

Higher Order Thinking Skills

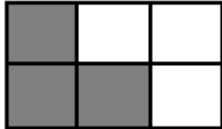
Primary 5

Lesson 9:
Pattern

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LESSON 9 Pattern

1. Consider the following diagram:



How many black boxes are there in

- a) the first row : ()
the second row : ()
- b) Total number of black boxes = () + ()
- c) How many black boxes are there altogether?
(Note that exactly half of the squares are black)

Total number of black squares = $\frac{1}{2} \times () \times ()$
- d) In conclusion: $1 + 2 = \frac{1}{2} \times () \times ()$

2. Consider the following diagram:

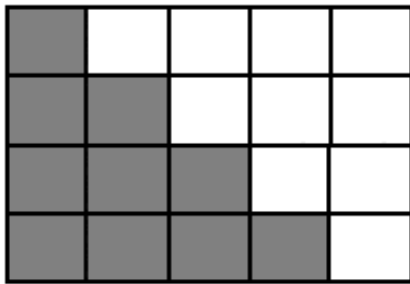


How many black boxes are there in

- a) the first row : ()
the second row : ()
the third row : ()
- b) Total number of black boxes = () + () + ()
- c) How many black boxes are there altogether?
(Note that exactly half of the squares are black)

Total number of black squares = $\frac{1}{2} \times () \times ()$
- d) In conclusion: $1 + 2 + 3 = \frac{1}{2} \times () \times ()$

3. Consider the following diagram:



How many black boxes are there in

- a) the first row : ()
 the second row : ()
 the third row : ()
 the fourth row : ()
 - b) Total number of black boxes = () + () + () + ()
 - c) How many black boxes are there altogether?
 (Note that exactly half of the squares are black)

 Total number of black squares = $\frac{1}{2} \times () \times ()$
 - d) In conclusion: $1 + 2 + 3 + 4 = \frac{1}{2} \times () \times ()$
-

4. Complete the following:

- $1 + 2 = \frac{1}{2} \times () \times ()$
- $1 + 2 + 3 = \frac{1}{2} \times () \times ()$
- $1 + 2 + 3 + 4 = \frac{1}{2} \times () \times ()$
- $1 + 2 + 3 + 4 + 5 = \frac{1}{2} \times () \times ()$
- $1 + 2 + 3 + 4 + 5 + \dots + 100 = \frac{1}{2} \times () \times ()$
- $1 + 2 + 3 + 4 + 5 + \dots + (\text{last Number}) = \frac{1}{2} \times () \times ()$

GUIDED EXAMPLE 1

How many different handshakes can be made in a party of;

- a) 2 children?

- b) 3 children?

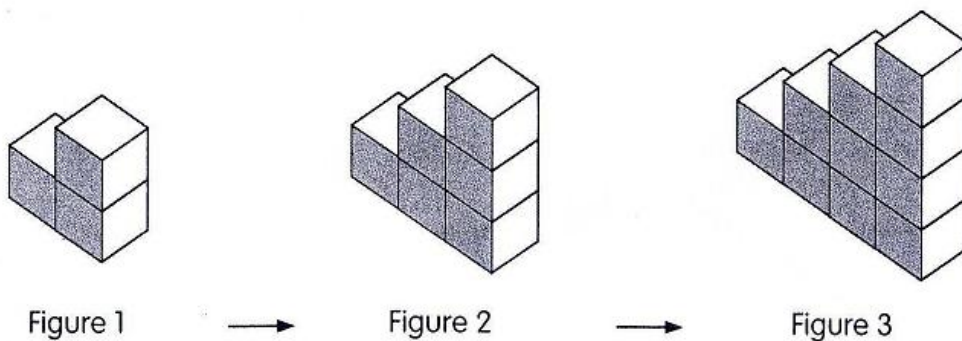
- c) 4 children?

- d) 100 children?

