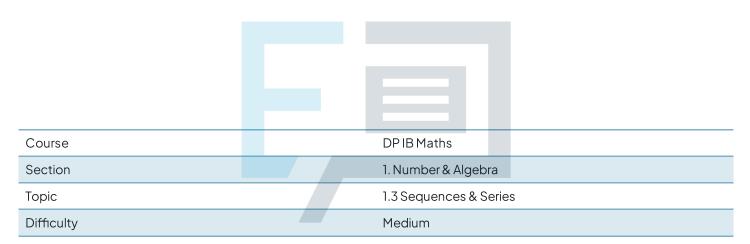


#### 1.3 Sequences & Series

#### **Mark Schemes**



### **Exam Papers Practice**

To be used by all students preparing for DP IB Maths AA SL Students of other boards may also find this useful



a) For a geometric sequence the common ratio,  $r_1$  is given by  $f = \frac{U_2}{U_1} = \frac{U_3}{U_2} = \frac{U_4}{U_3}$ ...  $U_2 = 44$   $U_3 = 55$ 

sub us and us into r tormula

Exam Paper Practice

6)

 $f = \frac{55}{44}$ 

rearrange for un

 $\mathcal{U}_1 = \frac{44}{\left(\frac{5}{4}\right)}$ 

 $U_1 = 35.2$ 

For more help visit our website www.exampaperspractice.co.uk



c) For a geometric sequence the sum of  
the first n terms is given by  
$$S_n = \underbrace{\mu_1(r^n - 1)}_{r-1}$$
 (in formula booklet)

sub u, r and n=5

$$S_{5} = \frac{35 \cdot 2((\frac{5}{4})^{5} - 1)}{(\frac{5}{4}) - 1}$$

$$S_{5} = 288 \cdot 8875$$

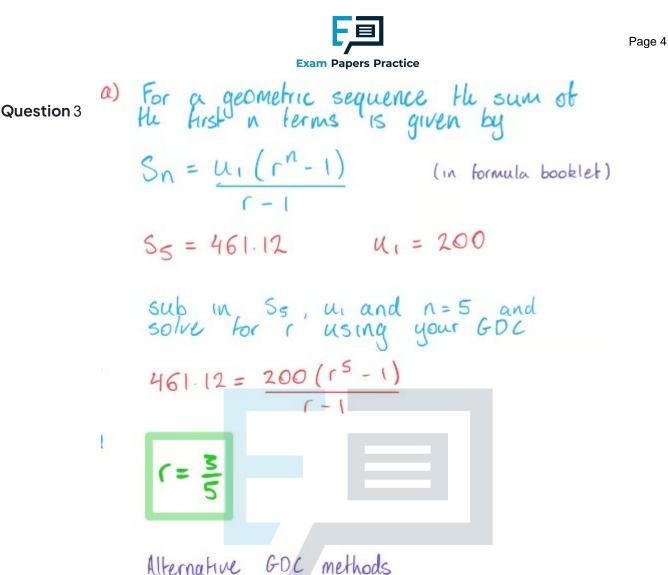
$$S_{5} = 289 (3sf)$$

# **Exam Papers Practice**

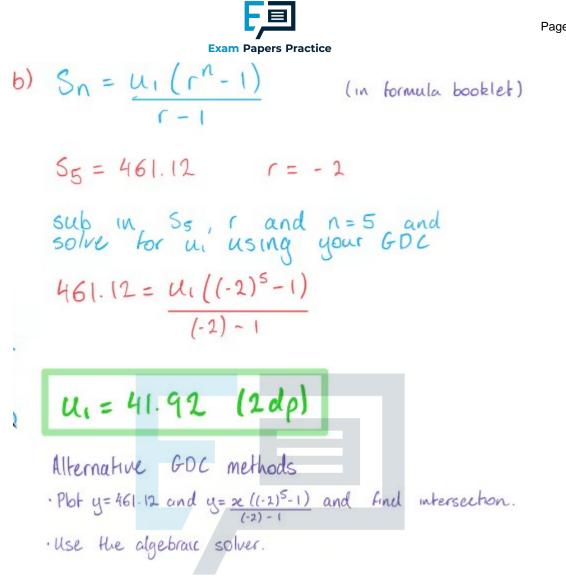


Question 2  
A) For an antimetic sequence the sum of the host n terms is given by  

$$S_n = \frac{n}{2} (2u_1 + (n-1)d)$$
 (in formula booklet)  
 $S_{16} = 920$   $u_1 = 27.5$   
sub in Si6, u and  $n = 16$   
 $920 = 8(55 + 15d)$   
 $115 = 55 + 15d$   
 $60 = 15d$   
 $d = 4$   
b)  $S_n = \frac{n}{2} (2u_1 + (n-1)d)$  (in formula booklet)  
Example of the sum of the sum



