## Year 12 2 Unit Sequences and Series – Alternative Task 1

2.0	- J. C.	- 51
	3 4 *	- [:
Time:	E0	_ 5
i ime	~umu	10
IL ALLER VA	SOM	
·		_,£.;

Тант	1	201	2
Term	1,	<b>4</b> 01	J

MARKS: 24

Name:

Teacher: HRK

Question	1	Start a new Booklet	Total Marks 8
a.	$\sum_{n=1}^{1}$	$\sum_{n=1}^{5} 3n+2$	1
ь.		the $10^{th}$ term of an arithmetic sequence is 93 and the $3^{rd}$ term is expression for $T_n$ , the nth term in the sequence.	30. Find an <b>2</b>
c.		he 5 <sup>th</sup> term of a geometric series is 2 and the 8 <sup>th</sup> is 54. Find the terms of the series.	sum of the first 2
d.		ick earns \$68,000 in his first year working for a bank. His salar $\frac{1}{2}$ per annum (each year).  Write an expression for $T_n$ , the amount Rick will earn in his r	
		bank.	1
	ii.	How much will Rick earn in his 10 <sup>th</sup> year at the bank?	1
	iii.	What will the total of his earnings be after 10 years?	1

### Year 12 2 Unit Sequences and Series – Alternative Task 1

<u>: (1)                                   </u>	ئا ا	-	4
lime	: 5	$0\mathbf{m}$	ins
		MT.	

Term	1,	203	15
------	----	-----	----

Name:

Teacher: HRK

**Total Marks 8** 

# Question 2 Start a new Booklet

- a. Consider the series  $x + x(2-x) + x(2-x)^2 + ...$ 
  - i. Find all possible values x if the series is to have a limiting sum.
  - ii. It is known that the limiting sum is  $\frac{7}{4}$ . Find the value of x
- b. The Snowy River is 30 metres deep. A new dam is built that will remove 6 metres of water in the first year and then  $\frac{2}{3}$  of that amount each year thereafter.

  Ultimately, what will the level of water be?
- c. A Cranbrook student, looking to increase his fitness, takes up running. He runs
  10 kilometres in the first week and each week after that runs an additional
  2 kilometres.
  - i. How far will he run in the 24<sup>th</sup> week?
  - ii. At the end of the 24<sup>th</sup> week, how far will he have run in total?

دے

### Year 12 2 Unit Sequences and Series - Alternative Task 1

Time: 50mins
MARKS: 24
Tabak
Teacher: HRK

Term 1, 2015

Name:

#### Question 3 Start a new Booklet

**Total Marks 8** 

- a. Jake begins a new savings plan at First National Bank by investing \$3000 at the end of each year beginning in 2012. His investment earns 7% per annum.
  - i. Show that at the end of 2014, the amount he has in his account,  $A_3$ , can be expressed by:

$$A_3 = 3000(1.07)^2 + 3000(1.07) + 3000$$

1

2

2

- ii. How much money will he have saved when he retires at the end of 2030?
- b. Kate borrows 800,000 to buy her dream home at 9% per annum, reducible monthly interest. The loan is to be paid back in monthly instalments. The bank is offering the first 3 months interest free and the loan is to be repaid over 20 years.

If  $A_n$  is the amount owing after n months, and M is the monthly instalment:

- i. Find an expression for  $A_1, A_2, A_3, A_4$  in terms of M
- ii. Find an expression for  $A_{240}$
- iii. Find M, the monthly instalment.

Start here.
Q(
a) \$\frac{5}{2} 3nf2
NA NA
= S15 (57) X
3x (+2 =5
S <sub>15</sub> - S <sub>1</sub>
= 15 (5+5+(15-1) +3) - 2 (5+5+(7-1)+3)
- 2 (3+5+(15-1) - 2 (3+3 + (7-1/x))
-291,
$0) T_{10} = 93 T_3 = 30$
b) $T_{10} = 93$ $\Gamma_{3} = 30$ $101 + \alpha = 93$ $\bigcirc$
- 4 4 4 7 5 (Z)
10d fa = 93 (0-2)
3 d f a = 30
7d 263
d = 9
subdinto 3
3×9 fa = 30
023
Tn = 9n + 3
0 Ts= 2, Ts=54
r= 3/54

