

868



TUTORS

Preparation for

High School Mathematics

Investigation

Solutions

Math



Instructions and Tips:

- ✓ **You have 60 minutes to complete this worksheet**
- ✓ **This worksheet consists of 6 questions**
- ✓ **Write answers in the spaces provided**
- ✓ **Show all working**



Student Name: _____

Student ID: _____

Date: __ / __ / ____

Total Score:

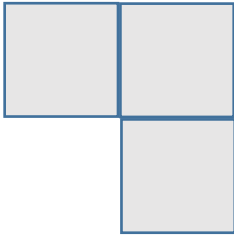
Highest Score:

Tutor's Comments:

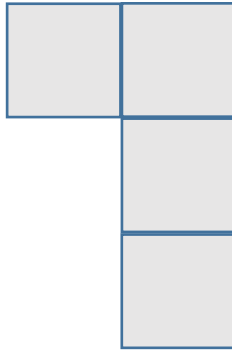
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Question 1

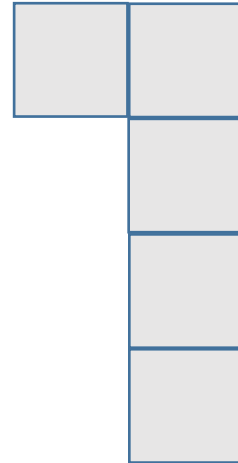
Consider these patterns made from squares:



first figure

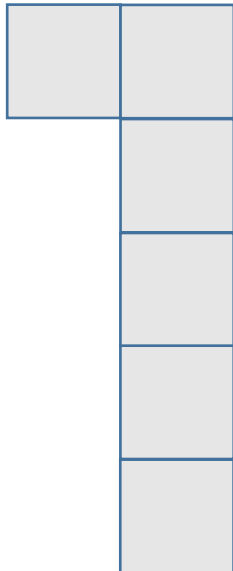


second figure



third figure

(a) Draw the fourth figure in the pattern :



fourth figure

(2 marks)

(b) Complete the table below :

Figure number (f)	1	2	3	4	5	6
Number of squares (N)	3	4	5	6	7	8

(3 marks)

(c) Write an equation in terms of figure number (f) that gives the number of squares (N) in the figure.

$$N = f + 2$$



(3 marks)

(d) Determine the number of squares used for the 12th figure in the pattern.

$$N = f + 2$$

$$N = 12 + 2$$

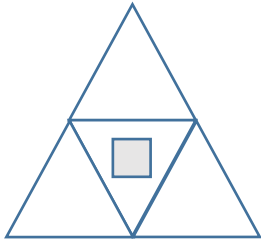
$$N = 14$$

For the 12th figure, 14 squares are used.

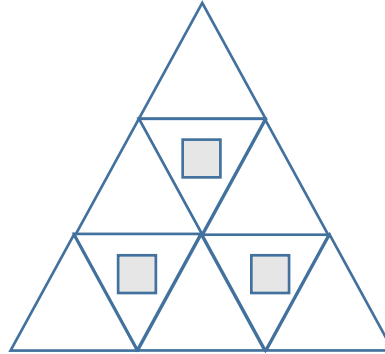
(2 marks)

Question 2

Consider these patterns that consists of triangles and squares:

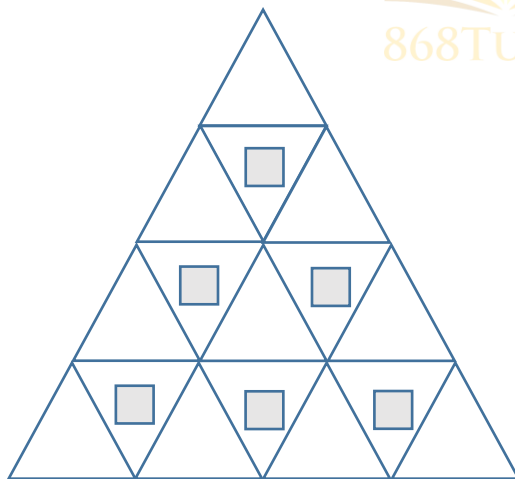


first figure



second figure

(a) Draw the third figure in the pattern :



third figure

(3 marks)

(b) Complete the table below :

Figure number (f)	1	2	3
Number of shaded squares (n)	1	3	6

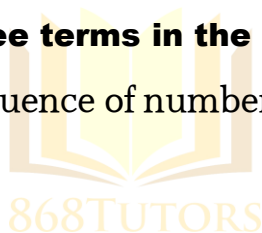
(2 marks)

Consider the sequence of numbers below:

0, 1, 1, 2, 3, 5, 8, 13, 21...

(c) Determine the next three terms in the sequence of numbers.

The next three terms in the sequence of numbers are 34, 55 and 89.



(3 marks)

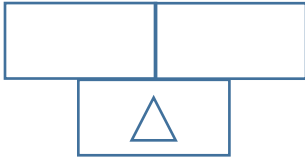
(d) What is the name of this sequence of numbers?

This sequence of numbers is known as a Fibonacci sequence.