Alternative our methods · Plot y=461.12 and y= $\frac{200(x^{5}-1)}{x-1}$  and find intersection. EXA. Use the algebraic solver. S Plactice



### **Exam Papers Practice**

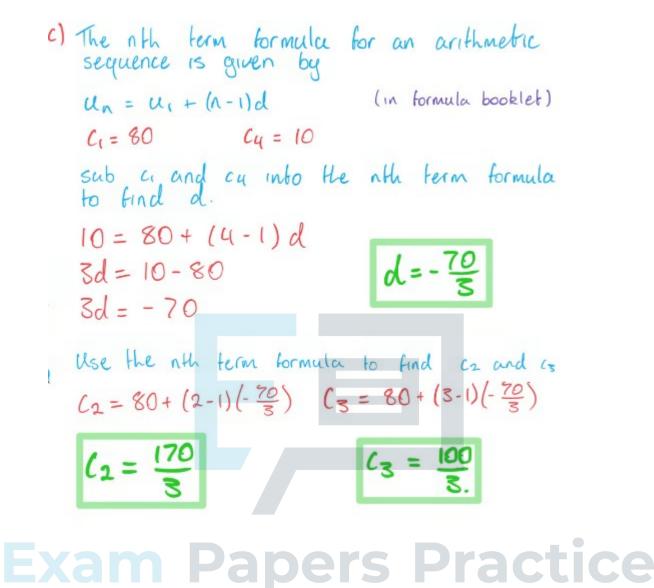


a) For an arithmetic sequence the common difference, d, is given by  $d = u_2 - u_1 = u_3 - u_2 = u_4 - u_3 \dots$  $a_3 = 30$ a2=12 sub in us and us into d tormula d = 30 - 12d = 18 Use d= 18 to find a, and ay  $18 = a_4 - 30$ 18 = Qy = 48  $a_1 = -6$ Practice



b) For a geometric sequence the common  
ratio, r, is given by  
$$\begin{aligned} & (= \frac{U_2}{U_1} = \frac{U_3}{U_2} = \frac{U_4}{U_3} \cdots \\ & b_2 = 12 \qquad b_3 = 30 \\ & sub in b_2 and b_3 into r formula \\ & (= \frac{30}{12} \\ \hline r = 2.5 \\ & use r = 2.5 \\ & to find b_1 \\ & and b_4 \\ & 2.5 = \frac{b_4}{30} \\ \hline b_1 = 4.8 \\ \hline b_1 = 4.8 \\ \hline b_2 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_1 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_1 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_1 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_1 = 4.8 \\ \hline common b_2 \\ & b_1 = 4.8 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_1 = 4.8 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_1 = 4.8 \\ \hline common b_1 \\ & b_1 = 4.8 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_1 = 4.8 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_1 = 4.8 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_1 \\ & b_1 = 4.8 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_2 \\ & b_1 = 4.8 \\ \hline common b_2 \\ & b_1 = 4.8 \\ \hline common b_2 \\ & b_1 = 4.8 \\ \hline common b_2 \\ & b_2 = 75 \\ \hline common b_2 \\ & b_1 = 4.8 \\ \hline common b_1 \\ & b_2 = 75 \\ \hline common b_2 \\ & b_1 = 4.8 \\ \hline common b_2 \\ & b_1 = 4.8 \\ \hline common b_2 \\ & b_1 = 4.8 \\ \hline common b_1 \\ &$$





