  $n$  terms of the series is greater than 300.

(d) Calculate the smallest possible value of  $n$ . **(4)**  
**(Total 11 marks)**

[Mark scheme on next page](#)

10.	(a)	$\frac{a}{1-r} = 480$		M1	
		$\frac{120}{1-r} = 480 \Rightarrow 120 = 480(1-r)$		M1	
		$1-r = \frac{1}{4} \Rightarrow \underline{r = \frac{3}{4}}$	*	A1cso	3
	(b)	$u_5 = 120 \times (\frac{3}{4})^4 [= 37.96875]$	either	M1	
		$u_6 = 120 \times (\frac{3}{4})^5 [= 28.4765625]$			
		Difference = <u>9.49</u>	(allow $\pm$ )	A1	2
	(c)	$S_7 = \frac{120(1-(0.75)^7)}{1-0.75}$		M1	
		$= 415.9277\dots$	(AWRT) <u>416</u>	A1	2
	(d)	$\frac{120(1-(0.75)^n)}{1-0.75} > 300$		M1	
		$1-(0.75)^n > \frac{300}{480}$	(or better)	A1	
		$n > \frac{\log(0.375)}{\log(0.75)}$	(= 3.409 ...)	M1	
		<u><math>n = 4</math></u>		A1cso	4

[11]