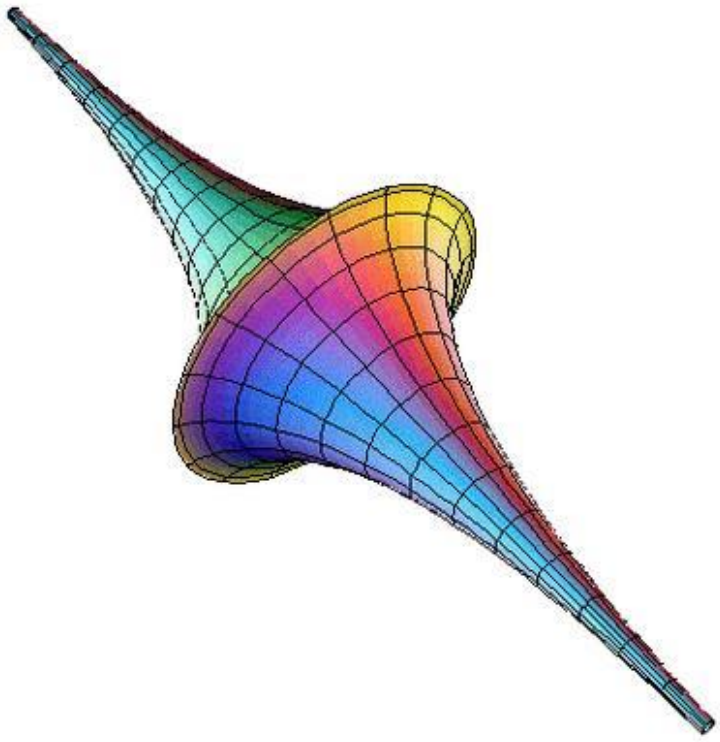

NUMBER PATTERNS

MATHEMATICS GRADE 10

REVISION PACK

PAST PAPERS

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QUESTION 8 (MAY 07 BISHOP)

8.1 A sequence begins 5; 9; 13; 17; …

8.1.1 Write down the next two terms (2)

8.1.2 Describe in words how each term is calculated from the previous term (1)

8.1.3 Find a formula in terms of n for T_n, the n^{th} term (so $T_1 = 5$, $T_2 = 9$ etc.) (3)

8.1.4 Use your formula to determine whether 151 is a term in the sequence (3)

8.2 Study the pattern given alongside.

$$\frac{1}{1}+\frac{1}{3}=\frac{2.2}{1.3}$$

$$\frac{1}{2}+\frac{1}{4}=\frac{2.3}{2.4}$$

$$\frac{1}{3}+\frac{1}{5}=\frac{2.4}{3.5}$$

8.2.1 Write down the row that begins with $\frac{1}{8}$ (2)

8.2.2 Now write down the row that begins with $\frac{1}{n}$ (4)

8.2.3 Prove that the row you have written down in 8.2.2 is algebraically correct (3)

[18]

QUESTION 3 (EXEMPLAR 12)

3.1 $3x+1$; $2x$; $3x-7$..... are the first three terms of a linear number pattern.

3.1.1 If the value of x is three, write down the FIRST THREE terms. (3)

3.1.2 Determine the formula for T_n, the general term of the sequence. (2)

3.1.3 Which term in the sequence is the first to be less than -31? (3)

3.2 The multiples of three form the number pattern: 3 ; 6 ; 9 ; 12 ; ...
Determine the 13^{th} number in this pattern that is even. (3)

[11]

QUESTION 4 (JUNE 12 HUD)

4. Given :

$$5\,;\,-1\,;\,-7\,;\,\cdots\,;\,-283$$

4.1. Determine an expression for T_n , the general term of the sequence. (3)

4.2. Hence, determine the number of terms in the sequence. (2)

[5]

QUESTION 5 (NOV 12 HUD)

5.1. Given : $17\,;\,15\,;\,13\,;\cdots$

5.1.1. Write down an expression for the n-th term of the sequence, T_n . 1

5.1.2. Hence, determine the position of the term whose value is -981 . 2 (3)

5.2. If : $3x-1\,;4x+7\,;2x-5$ are 3 consecutive terms of an arithmetic sequence, calculate the value of x . (2)

[5]

QUSTION 7 (JUNE 13 HUD)

7.1) Given 7;19;31;43;...;475

7.1.1) Determine an expression for T_n, the general term of the sequence. (2)

7.1.2) Hence, determine how many terms there are in the given sequence. (2)

7.2) The first three terms of an arithmetic sequence are

$$2x-5;\,2x+1;\,4x+3$$

Calculate the value of x (2)

[6]

QUESTION 8 (NOV 13 HUD)

8.1) If 13; 10; 7...

