Greenwood College
Year 12 Applications
Test 1 2018/2019
Resource-Free

Name……

No calculators nor notes allowed.
25 mark total.

Formula sheet allowed.
25 minute time limit

Question 1 **[4 marks: 1, 3]**

A number sequence is described using the recursive equation:

$$T_{n+1} = 2T_n - 1 \quad , T_3 = 5$$

(a) Determine T_4

(b) Determine T_1

Question 2 **[2 marks]**

A number sequence is defined as follows:

$$u_n = 2u_{n-1} - u_{n-2} \quad , \quad u_1 = 8 \text{ and } u_2 = 15$$

Calculate u_3.

Question 3 **[4 marks]**

A recursive sequence is defined as

$$u_n = pu_{n-1} + q$$

Given that $u_1 = -8$, $u_2 = 8$ and $u_3 = 4$, write down the two equations to determine the values of *p* and *q*. Do not solve for *p* and *q*.

Question 4 **[5 marks: 2, 3]**

A number sequence is generated by $T_n = 3n + 2$, with n = 1, 2, 3,…

(a) Express in the form $T_n = a + (n - 1) \times d$

(b) Express the number sequence in recursive form.

Question 5 **[4 marks: 2, 2]**

For this number sequence $\frac{1}{2}$, -4, 32, -256,….

Determine the…

(a) nth term formula

(b) the recursive formula

Question 6 **[4 marks: 2, 2]**

The first term of a geometric progression is 4.

The fourth term is 108.

(a) Show that the ratio is 3.

(b) Write the recursive formula.

Question 7 **[2 marks]**

Express the geometric ratio of r = 0.76 as a % increase/decease.

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Formula sheet, one A4 page double-sided of notes and calculators allowed.

25 mark total. 25 minute time limit

Question 8 **[11 marks: 2, 2, 2, 2, 3]**

Mary buys a car with a purchase price of $15 000. However, she has been told to expect the car to depreciate in value. The value of the car after *n* years can be determined by using the recursive rule.

$$T_{n+1} = 0.82T_n \text{ , } T_0 = 15\,000$$

(a) Complete the table below to show the value of the car at the end of each year, to the nearest dollar.

n	0	1	2	3
Value of car after n years ($)				

(b) Describe the graph if we plotted the value of the car versus the year.

(c) Express the car values from year to year as a nth term formula.

(d) Determine the value of Mary's car after 10 years, correct to the nearest dollar.

Question 8 cont.

(e) Mary decided that she will sell her car at the end of the year in which its value drops below 80% of its original purchase price. After how many years should she sell the car?

Question 9 **[5 marks: 2, 3]**

5, x, 20,…. is a number sequence.

(a) Determine x if the number sequence is an arithmetic progression.

(b) Determine x if the number sequence is a geometric progression.

Question 10 **[5 marks: 2, 3]**

5, x, y, 78.125,…. is a number sequence.

(a) Determine *x* and *y* if the number sequence is an arithmetic progression.

(b) Determine *x* and *y* if the number sequence is a geometric progression.

Question 11 **[4 marks: 2, 2]**

$\mathbf{T_{n+1} = 0.6T_n - 150, T_1 = 85}$ is used to generate a number sequence.

(a) Explain why this is neither an arithmetic progression nor a geometric progression.

(b) T_{n+1} will become constant as n gets very large. Show how this value can be found using an algebraic equation.