

# P5 HAPS – Lesson 4

## Patterns (II)

### Figures

enquiry@mathsheuristics.com  
<http://unittransfermethod.blogspot.com>

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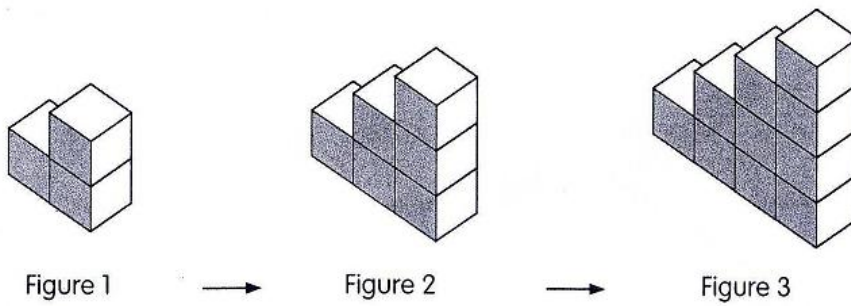
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# LESSON 4: FIGURE PATTERNS

**GUIDED EXAMPLE 1**

Sum of consecutive Numbers

Study the pattern below and complete the table:



(a) Complete the following table:

Figure number	Number of cubes
1	
2	
3	
4	
5	

(b) Calculate the number of cubes in Figure 15.




(c) Calculate the number of cubes in Figure 50.

(d) Which Figure number has 5151 cubes?

**GUIDED EXAMPLE 2**

Common Difference

Study the pattern carefully and answer the questions that follow.

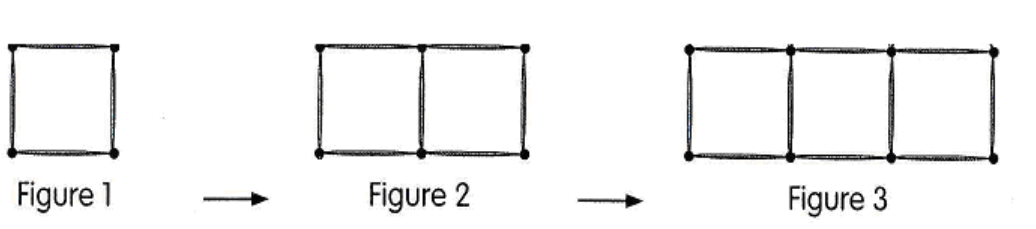
Pattern 1	Pattern 2	Pattern 3
		

- a) How many dots are there in Pattern 5?
  
- b) How many dots are there in pattern 73?
  
- c) What Pattern No. has 517 dots?

**GUIDED EXAMPLE 3**

Common Difference

Study the pattern below and answer the following questions:

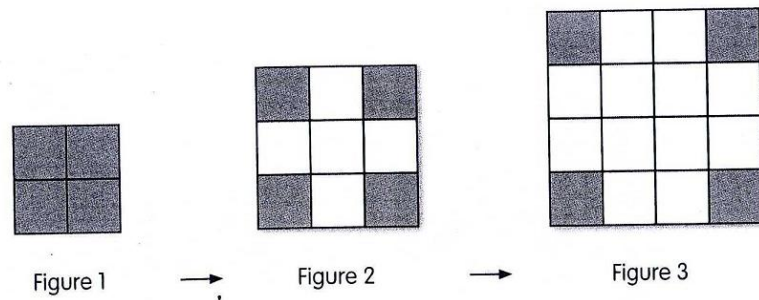


- a) How many sticks will figure 5 have?
  
- b) How many sticks will figure 91 have?
  
- c) Which figure number has 2317 sticks?

