SHENTON COLLEGE

# Mathematics Methods Year 11
2016 Test 4

NAME:_____

Teacher (circle one): Friday Mackenzie McRae

**Section 2: Calculator (1 page of notes, 1 side; formula sheet given) (25 minutes, 27 marks)**

**Question 1. [2, 2, 3 & 2 = 9 marks]**

Two sequences A and T are defined below.

$T_n = 100 - 2n$

$A_n = 0.8A_{n-1}$ $A_3 = 4$

(a) Find the first 4 terms of both sequences.

(b) Write a recursive definition for $T_n$.

(c) One of the series, of the sequences above, tends towards a certain value. What is this value and explain why it does this?

(d) Calculate the sum of the terms $T_{40}$ to $T_{60}$, inclusive.

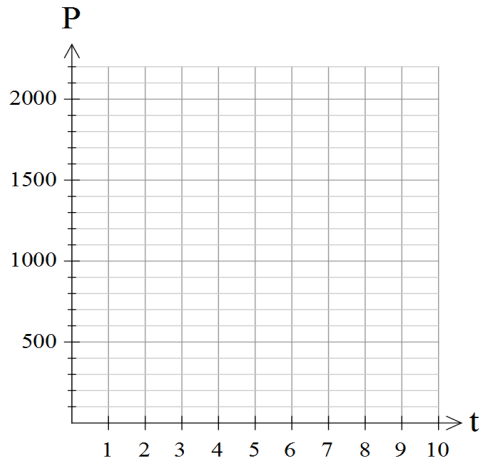
**Question 2. [ 2, 2, 2, 2, 2 = 10 marks]**

The population of Llamas in a South American reserve is slowly dwindling due to new management. After 3 years the population of Llamas is 1244 and two years later the population is 876. If the population is declining at an exponential rate

a) What percentage of Llamas are they losing per year (to 1 d.p.)?

b) How many Llamas were there when the new management took over?

c) Use the grid below to draw a graph of the population of Llamas after new management took over, for $0 \leq t \leq 6$, where *t* is the time in years.




d) Write a general rule for describing the population (P), in terms of years (t), of the Llamas after new management began.

e) After 6 years the current management is fired and a breeding program is developed that promises that numbers will be back up to the original level in 4 years' time. What percentage growth rate must they have promised?

**Question 3. [2, 2 = 4 marks]**

On the 1st January 2001 John opens an account for his new born baby boy with a deposit of $2000 in an account that accrues interest at 3.8% compounded annually. On the same day each year he puts in another $1000 into the account. If the interest rate stays the same for the time he has the account,

a) Write a recursive rule that describes this investment.

b) How much will he have in the account if he closes the account after 12 years, just before he makes his annual January deposit?

**Question 4. [ 4 marks]**

For the geometric series 40 + 24 + 14.4 + . . . find the least value of n so that the difference between $S_\infty$ and $S_n$ is less than 0.2.