- e) Given that there a total of 1225 handshakes made in the party,
how many children are there in the party?
(Assume that each child shakes hands with every other child only once)

GUIDED EXAMPLE 2

Study the pattern below and complete the table:



(a) Complete the following table:

Figure number	Number of cubes
1	()
2	()
3	()
4	()
5	()

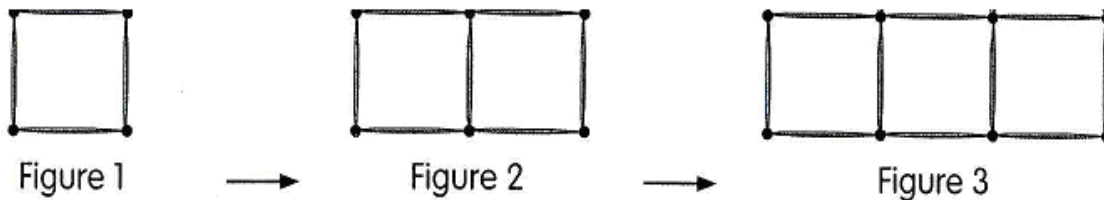
(b) Calculate the number of cubes in Figure 15.

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

(d) Which Figure number has 5151 cubes?

GUIDED EXAMPLE 3

Study the pattern below and fill up the table:

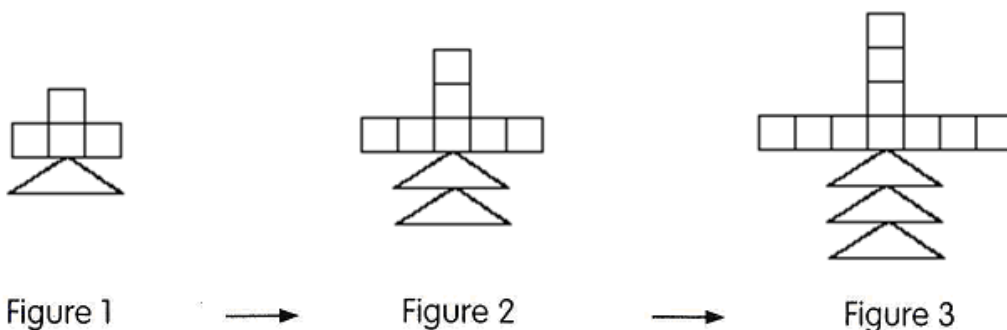


Complete the following table:

Figure	Number of sticks
1	()
2	()
3	()
4	()
5	()
:	:
50	()
:	:
()	205

GUIDED EXAMPLE 4

Study the pattern below and fill up the table:

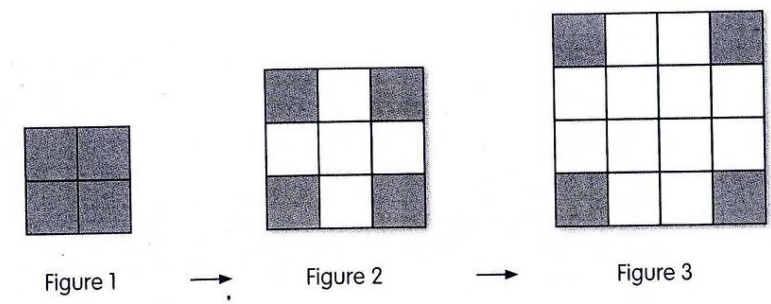


Complete the following table:

Figure	Total Numbers of Triangles	Total Numbers of Squares	Total numbers of Triangles and Squares
1	1	()	()
2	2	()	()
3	3	()	()
4	()	()	()
5	()	()	()
.....
()	()	43	()
.....
25	()	()	()
.....
()	()	()	121
.....
40	()	()	()

GUIDED EXAMPLE 5

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
:	:	:	:
:	:	:	:
30	()	()	()

BUILD YOUR UNDERSTANDING

Find the sum of the following:

1

a) $1 + 2 + \dots + 18 + 19$

b) $1 + 2 + \dots + 179 + 180 + 180 + 179 + \dots + 2 + 1$

c) $2 + 4 + 6 + \dots + 398 + 400$

d) $7 + 14 + 21 + \dots + 490 + 497$

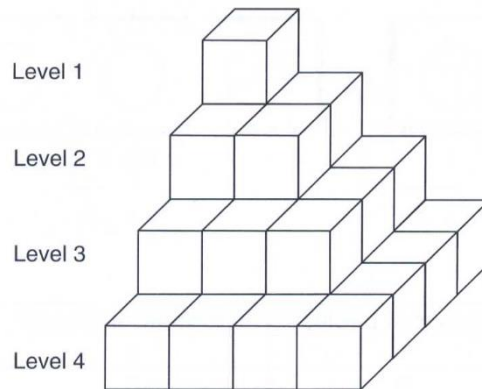
e) $56 + 57 + 58 + \dots + 87 + 88$

f) $99 + 100 + 101 + \dots + 299 + 300$

g) $5 + 12 + 19 + 26 + 33 + 40 + 47 + 54$

h) $3 + 11 + 19 + 27 + 35 + 43 + 51 + 59 + 67$

2. 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?

3. Study the pattern below.



Figure 1



Figure 2

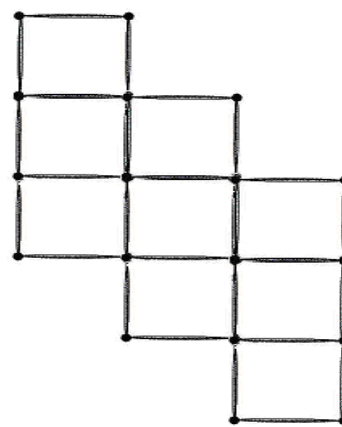


Figure 3


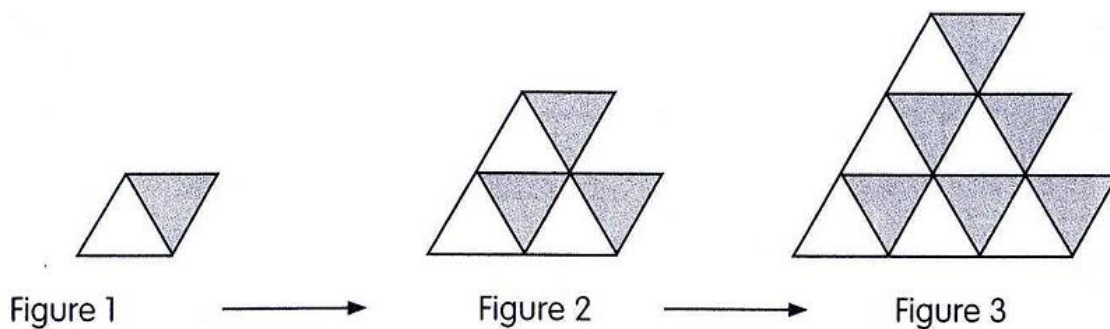
Each  represents a square. Complete the following table.

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 white triangles	Number of black triangles	Total number of triangles
1	()	()	()
2	()	()	()
3	()	()	()
4	()	()	()
5	()	()	()
:	:	:	:
30	()	()	()
:	:	:	:
()	()	()	6480
:	:	:	:
()	()	()	14520

5. Study the pattern in the table and answer the questions below:

Pattern	Statement	Sum
1	1	1
2	1 + 2 + 1	4
3	1 + 2 + 3 + 2 + 1	9
4	1 + 2 + 3 + 4 + 3 + 2 + 1	16

a) Write down the statement for pattern 6.

b) Calculate this sum.

c) When the sum is 900,
what is the pattern number?

6. Study the pattern below and complete the following table:

Sequence	Number
1	4
2	7
3	10
4	()
:	:
:	:
55	()
:	:
()	205