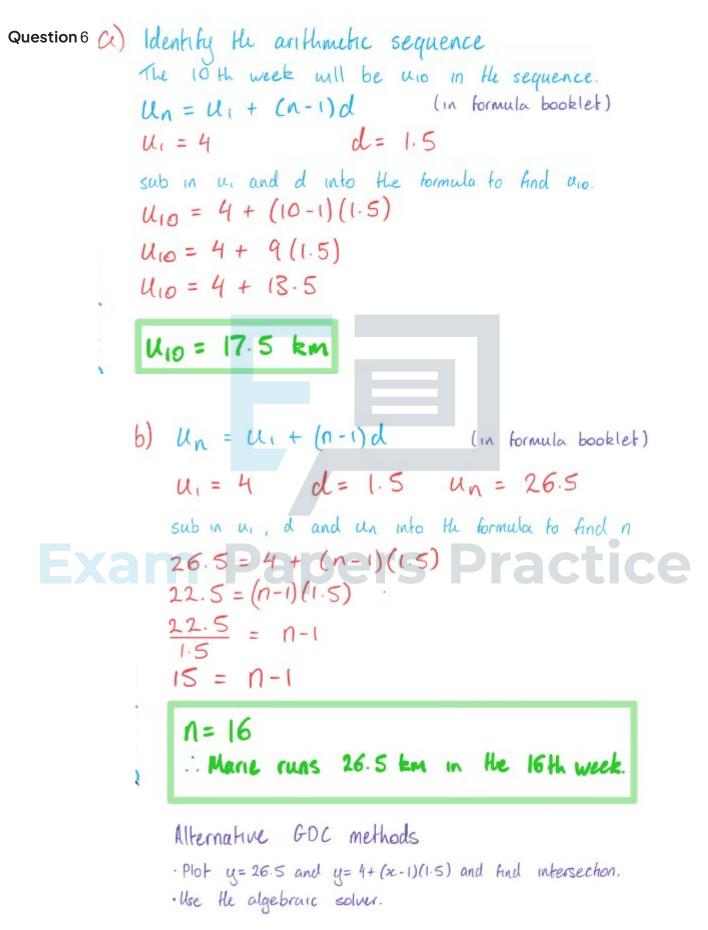


d) The nth term tormula for a geometric sequence is given by (in formula booklet) Un= Urr-1  $d_1 = 80$   $d_4 = 10$ sub di and dy into the nth term formula to find r 10=80 r<sup>4-1</sup>  $(^3 = \frac{10}{80}$ (=  $f = \left(\frac{1}{8}\right)^{1/3}$ Use the nth term formula to find dz and dz  $d_3 = 80(\frac{1}{2})^{3-1}$  $d_2 = 80(\frac{1}{2})^{2-1}$   $d_3 = 80(\frac{1}{2})^{2-1}$  $d_2 = 40$   $d_3 = 20$ ractice



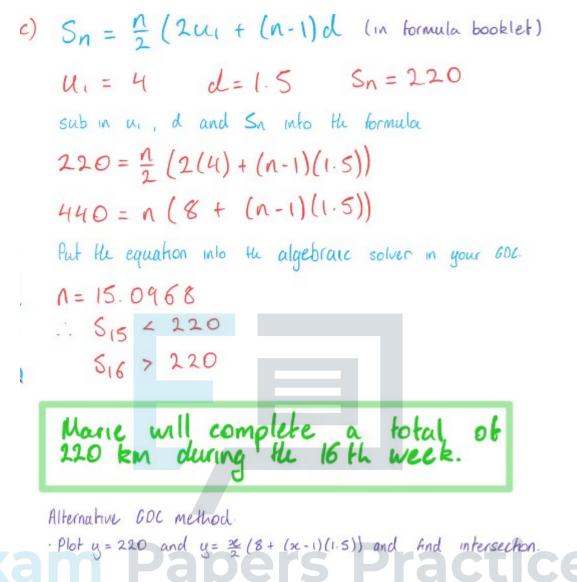
Question 5 a); 
$$u_n = u_{1+} (n-1)d$$
 (in formula booklet)  
 $u_q = 20$   $u_{10} = 44$   
 $20 = u_{1+} (q-1)d$   $44 = u_{1+} (10-1)d$   
 $20 = u_{1+} sd$   $44 = u_{1+} 9d$  (2)  
(2) - (0)  
 $44 = u_{1} + 9d$   
 $-20 = u_{1+} sd$   $d = 4$   
 $24 = 6d$   $d = 4$   
(i) Sub  $d = 4$  into () to find  $u_1$   
 $20 = u_{1+} + 3(4)$   $u_1 = 8$   
 $20 = u_{1+} + 12$   
 $20 - 12 = u_1$   
EX b)  $S_n = n (2u_1 + (n-1)d)$  (in formula booklet)  $e^{-1}$   
 $n = 20$   $u_1 = 8$   $d = 4$   
Sub  $n, u_1$  and  $d$  into  $Sn$  formula  
 $S_{20} = \frac{20}{2} (2(6) + (20-1)/4))$   
 $S_{20} = 10 (16 + 76)$   
 $S_{20} = 920$  students