**GUIDED EXAMPLE 4**

Square Numbers

Study the pattern below and fill up the table:

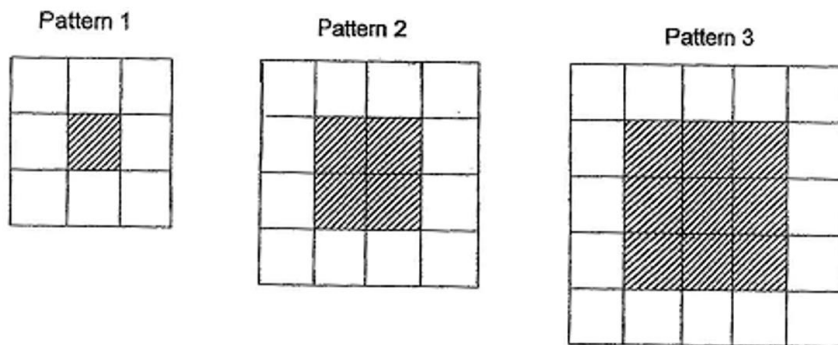


Complete the following table:

Figure	Number of black squares	Number of white squares	Total number of squares
1	(    )	(    )	(    )
2	(    )	(    )	(    )
3	(    )	(    )	(    )
4	(    )	(    )	(    )
5	(    )	(    )	(    )
⋮	⋮	⋮	⋮
10	(    )	(    )	(    )
⋮	⋮	⋮	⋮
(    )	(    )	140	(    )
⋮	⋮	⋮	⋮
(    )	(    )	(    )	625

**GUIDED EXAMPLE 5** \_\_\_\_\_ Square Numbers

Study the pattern carefully and answer the questions that follow.

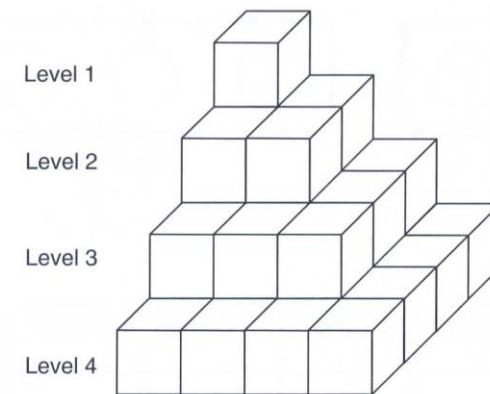


- a) How many shaded squares will there be in Pattern 8?
  
- b) How many unshaded squares are there in Pattern 14?
  
- c) What pattern number has 324 unshaded squares?

**GUIDED EXAMPLE 6**

Systematic Listing

Study the pattern of the structure below.



(a) Fill in the missing number of cubes.

Level	Number of cubes	Total
1	( )	( )
2	( )	( )
3	( )	( )
4	( )	( )
5	( )	( )
:	:	:
10	( )	( )

(b) If more cubes are to be added to build the structure, how many cubes are needed to use for Level 10?

(c) If a total of 506 cubes are used to build the whole structure, how many levels are there in the structure?



**GUIDED EXAMPLE 7**

Cyclical Patterns

See the pattern below.



What is the 79<sup>th</sup> shape in the pattern?

(MGS P5 CA1 2014)

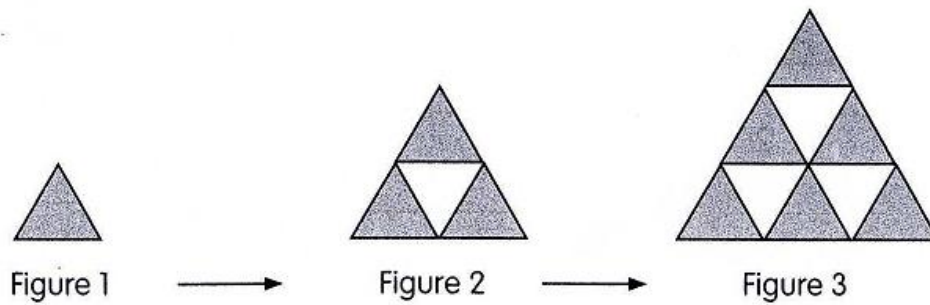
A group of pupils were given white and grey 'Smiley face' badges. They are arranged in the pattern shown below.