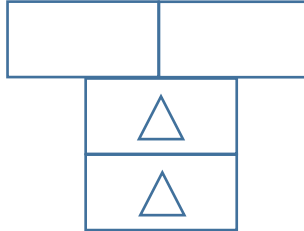
(2 marks)

Question 3

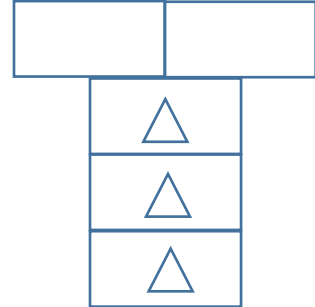
Consider some patterns made from rectangles and triangles:



first figure

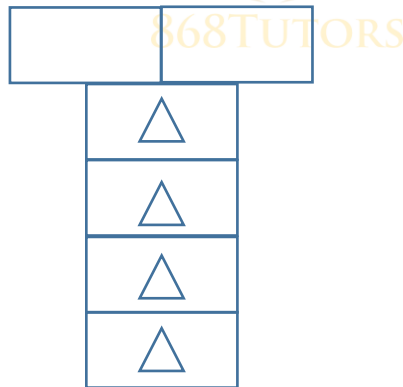


second figure



third figure

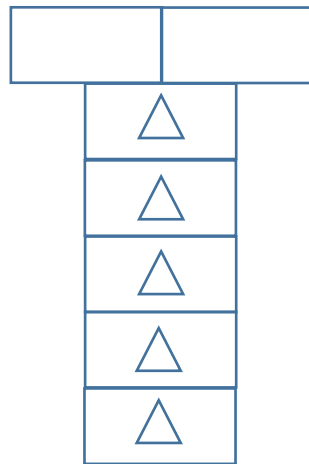
(a) Draw the fourth figure in the pattern :



fourth figure

(2 marks)

(b) Draw the fifth figure in the pattern :



fifth figure

(2 marks)

(c) Complete the table below :

Figure number	1	2	3	4	5	6	7
Number of triangles	1	2	3	4	5	6	7

(2 marks)

(d) How many triangles will the 100th figure have?

The 100th figure will have 100 triangles.

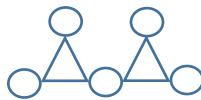
(2 marks)

Question 4

Consider the first three figures in the pattern below:



first figure

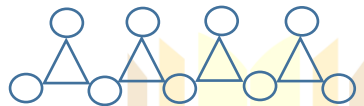


second figure



third figure

(a) Draw the fourth figure in the pattern :



fourth figure

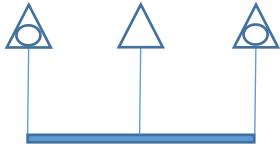
(2 marks)

(b) From your observation and analysis of the patterns, complete the table below:

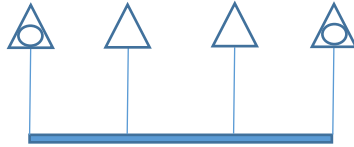
Figure Number	Number of triangles	Number of circles
1	1	3
2	2	5
3	3	7
4	(i) <u>4</u>	(ii) <u>9</u>
n	n	(iii) <u>$2n + 1$</u>
(iv) <u>150</u>	(v) <u>150</u>	301

$$2n + 1 = 301 \quad 2n = 301 - 1 \quad 2n = 300 \quad n = 150$$

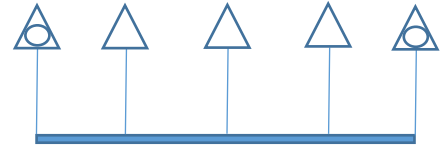
(6 marks)

Question 5**Consider the first three figures in the pattern below:**

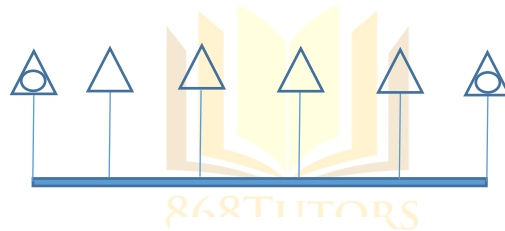
first figure



second figure



third figure

(a) Draw the fourth figure in the pattern :

fourth figure

(4 marks)**(b) From your observation and analysis of the patterns, complete the table below:**

Figure Number	Number of circles	Number of triangles
1	2	3
2	2	4
3	2	5
4	(i) <u> 2 </u>	6
n	2	(ii) <u> n + 2 </u>
(iii) <u> 296 </u>	2	298

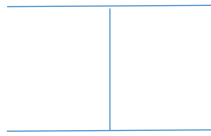
$$n + 2 = 298 \quad n = 298 - 2 \quad n = 296$$

(6 marks)

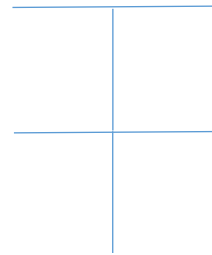
Question 6



first figure

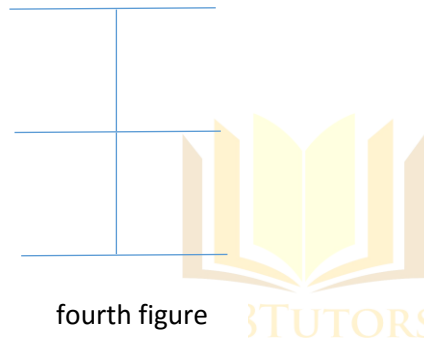


second figure



third figure

(a) Draw the fourth figure in the pattern :



fourth figure

(3 marks)

(b) Complete the table

Figure Number	Number of horizontal lines	Number of vertical lines
1	1	1
2	2	1
3	2	2
4	(i) <u> 3 </u>	2
5	3	(ii) <u> 3 </u>

(2 marks)



END OF WORKSHEET