$T_{1} = \frac{r_{1}}{r_{2}}$ $\frac{2}{3}$ $S_{1} = \frac{3(3^{-1})}{(3^{-1})}$ $= 80 \frac{30}{81} \text{ M}$ $\frac{3}{3} = \frac{3(3^{-1})}{(3^{-1})}$ $= 8000 \times (1.06)^{10-1}$ $\frac{3}{3} = \frac{3(3^{-1})}{(3^{-1})}$ $$	- L -	
$S_{N} = \frac{a(N-1)}{C-1}$ $S_{S} = \frac{3(3^{3}-1)}{3^{3}-1}$ $= 80 \frac{30}{81}$ $M$		
$S_{N} = \frac{a(N-1)}{C-1}$ $S_{S} = \frac{3(3^{3}-1)}{3^{3}-1}$ $= 80 \frac{30}{81}$ $M$	$\Gamma_1 = \frac{\Gamma_5}{c^4}$	
$S_{N} = \frac{a(N-1)}{C-1}$ $S_{S} = \frac{3(3^{3}-1)}{3^{3}-1}$ $= 80 \frac{30}{81}$ $M$	- 5	
$S_{8} = \frac{1}{10} \frac{(3^{8}-1)}{(3^{8}-1)}$ $= 80 \frac{30}{21} \text{ M}$ $\frac{1}{10} T_{0} = 68000 \times (106)^{10} \cdot \frac{1}{100}$ $= 68000 \times (106)^{10} \cdot \frac{1}{100}$ $= $11 4884.57$ $= $110 106.7$ $= $1200 ((106)^{10}-1)$ $= $1000 ((106)^{10}-1)$ $= $1000 ((106)^{10}-1)$ $= $1000 ((106)^{10}-1)$ $= $1000 ((106)^{10}-1)$	2	
$S_{8} = \frac{1}{10} \frac{(3^{8}-1)}{(3^{8}-1)}$ $= 80 \frac{30}{21} \text{ M}$ $\frac{1}{10} T_{0} = 68000 \times (106)^{10} \cdot \frac{1}{100}$ $= 68000 \times (106)^{10} \cdot \frac{1}{100}$ $= $11 4884.57$ $= $110 106.7$ $= $1200 ((106)^{10}-1)$ $= $1000 ((106)^{10}-1)$ $= $1000 ((106)^{10}-1)$ $= $1000 ((106)^{10}-1)$ $= $1000 ((106)^{10}-1)$	P 9(r^-1)	
$= 80 \frac{80}{81} \text{ M}$ $d)$ $i) T_{n} = 68000 \times (1.06)^{n-1}$ $= 68000 \times (1.06)^{n}$ $= $11 4884.57$ $= \frac{46^{n}-1}{1.06}$ $= $39.6294.06$	$\frac{2}{3}(3^8-1)$	
$\frac{1}{1} \int_{0}^{\infty} \frac{1}{1} \int_$	3 = 1	
i) $T_{n} = 68000 \times (1.06)^{n-1}$ $= 68000 \times (1.06)^{n-1}$ $= 68000 \times (1.06)^{n-1}$ $= $114884.57$ $= \frac{aG^{n-1}}{7-1}$ $= \frac{68000 \times (1.06)^{n-1}}{2}$ $= $396294.06$	= 80 = 1	
i) $T_{n} = 68000 \times (1.06)^{n-1}$ $= 68000 \times (1.06)^{n-1}$ $= 68000 \times (1.06)^{n-1}$ $= $114884.57$ $= \frac{aG^{n-1}}{r-1}$ $= \frac{68000 \times (1.06)^{n-1}}{r-1}$ $= \frac{68000 \times (1.06)^{n-1}}{r-1}$ $= \frac{68000 \times (1.06)^{n-1}}{r-1}$ $= $1106 - 1$ $= $1396294.06$		
(ii) $T_0 = 68000 \times (1.06)^{10-1}$ $= 68000 \times (1.06)^{10-1}$ $= 811 \times 884.57$ $= 68000 \times (1.06)^{10-1}$ $= 68000 \times (1.06)$		
\$6800, (1.06) =\$114884.57 =\frac{4G^{-1}}{7-1} =\frac{68000 \cdot (0.06)^{10} - 1}{1.06 - 1} =\frac{5896294.06}{1.06}	i) $T_n = 68000 \times (1-06)^{n-1}$	
\$6800, (1.06) =\$114884.57 =\frac{4G^{-1}}{7-1} =\frac{68000 \cdot (0.06)^{10} - 1}{1.06 - 1} =\frac{5896294.06}{1.06}		
\$6800, (1.06) =\$114884.57 =\frac{4G^{-1}}{7-1} =\frac{68000 \cdot (0.06)^{10} - 1}{1.06 - 1} =\frac{5896294.06}{1.06}	ii) To = 68000x (1.06)10-1	
= \$114884.57 = \frac{46^{-1}}{5000(1.06)^{10}-17} = \frac{5900(1.06)^{10}-17}{1.06-7} = \frac{5}{3}96294.06	= 68000 > (1.06)°	
$\frac{a(C_1)}{c_1} = \frac{a(C_1)}{c_2}$ $= \frac{a(C_1)}{c_3}$ $= \frac{a(C_1)}{c_4}$ $= \frac{a(C_1)}{c_5}$ $= \frac{a(C_1)}{c_5$		
= \$8 96294.06		· ·
= 6900° (C1.06) 10-17 = \$900° (C1.06) 10-17 = \$900° (C1.06) 10-17	$(ii)$ $S_n = \frac{aG^n - i}{aG^n}$	
= \$0 (0294.06 )	68000 ((1.06)10-1)	
	= \$8 96294.06	
		,
	·	
Additional writing space on back page		
Additional writing space on back page		
Additional writing space on back page		
Additional writing space on back page		
		Additional writing space on back page