If there are 74 badges, what is the colour of the last badge?  
(Rosyth P5 SA2 2012)

**BUILD YOUR UNDERSTANDING**

1. Study the pattern below.  
 Note: The white space inside the figure is empty



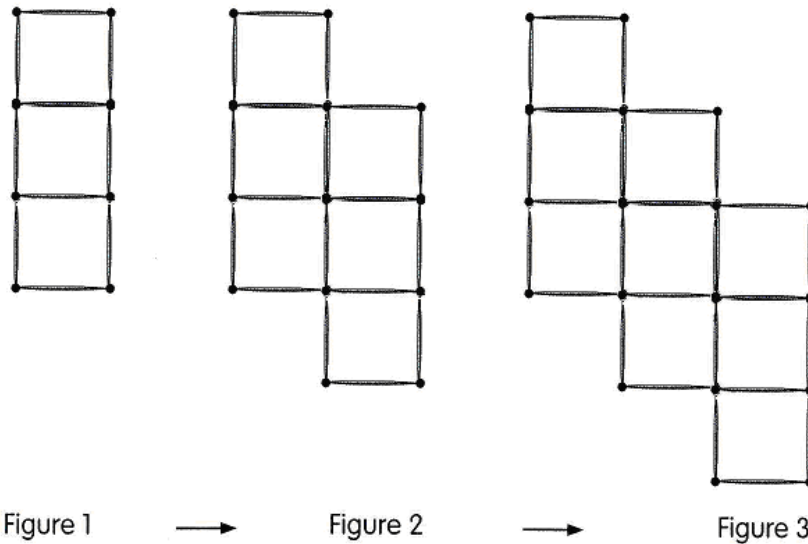
- (a) Complete the following table:

Figure	Number of (shaded) triangles
1	(     )
2	(     )
3	(     )
4	(     )
5	(     )

- (a) Calculate the number of triangles in Figure 25.
- (b) Calculate the number of triangles in Figure 40.
- (c) Which Figure number has 595 triangles?

2. Su Lin is training for a running event.  
For each day after the first day, she ran 100 m more than the previous day.  
At the end of the 10 days, she ran a total of 21500 m.  
How far did she run on the first day?

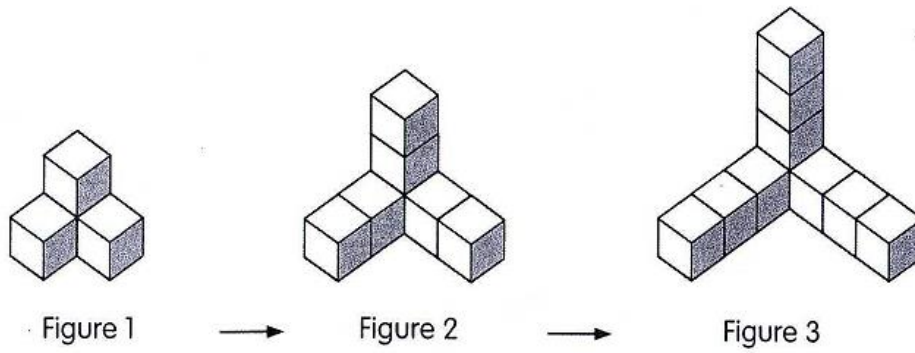
3. Study the pattern below.



Each represents a square. Complete the following table.

Figure	Number of Squares	Number of sticks
1	(    )	(    )
2	(    )	(    )
3	(    )	(    )
4	(    )	(    )
5	(    )	(    )
:	:	:
50	(    )	(    )
:	:	:
(    )	300	(    )
:	:	:
(    )	(    )	890

4. Study the pattern below.



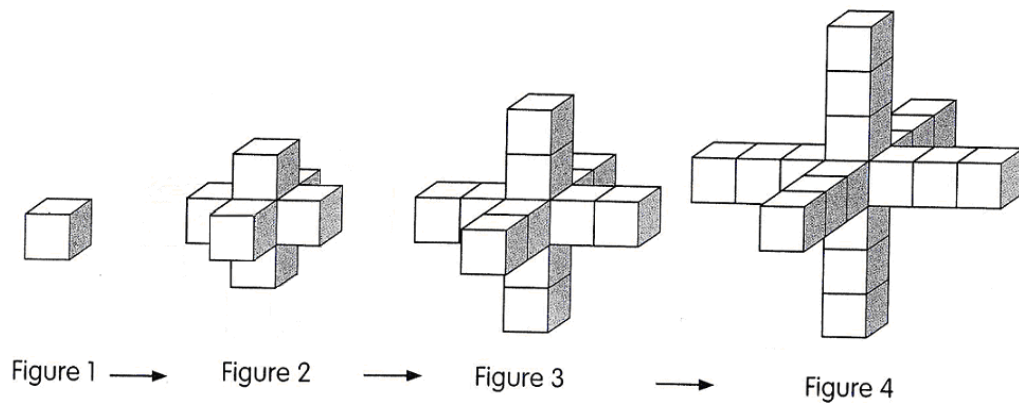
Complete the following table.