For more help visit our website www.exampaperspractice.co.uk



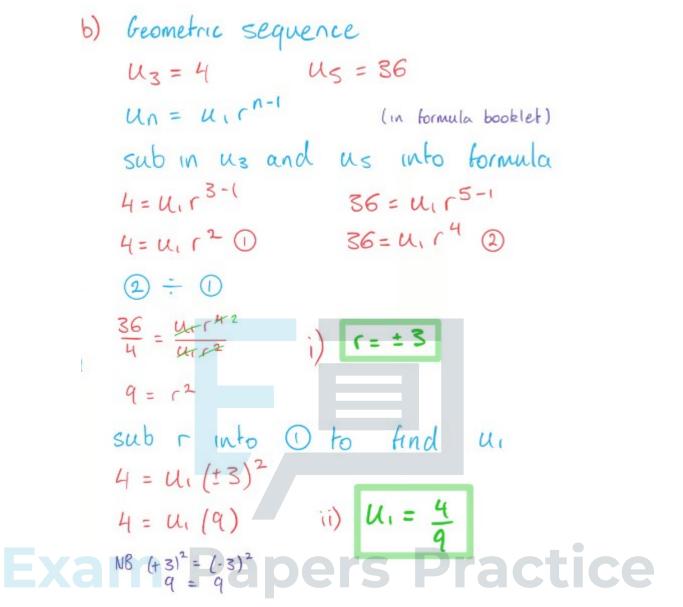




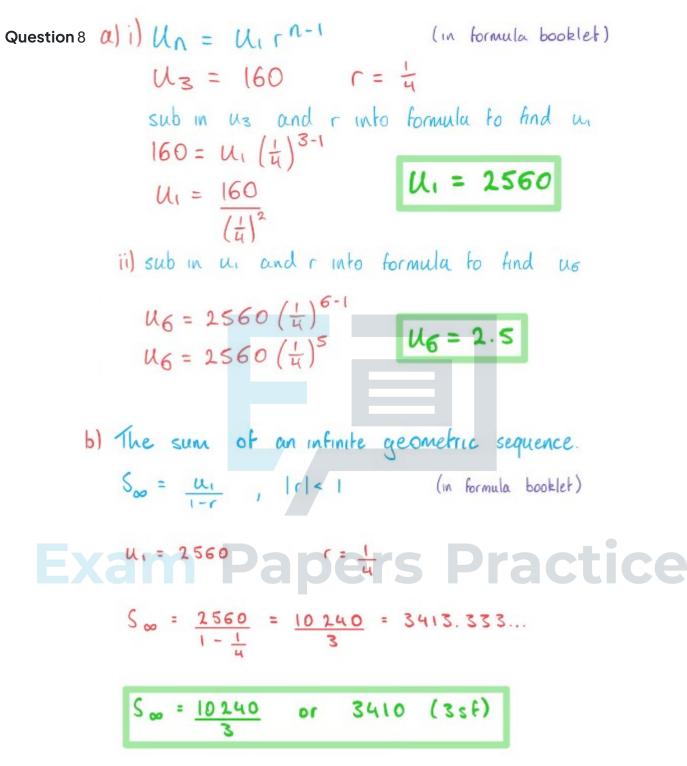
Question 7  
a) i) 
$$U_n = U_1 + (n-1)$$
 (in formula booklet)  
 $U_8 = 18$   $d = 2$   
sub in us and d into the formula to find u.  
 $18 = U_1 + (8-1)(2)$   
 $18 = U_1 + 14$   
 $U_1 = 4$   
(i) sub in u, and d into the formula to find  $u_{17}$   
 $u_{17} = 4 + (17-1)(2)$   
 $u_{17} = 36$ 

## **Exam Papers Practice**

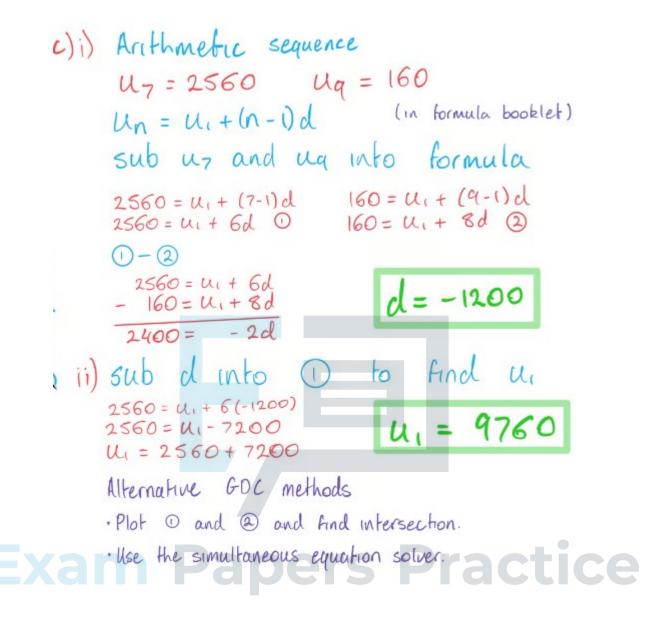
For more help visit our website www.exampaperspractice.co.uk