8.1.1) Write down an expression for the n-th term of the sequence T_n and simplify the expression (3)

8.1.2) In which position will you find the first term lower than −44? (3)

8.2) If $3x - 1; 2x + 3; 2x - 1$ are the first 3 terms of an arithmetic sequence. Calculate x. (4)

[9]

QUESTION 8 (JUNE 15 HUD)

8.1 Given : **1; -4; -9; -14; .... ; -124**

8.1.1. Determine an expression for the general term, T_n , of this sequence; simplify your answer. 2

8.1.2. Hence, using your answer in 8.1.1., determine how many terms are in this sequence. 2 (4)

8.2 Given : $x + 1 ; 3x - 1 ; 4x + 1$ as the 1st , 2nd and 3rd terms of an arithmetic sequence, calculate:

8.2.1 x, showing it to be 4 3

8.2.2 the common difference of the sequence 3 (6)

[10]

QUESTION 3 (NOV 15)

3.1 Given the linear number pattern: 8 ; 3 ; --2 ; ...

3.1.1 Write down the NEXT TWO terms of the pattern. (2)

3.1.2 Determine the n^{th} term of the pattern. (2)

3.1.3 Calculate T_{30}, the thirtieth term of the pattern. (2)

3.1.4 Which term of the pattern is equal to –492? (2)

3.2 The first four terms of PATTERN A and PATTERN B are shown in the table below:

Position of term (n)	1	2	3	4
PATTERN A	1	3	5	7
PATTERN B	1	9	25	49

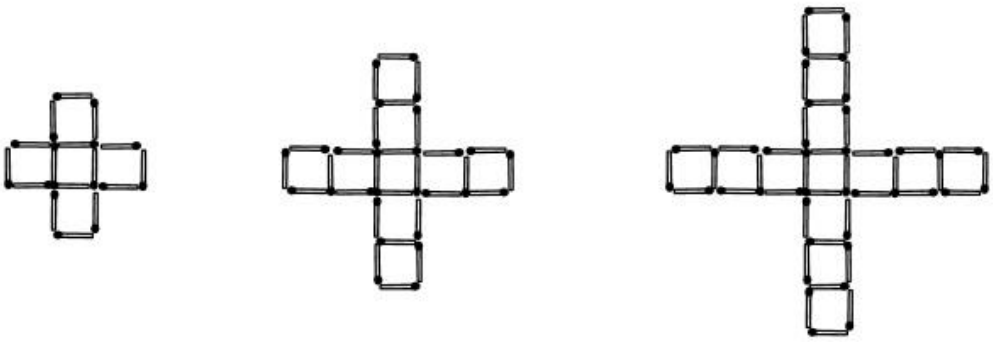
3.2.1 Determine a general formula for the n^{th} term of PATTERN A. (2)

3.2.2 Hence, or otherwise, determine a general formula for the n^{th} term of PATTERN B. (1)

3.2.3 Hence, determine a general formula for the pattern $0 ; -6 ; -20 ; -42 \ldots$ Simplify your answer as far as possible. (4)
[15]

QUESTION 3 (NOV 06)

Thandi builds patterns that consist of squares as shown below:



Picture 1 Picture 2 Picture 3

Assume the pattern is continued, answer the following questions:

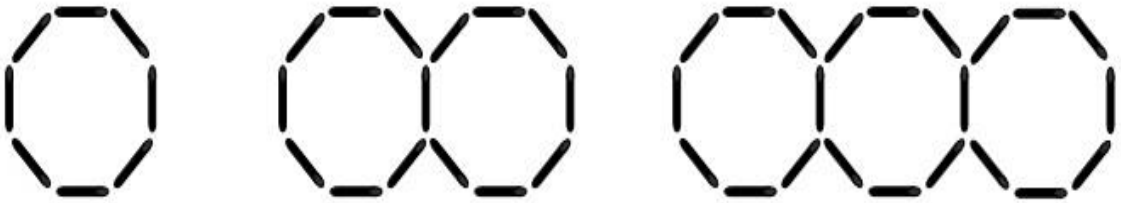
3.1 How many squares will Picture 5 have? (2)

3.2 Make a conjecture about the number of matches required for any pattern. (2)

3.3 Use a variable to write an algebraic statement to generalise the relationship between the number of squares and the picture number. (2)
[6]

QUESTION 4 (N0V 07)

Study the following patterns made up of sticks.