Figure	Number of cubes
1	(    )
2	(    )
3	(    )
4	(    )
5	(    )
:	:
30	(    )
:	:
60	(    )
:	:
(    )	271

# P5 Heuristics Approach to Problem Solving

# Patterns (II)

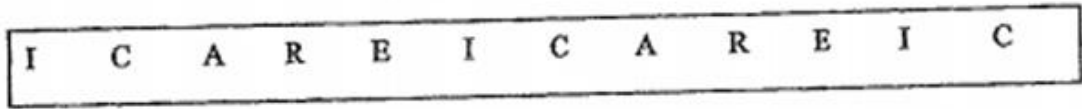
5. Study the pattern below.



Complete the following table.

Figure	Number of cubes
1	( )
2	( )
3	( )
4	( )
:	:
20	( )
:	:
50	( )
:	:
( )	475

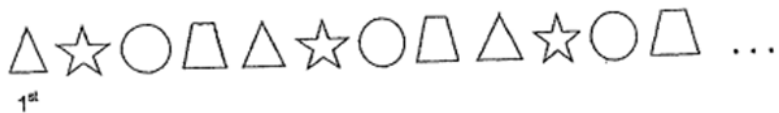
6. Judy uses the five letters of I,C,A,R andE to form a pattern.



The first 12 letters are shown below.  
Which letter is in the 37<sup>th</sup> position?

(Nan Hua P5 CA1)

7. Some shapes are arranged in the following pattern:



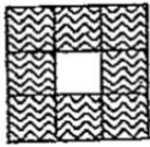
Which shape is the 59<sup>th</sup> position?

(MGS P5 SA1 2014)

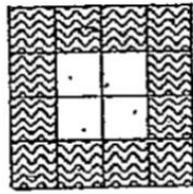
## P5 Heuristics Approach to Problem Solving

## Patterns (II)

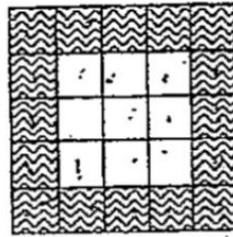
8. A wall design is created using white and shaded tiles.



Pattern 1



Pattern 2



Pattern 3

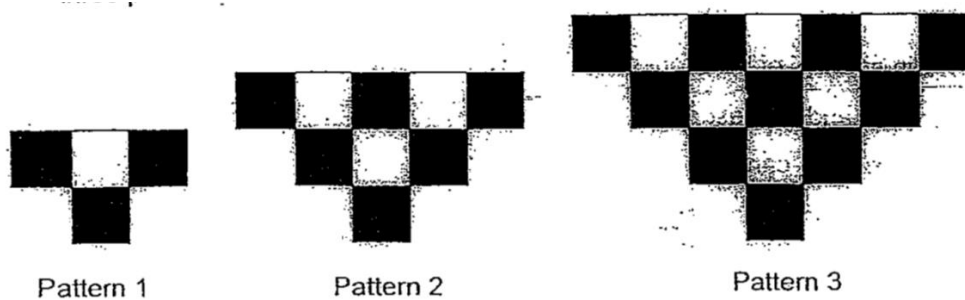
- a) Complete the table below.

Pattern No.	Shaded	Unshaded	Total
1			
2			
3			
4			
5			

- b) How many shaded tiles will there be in Pattern 13?
- c) A pattern has 100 white tiles. How many shaded squares are there?



9. Black and white squares are used to form a sequence of patterns. The first three patterns are shown below.



- a) Complete the information in the table provided.

Pattern No.	Shaded	Unshaded	Total
1			
2			
3			
4			
5			

- b) Find the number of white squares in Pattern 27.
- c) Which pattern number will there be 729 squares?