estion 9  
a) Using sigma notation  

$$a_1 + a_2 + a_3 + ... + a_{12} = \sum_{k=1}^{12} a_k$$
  
 $\sum_{k=1}^{12} (32 - 7k)$   
 $S_n = \frac{n}{2} (2u_1 + (n - 1)d) (1n \text{ formula booklet})$   
 $a_1 = 25$   $d = -7$   $N = 12$   
Sub in  $a_1$ ,  $d$  and  $n$   
 $S_{12} = \frac{12}{2} (2(25) + (12 - 1)(-7))$   
 $S_{12} = -162$   
Alternative GOC method using sigma notation.  
Example papers Practice



b) Using sigma notation  

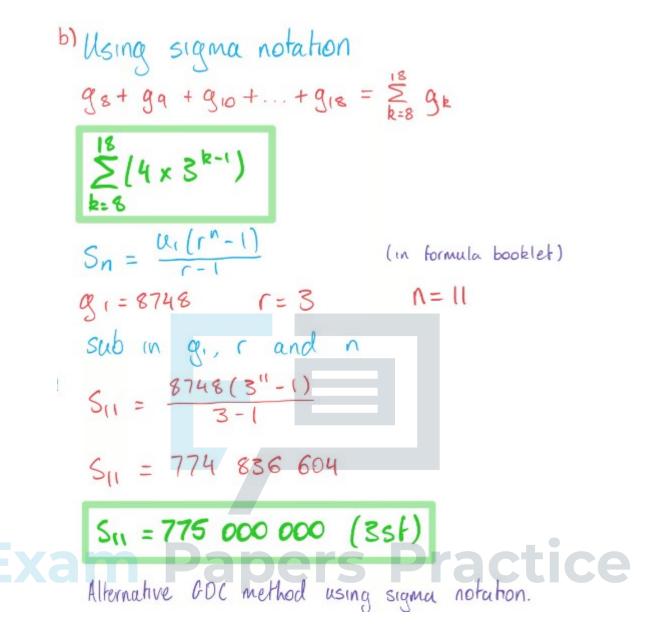
$$a_{4} + a_{5} + a_{6} + ... + a_{15} = \sum_{k=4}^{15} a_{k}$$
  
 $\sum_{k=4}^{15} (32 - 7k)$   
 $S_{n} = \frac{n}{2} (2u_{1} + (n - 1)d) (in formula booklet)$   
 $a_{1} = 4$   $d = -7$   $n = 12$   
Sub in  $a_{1}$ ,  $d$  and  $n$   
 $S_{12} = \frac{12}{2} [2(4) + (12 - 1)(-7)]$   
 $S_{12} = -414$   
Alternative GDC method using sigma notation.



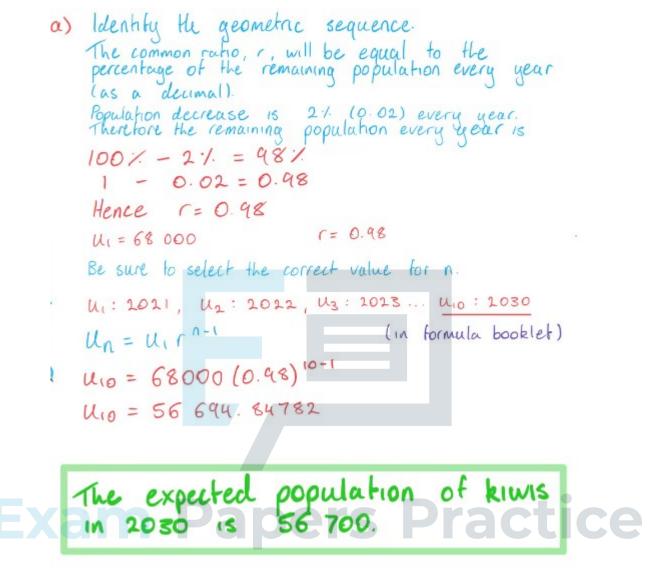
a) Using sigma notation  

$$g_1 + g_2 + g_3 + ... + g_{10} = \bigvee_{k=1}^{10} g_k$$
  
 $\bigvee_{k=1}^{10} (4 \times 3^{k-1})$   
 $g_n = \frac{U_1(n-1)}{n-1}$  (in formula booklet)  
 $g_1 = 4$  (in formula booklet)  
 $g_2 = 4$  (in formula booklet)  
 $g_1 = 4$  (in formula booklet)  
 $g$ 

