LESSON-13

DESIGN AND PATTERNS

T8D8Y4

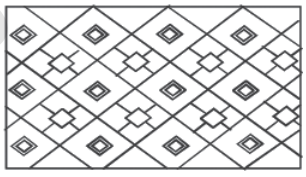
Let us go to Sualkuchi

Sualkuchi is a mini township in the district of Kamrup (Rural). But Sualkuchi is famous for cloths made of Pat and Muga. The weavers are artists in their own right. They create designs and patterns and materialize them in different types of clothes. There is a gate-way beautifully decorated with patterns. Just entering into the town, a visitor is welcomed by the sweet and tick-tack sounds of shuttles from the looms. Have you ever visited Sualkuchi? If not, make it a point to visit the site of glory of Assam.

Let us see how and what patterns the weavers make on cloths :

Now let us see how the weavers make the designs and pattern and weave them in cloths.

(A)



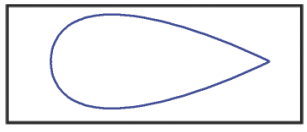
(B)

(C)

Draw the patterns shown above in the given place below

A) 

B) 

C) 

Assamese cloths such as Mekhela, Gamocha, they create the patterns on the border to make them more aesthetic and beautiful.

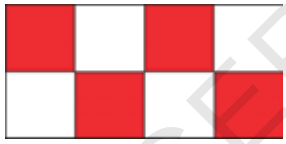
Apart from colths let us observe various patterns in ours sorroundings

Some rules of creating patterns

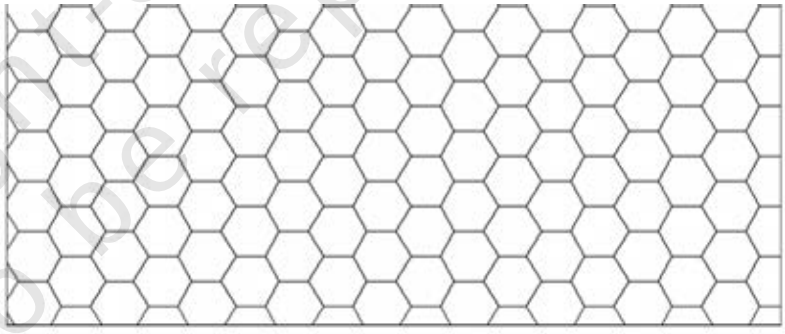
a) Repeating

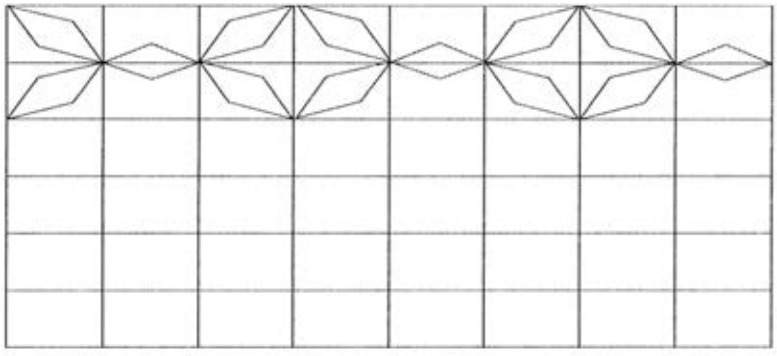
b) Successive increasing

c) **Taking alternates**



Use any of the rules stated above to create colour patterns on the following diagrams.





❄ **Some patterns we find in Nature**

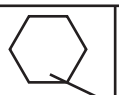
(a) Tortoise

(b) Peacock

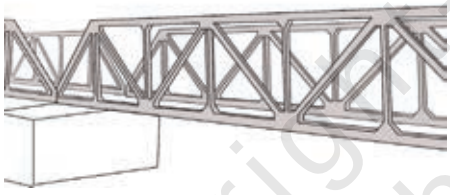
(c) Bee hive

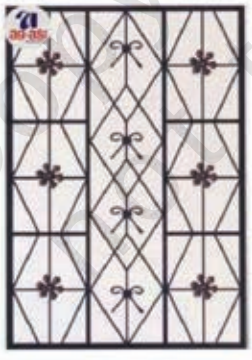
(d) Aloe-vera

Match the designs with the patterns found in the examples of Nature :

	a
	c
	b
	d

❄ **We find several designs and patterns in modern and classical constructions. Notice them in the following diagrams.**