Pattern 1 — 8 sticks

Pattern 2 — 15 sticks

Pattern 3 — 22 sticks

4.1 How many sticks will the fourth (4^{th}) pattern have? (1)

4.2 Write down a conjecture that describes the relationship between the pattern number and the number of sticks required for the pattern. (2)

4.3 Write down an algebraic formula for the number of sticks in the n^{th} pattern. (2)

4.4 Which pattern will use 351 sticks to build? (2)

[7]

QUESTION 5

Katlego was revising for her examination and came across the following sequence of numbers: 2 ; 4 ; 8 ; 16 ; ...

5.1 Write down the next two terms in the sequence. (2)

5.2 Write down an algebraic formula for the n^{th} term of the sequence. (3)

5.3 Calculate the value of the 20^{th} term in the sequence. (2)

[7]

QUESTION 5 (NOV 15 CURRO)

5.1 Consider the sequence:

23 4 **18** 7 **13** 10 **8** 13 **3**

5.1.1 Write down the next two terms of this sequence. (2)

5.1.2 If the **bold** terms are removed, determine a general formula T_n for the remaining terms. (2)

5.1.3 Use your formula to find which term, in the remaining terms, has a value of 244. (2)

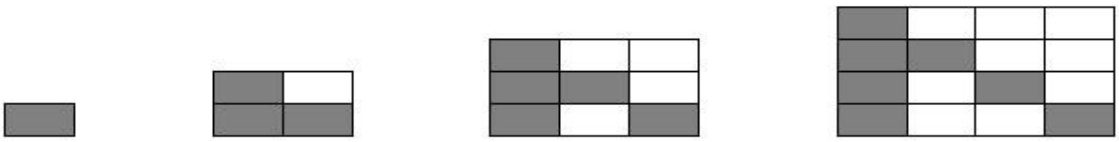
5.2 $3x + 1$; $2x$; $3x - 7$ are the first three terms of a linear number pattern (Arithmetic pattern). Determine the value of x. (3)

5.3 If the pattern **BRANDONBRANDONBRANDON…** is continued in this way, what will the 349th letter be? (2)

[11]

QUESTION 3 (N0V 16)

Dark tiles (D) and light tiles (L) are used to create patterns on a floor. The first four patterns are shown below. For the patterns that follow the tiles are arranged in a similar manner.



Pattern 1 **Pattern 2** **Pattern 3** **Pattern 4**

3.1 How many dark tiles were used in pattern 5? (1)

3.2 How many light tiles were used in pattern 6? (1)

3.3 Write down the general term (D_n) for the number of dark floor tiles used in each pattern. (2)

3.4 Write down the general term (L_n) for the number of light floor tiles used in each pattern. (2)

3.5 Which pattern will have exactly 64 light floor tiles? (3)

3.6 Each dark tile is 0,3 m wide and 0,6 m long. Calculate the total area covered by all the dark tiles in the first 100 patterns. (3)

[12]

QUESTION 3 (N0V 17)

3.1 Consider the linear sequence: 5 ; 8 ; 11 ; b ; 17 ; …

3.1.1 Write down the value of b. (2)

3.1.2 Determine the n^{th} term of the sequence. (2)

3.1.3 Calculate the value of the 15^{th} term of the sequence. (2)

3.1.4 Which term in the sequence is equal to 83? (2)

3.2 Consider the number pattern below created by using the numbers of the sequence 2 ; 6 ; 10 ; 14 ; 18 ; …

			2				
		6		10			
	14		18		22		
26		30		34		38	
42	…		…		…		…

3.2.1 Calculate the sum of the numbers in the 8^{th} row. (3)

3.2.2 Determine the mean of the numbers in the 20^{th} row. (2)

[13]

QUESTION 6

6.2 Matches are used to make the figures below.

6.2.1 Copy and complete the following table: (4)

Area	2	4	6	8	20	
Number of matches						207

6.2.2 Determine how many matches you will need if the area is $2n$. (2)

[9]

QUESTION 7

7.1 Use a calculator to calculate the following:

7.1.1 11×24

7.1.2 11×52

7.1.3 11×63 (1)

7.2 Explain in words any pattern that you notice. (A conjecture) (3)

7.3 Check if your conjecture works for another 3 examples. (3)

7.4 Use algebra to prove your conjecture for multiplying eleven by a two digit number. (4)

[11]

THE END

THANK YOU VERY MUCH FOR READING THIS TUTORIAL.