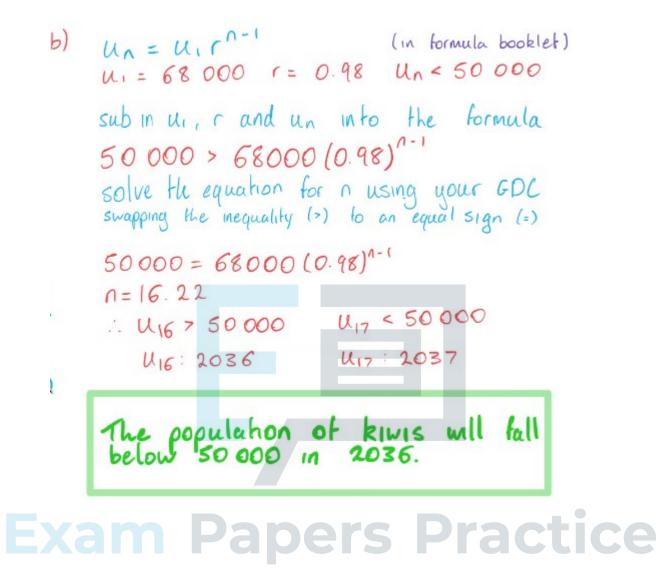














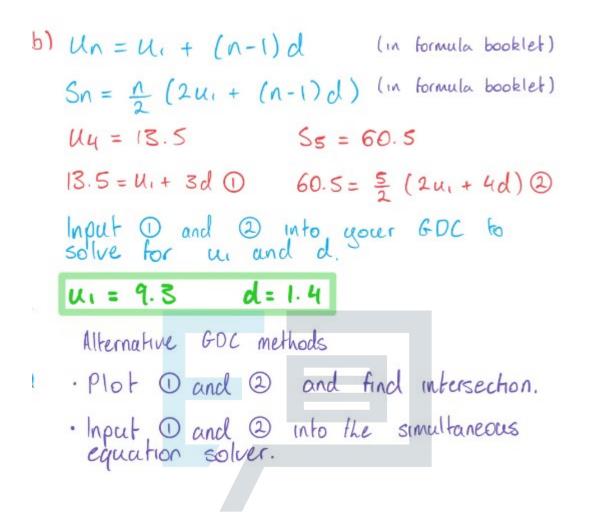
Question 12 a) Identify the geometric sequence  

$$u_n = u_i r^{n-1}$$
 (in formula booklet)  
 $u_i = 240$   $r = 1.125$   $n = 5$   
sub in  $u_i, r$  and  $n$   
 $u_s = 240 (1.125)^4$   
 $u_s = 384$  km (Ssf)  
b)  $S_n = u_i (r^n - 1)$  (in formula booklet)  
 $u_i = 240$   $r = 1.125$   $n = 10$   
sub in  $u_i, r$  and  $n$   
Example =  $240$  (1.125<sup>10</sup>-1)  
 $u_i = 240$  (1.125<sup>10</sup>-1)  
 $u_i = 240$  (1.125<sup>10</sup>-1)  
 $u_i = 240$  (1.125<sup>10</sup>-1)  
Sub in  $u_i, r$  and  $n$   
Example =  $240$  (1.125<sup>10</sup>-1)  
 $u_i = 1.125 - 1$ 



a) i) 
$$U_n = U_1 r^{n-1}$$
 (in formula booklet)  
 $U_1 = 0.5 r = 3 n = 4$   
sub in  $U_1, r$  and n  
 $U_4 = 0.5 (3)^{4-1}$   
 $U_4 = (3.5)$   
ii)  $S_n = U_1 (r^{n-1})$  (in formula booklet)  
 $U_1 = 0.5 r = 3 n = 5$   
sub in  $U_1, r$  and n  
 $S_5 = 0.5 (3^5 - 1)$   
**Xangeors Practice**  
 $S_5 = 60.5$ 





### **Exam Papers Practice**