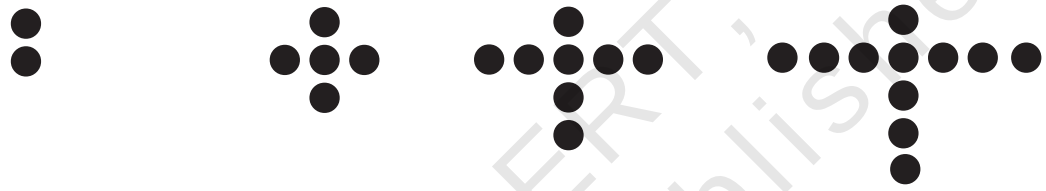


Tips to Teachers : *Show and discuss other such patterns available in and around the surroundings.*

❄ **Look around your surroundings. Surely you come across some nice patterns. Put your observations in the table as shown below**

Name of object you observed	The outline of the pattern you discovered

❄ One interesting information– we can observe mathematics in any pattern and vice verse. Let us see and enjoy some of them.

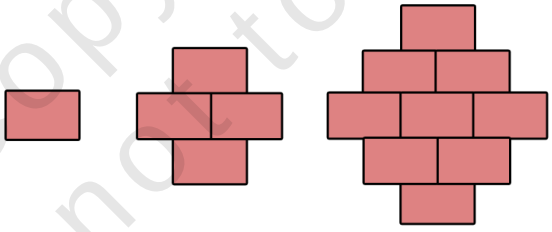


(a) (b) (c) (d)

Picture no.	No. of circle
a	2
b	5
c	8
d	11

Notice that
Every next pattern is created by adding 3 circlar dots.

☛ **Look at the stack of bricks**

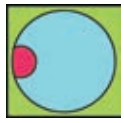


(a) (b) (c)

Picture no.	No. of bricks
a	
b	
c	

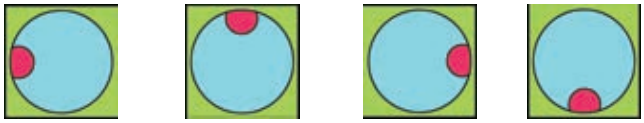
— Follow the pattern to construct next two structures (d) & (e)

— Number of bricks in structure (e) is ☐

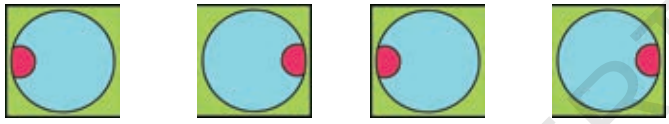
❄ Now look at the structure. 

We rotate it along the clock-hand (i.e. clock wise) in three different ways. Let us see what we get

First rule : Rotate it one fourth of a round at in time



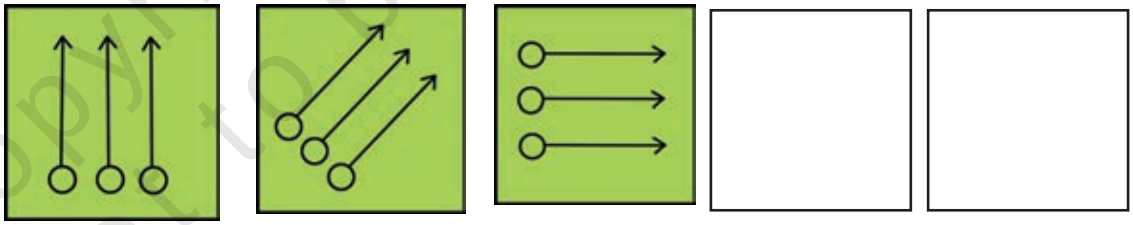
Second rule : Rotate one half of a round at in time



