

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Topic: \_\_\_\_\_

**SEQUENCES****Question 1** [3 + 1 + 1 = 5 marks]

Given that  $T_n = 200(0.5)^{n-2}$  then find:

(a) the first three terms of the sequence.

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(b) the eighth term of the sequence.

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(c) the recursive formula for the sequence.

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**Question 2** [3 + 1 + 1 = 5 marks]

Given that  $t_{n+1} - t_n = 5$  and that  $t_1 = 3$  then find:

(a) the first three terms of the sequence.

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(b) the general term for the sequence.

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(c) the twelfth term of the sequence.

**Question 3** [2 + 1 + 2 = 5 marks]

Given the sequence 240, -180, 135, ... then find:

(a) the general term of the sequence.

(b) the recursive formula for the sequence.

(c)  $T_6$

**Question 4** [2 + 2 = 4 marks]

A man gives his son \$5 on his fifth birthday, \$8 on his sixth birthday, \$11 on his seventh birthday and continues thereafter.

(a) How much does the man give his son on his twentieth birthday?

(b) On which birthday will the son receive more than \$80 for the first time?

**Question 5** [2 + 3 = 5 marks]

The Fibonacci Sequence can be written as:

$$F_n + F_{n-1} = F_{n+1} \quad \text{where} \quad F_1 = F_2 = 1$$

(a) Find  $F_{10}$

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(b) Show that  $4F_5^2 + 5 = F_7^2 - F_6^2$

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**Question 6** [2 + 2 + 2 = 6 marks]

A car valued at \$19200 is bought January 1st 2004. It depreciates at a rate of \$1800 per year for the first five years and then 10% per annum thereafter.

(a) Find the value of the car on January 1st 2009

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(b) Find the value of the car on January 1st 2015

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If the car is sold when its value first drops below \$3000 then find:

(c) during which year the car is sold.

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( 5 + 5 + 5 + 4 + 5 + 6 = 30 marks )

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**SEQUENCES****Question 1**

- (a)  $T_1 = 400, T_2 = 200, T_3 = 100$  [3]
- (b)  $T_8 = 200(0.5)^6 = 3.125$  [1]
- (c)  $T_{n+1} = \frac{1}{2}T_n$  where  $T_1 = 400$  [1]

**Question 2**

$$t_{n+1} = t_n + 5$$

- (a)  $t_1 = 3, t_2 = 8, t_3 = 13$  [1,1,1]
- (b)  $t_n = 5n - 2$  [1]
- (c)  $t_{12} = 58$  [1]

**Question 3**

- (a)  $T_n = 240(-0.75)^{n-1}$  or  $T_n = 320(-0.75)^n$  [1,1]
- (b)  $T_{n+1} = (-0.75)T_n$  where  $T_1 = 240$  [1]
- (c)  $T_6 = 240(-0.75)^5$  [1]  
 $= -56.95$  [1]

**Question 4**

5, 8, 11, ...A.P.

- (a)  $T_n = 3n + 2$  [1]  
 $T_{16} = \$50$  [1]
- (b)  $T_n > 80$

n	20	25	26	27
$T_n$	62	77	80	83

On his 31st birthday [2]

### Question 5

(a)  $F_{10} = 55$  [2]

(b)  $4F_5^2 + 5 = F_7^2 - F_6^2$

$$4(5)^2 + 5 = 13^2 - 8^2 \quad [1,1]$$

$$100 + 5 = 169 - 64$$

$$105 = 105 \quad \text{verified} \quad [1]$$

### Question 6

$t_1$       $t_2$       $t_3$   
 19200, 17400, 15600, ...A.P.  
 2004, 2005, 2006,

(a)  $t_n = 1800n + 18200$   
 $t_6 = \$10200$  [2]

(b)      $t_1$       $t_2$       $t_3$   
 10200, 9180, 8262, ...G.P.  
 2009 2010 2011

$$t_n = 10200(0.9)^{n-1}$$

$$t_7 = 10200(0.9)^6 = \$5420.70 \quad [1,1]$$

(c)  $t_n = 10200(0.9)^{n-1} = 3000$

n	11	12	13
$t_n$	3557	3201	2881

During 2020 [2]

( 5 + 5 + 5 + 4 + 5 + 6 = 30 marks )