Start here.
<u>୧</u>
a)
7 1014
12-20/41
$\oplus$
2-90 <1 -(2-x) <1
-104-1 24-2
x >1 2 4 3
1 < x < 3
ii) 1= = 7
1 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 -
702 = 4x
14/72 = 42
1/4-1/2 x0
-11x=-14
$\chi = 1$
$\frac{q}{1-r}=\frac{7}{4}$
$\frac{2C}{1-(2+x)} = \frac{7}{4}$
2C
4xc = 7 (xc-1)
4 x = 7x -7
$-3x = -7$ / $\frac{7}{2}$
$x = \frac{7}{3}$
$6+6\times\frac{2}{3}+6\times(\frac{2}{3})^{2}$

Soo = a
- (- <del>2</del>
2 l8 m
Level of water 2 30-18
=12 m / Good.
c) (0+12+14+16
d=2
a = 60
Tr 22n+8
i) T <sub>24</sub> = 24×2t8 = 56 km
= 56 km ~
$\frac{1}{1} \int_{\Omega} S_n = \frac{h}{2} (a+0)$
524 = 24 (10+56)
= 12 × 66 = 792 km
2 + 1201
C.C.
·
Additional writing space on back page

Start here.
QJ
م ر
i) A = 3000
A = 3000 x (1.67) + 3006
A3 = 3000 x (1.07)2 + 3000 (107) +3000
ii) End = f 2030 = A19
A19 = 3000 × ((.07)18 + 3000 × (1.07)12 +3000
= 3000 (1+1.07+1.072++1.0718)
$= 3000 \times \frac{1(1.07^{19}-1)}{1.07-1}$
=\$112136-89
b) = 0-0075
) 1, = 8 00000 - M
Az=800000-2M
$A_3 = 800000 - 3M$
1 = 880000×(1.0075) - 3M(10075) - M
(i) 4240)= 800000 = (1.0076)297 M(3×1.0076297 (2075 295 +1) X
iii) M(3x1.0075297+1.0075296+1.0075295+1) = 800000 x(1.0075)297
My Jooks x M + My Jooks ) X
2x1.0075297 M +Mx 1(1.0075(27821) = 800000 x(1.0075)297
1120-914M = 7359889.037
M=\$6565-97 ×