Third rule : Rotate three fourth of a round at in time

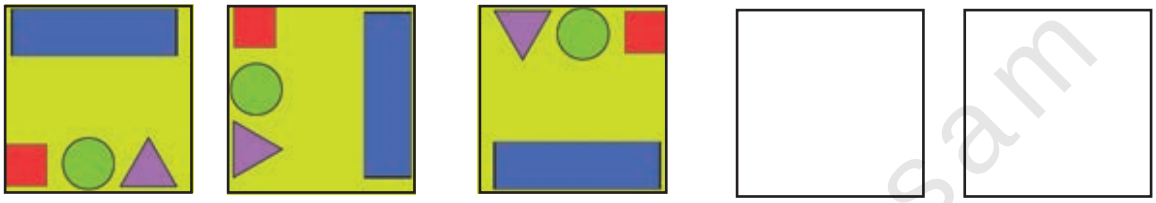
Time for self evaluation

☞ **Look at the patterns given bellow and fill up the two blanks.**

(a) 

(b) 

(c) 

(d) 

Magic Square

❄ **Let us see how a Magic Square is prepared**

Let us prepare a Magic Square by using the numbers 1, 2, 3, 4, 5, 6, 7, 8 and 9. While preparing a Magic Square we must keep in mind that–

Rule 1. Sum of the numbers from any side should be same.

Rule 2. One number can be used once only.

Look at the Magic Square ? →

8	1	6
3	5	7
4	9	2

Sum from any side is 15

Ways and Means of making a Magic Square

If any nine consecutive numbers are given, then with the help of the middlemost number, a Magic Square can easily be constructed. The middlemost number among 1 to 9 is 5. So, with the help of 5, we can construct the above Magic Square as–

5 +3	5 – 4	5 + 1
5 – 2	(5)	5 + 2
5 – 1	5 + 4	5 – 3

☛ **Let us do ourselves now**

Using numbers from 42 to 50, fill up the Magic Square given alongside (see that sum of number of each side 138)

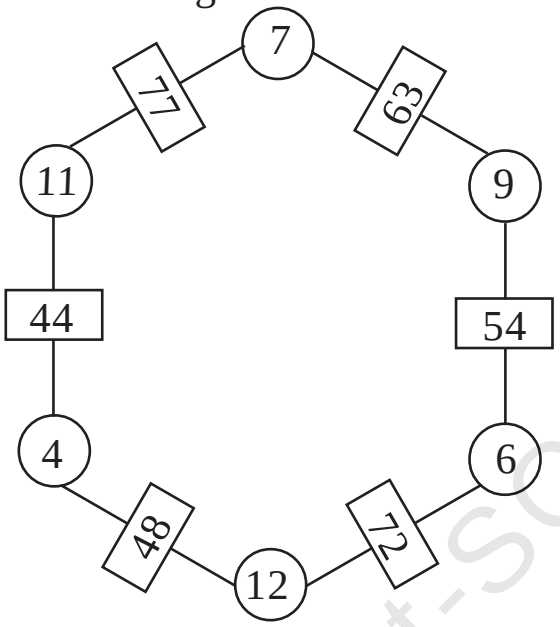
		47
44		
	50	43

	17	

Let us try another one:
Use number from 13 to 21 to construct the Magic square, whose desired sum is 51.

Now we face Magic hexagon (having six sides)

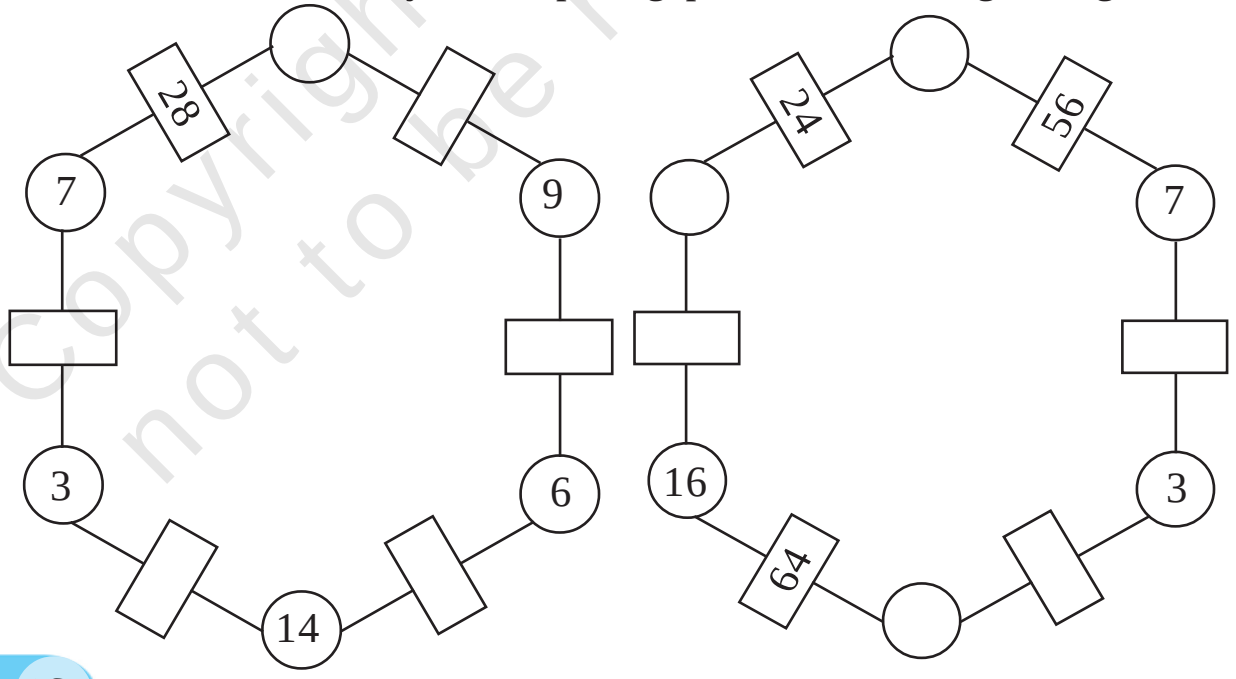
We carefully observe the ways how the numbers are placed on the six sides of the Hexagon.



Every side has two circles at its end and a rectangle at the middle.
Now unearth the rule of placing the numbers. Have you got any idea?

Rule : product of the numbers in two circles given the number in the rectangle.

With the same rule can you fill up the gaps in the following Hexagon?



☛ **Look at each pattern and fill up the blanks as asked for**

(a) BB AA BB AA BB AA BB A ___

(b) GHF GHF GHF GH ___ ___

(c) HT HT M HT HT M HT HT M HT ___ ___

(d) RU ST RU RU ST RU RU RU ST RU RU ___ ___

(e) C2 R3 Y C2 R3 Y C2 ___ ___ ___

☛ You prepare some designs of your own, discuss and share in group in class

Number Patterns

Number patterns are very rich.

A. **Notice the number patterns below and fill up the blanks**

$1 \times 1 = 1$
$2 \times 2 = 1 + 2 + 1$
$3 \times 3 = 1 + 2 + 3 + 2 + 1$
$4 \times 4 = 1 + 2 + 3 + 4 + 3 + 2 + 1$
$5 \times 5 = - + - + - + - + - + - + -$
$6 \times 6 = - + - + - + - + - + - + -$
$7 \times 7 = - + - + - + - + - + - + -$
$8 \times 8 = - + - + - + - + - + - + -$

B. **Now, mind the numbers and its patterns. Can you proceed some steps further. Try it**

(i)
$3 \times 4 = 10 + 2$
$3 \times 5 = 12 + 3$
$3 \times 6 = 14 + 4$
$3 \times 7 = 16 + 5$
$\_ \times \_ = \_ + \_$
$\_ \times \_ = \_ + \_$
$\_ \times \_ = \_ + \_$

(ii)
$2 \times 9 = 18$
$22 \times 9 = 198$
$222 \times 9 = 1998$
$2222 \times 9 = 19998$
$22222 \times 9 = 199998$
$\_\_\_\_ \times \_ = \_\_\_\_$

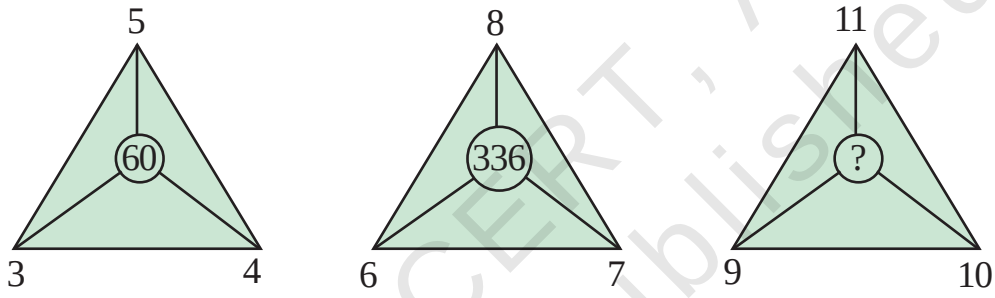
(iii)
$$4 \times 9 = 36$$
$$44 \times 9 = 396$$
$$444 \times 9 = 3996$$
$$\_\_ \times \_ = \_\_$$
$$\_\_ \times \_ = \_\_$$
$$\_\_ \times \_ = \_\_$$

On your familiarity and knowledge with the above three patterns, supply your ability to find two new ones.

C. Complete the following patterns

(i) 2,7,9 | 3,8,11 | 4,9,13 | 5,10,15 | ☐ | ☐

(ii)



Addition pattern

(a) 46 + 38 + 13 = 38 + 13 + 46

Is the equality true?

In the same pattern, fill up the blanks of

(a) 56 + 24 + 18 = + 18 +

(b) 92 + + = 33 + 41 +

(c) 34 + 64 + = 74 + +

(d) 89 + △ + 76 = + 54 +

(e) 26 + 38 + 13 = + +

❄ Magic square in calendar

March 2018

Sunday	Monday	Tuesday	Wednes	Thurs	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Take a 3 × 3 square on the calendar. It will be a magic square. We take 3 × 3 square box

6	7	8
13	14	15
20	21	22

How to find the sum of all numbers in the 3 × 3 square?

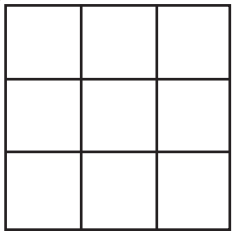
Simple way-

1. Find the smallest number among them.
2. Add 8 to it.
3. Multiply the sum by 9

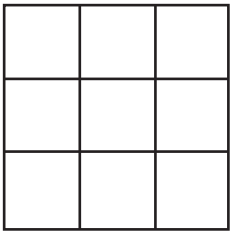
We apply it
Here smallest number is 6
Add 8 to it 6 + 8 = 14
Multiply it by 9, 14 × 9 = 126

Verify the result by actual addition.

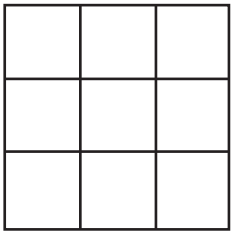
Activity : Choose any 3 × 3 square from the calender .Verify above results for your satisfection



box No. 1



box No. 2



box No. 3

	Box No. 1	Box No. 2	Box No. 3
Smallest number			
Smallest number + 8			
Result × 9			
Sum			

- Who am I ?
  - I am a number of two digits.
  - The digit in the unit's place is double the digit in the ten's place.
  - I am greater than 40 but less then 100.
  - Difference of my two digits is equal to that in ten's place.
  - Sum of the two digits is 12.

Now can you tell me who I am?

Hints : Since the sum of two digits is 12, answer may be 1 + 11, 2 + 10, 3 + 9, 4 + 8, 5 +7, 6 + 6. By condition the number is more than 40 but less than 100, the possible numbers be 48, 57 or 66. But the digit in the unit's place is double that of the digit in the ten's place of the number. Therefore the number is 48.

Note 1 : How do we come down from probable six numbers to three numbers and then finally to final one?

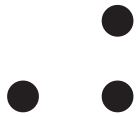
Note 2 : We use the given conditions to detect the right one.

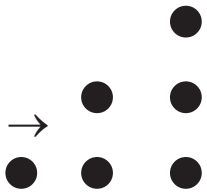
Magic of Numbers

(a) Take any number. Multiply it by 2. Add 6 to it. Make it half. From the result, subtract the original number. What do you find?

(b) Take any number. Multiply it by 100. From the product subtract the original number. Now, add the digits of the resulting numbers. What you got? Cay you tell us?

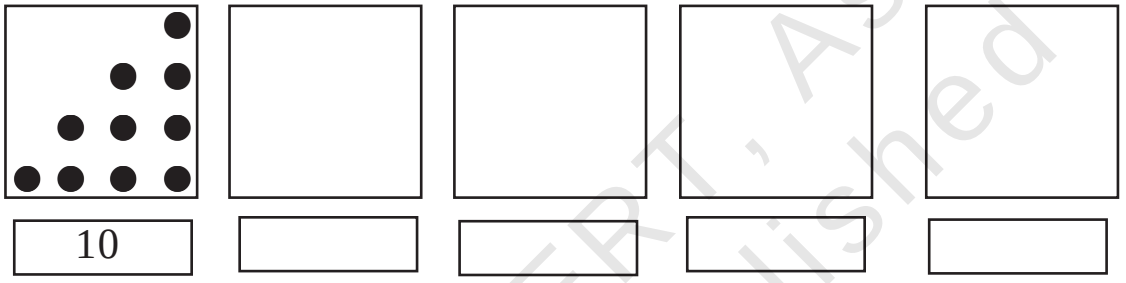
❄ Number in form of triangles

3 → 

6 → 

☛ The two sides of such triangle must be equal (isosceles) and on the top, there must be one point.

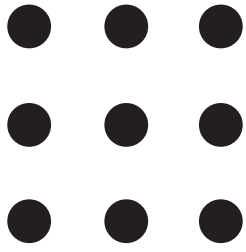
☛ Now you make groups and find 4 such numbers that can represent triangles.



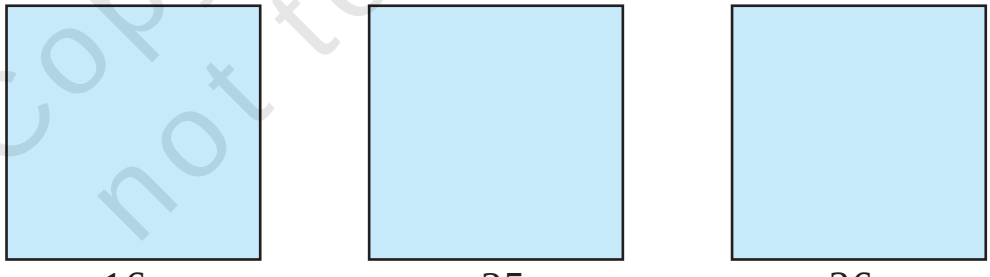
These 3, 6, 10...etc. numbers are called **Triangular Numbers.**

❄ Numbers in square form

4 → 

9 → 

Use the following numbers to design square arrangement



We note each of 1, 4, 9, 16 is a **square number**.

❄ From the table (1–100) find the numbers which can be arranged in square form. Round the square number with a circle.

(1)	2	3	(4)	5	6	7	8	(9)	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Note : 1 is a square number

Write down the numbers in the following order–

1 4 9 ___ ___ ___ ___ ___ ___ ___

The product of a number by itself is a square number.

e.g. – $\boxed{1} = 1 \times 1$ $\boxed{4} = 2 \times 2$ $\boxed{9} = 3 \times 3$

$\square = \square \times \square$ $\square = \square \times \square$ $\square = \square \times \square$

In the ordered square numbers above you count odd numbers between any two consecutive square numbers.

Number of odd numbers between 1 and 4 is 1

Number of odd numbers between 4 and 9 is 2

Number of odd numbers between 9 and 16 is ___

Number of odd numbers between 16 and 25 is ___

.....

..... **(Complete the pattern till 100)**

★★★★