UNIT-3

PATTERNS

3.1 Patterns in shapes

Observing shapes sequence from Kaleidoscope.

Kaleidoscope

A kaleidoscope consists of a tube containing mirrors and pieces of coloured glass or paper, whose reflections produce changing patterns when the tube is rotated.

"Kaleidoscope" is derived from the Ancient Greek word (kalos) "beautiful, beauty", (eidos) "that which is seen: form, shape"and (skopeō), "to look to, to examine", hence "observation of beautiful forms.
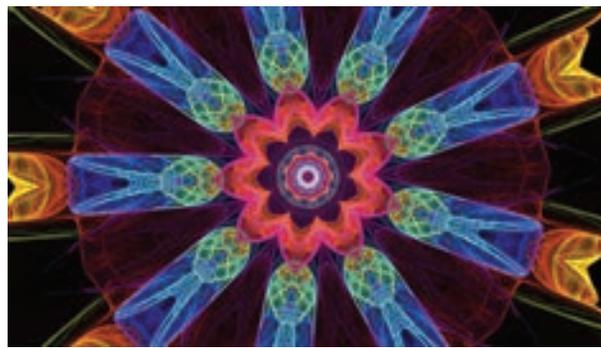
Colour the given picture	Complete the picture

## Identifying the patterns in a sequence of shapes.

EXAMPLES

1.

2.

3.

Exercise 3.1

Fill in the shapes.

1.

2.

3.

4. _____
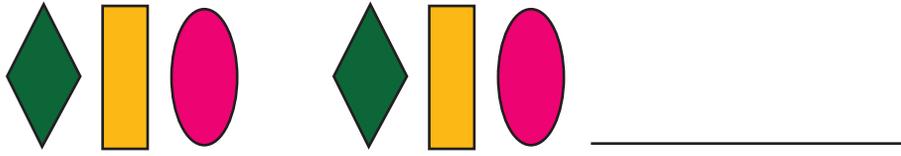
**5.** ____ ____ ____ ____
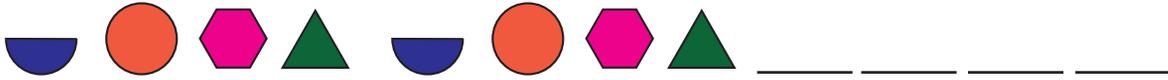
Let us Know

Spirograph is a mathematical toy which can be used for drawing pattern

Do your self

1. Draw a spirograph by using bottle caps
2. Draw a spirograph by using scale
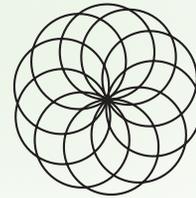
3.2 Patterns in numbers

Identify the patterns in multiplication and division (multiples of 6).

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

The multiples of 6 is coloured in orange for you.

Similarly, Colour the multiples of 5 in △ **, Multiples of 9 in** ▭ **, Multiples of 10 in** ● **, Multiples of 11 in** ■ **.**

Let us Know

Multiply any number by 9, the sum of all the digits of the product is 9.

Example:1	Example:2	Example:3
84 x 9 = 756 7 + 5 + 6 = 18 = 1 + 8 = 9	43 x 9 = 387 3 + 8 + 7 = 18 = 1 + 8 = 9	123 x 9 = 1107 1 + 1 + 0 + 7 = 9

Activity

Make patterns based on the multiples of 9.

multiple of 9	Product	Sum of all the digits of product
9 x 9	81	8 + 1 = 9
81 x 9	729	7 + 2 + 9 = 18 = 1 + 8 = 9
__ x 9		
__ x 9		
__ x 9		
__ x 9		

Remember:

If the sum of all digits of a number is 9 or divisible by 9, then the number is called multiple of 9.

Do you know

1 2 3 4 5 6 7 9 x 9 = 1 1 1 1 1 1 1 1 1

1 2 3 4 5 6 7 9 x 18 = 2 2 2 2 2 2 2 2 2

1 2 3 4 5 6 7 9 x 27 = 3 3 3 3 3 3 3 3 3

1 2 3 4 5 6 7 9 x 36 = 4 4 4 4 4 4 4 4 4

1 2 3 4 5 6 7 9 x 45 = 5 5 5 5 5 5 5 5 5

3.2.1 Cast out the digit nine from a given number to check if it is a multiple of nine.

EXAMPLE

Is 46908 multiple of 9?

$46908 = 4+6+0+8$
$= 18$
$= 1 + 8$
$= 9$

46908 is a multiple of 9 or divisible by nine.

Let us Know

Any number or combination of digits in that number which add to 9 can be cast out from the given number. Then the sum of remaining digits of the number is divisible by 9 or multiple of 9.

In addition problem, we can check the sum by casting out nines.

EXAMPLE 1

Check the following numbers whether it is a multiple of 9 or not

$24689 = 2 + 4 + 6 + 8 = 20$ (It's not a multiple of 9.)

$9108 = 0$ (It's a multiple of 9.)

$3165 = 1 + 5 = 6$ (It's not a multiple of 9.)

EXAMPLE 2

Check the addition fact

$3356 + 4729 = 8085$

$3356 + 4729 = 8085$

$8 + 4 = 21$
$12 = 21$
$1 + 2 = 2 + 1$
$3 = 3$

In subtraction problem, we can check the difference by the method of casting out nine.
(Remember that subtraction is reverse of addition).

EXAMPLE

$4897 - 2186 = 2711$

$4897 - 2186 = 2711$

$19 - 8 = 2$

$10 - 8 = 2$

$2 = 2$

Let us Know

Think of a two digit number say 52, reverse the digits of that number and subtract from 52.

Difference $= 52 - 25 = 27$

27 is a multiple of 9.

Activity

Number	Reverse Number	Difference	Sum of the digits
92	29	$92 - 29 = 63$	$6 + 3 = 9$
14		$- \quad = 27$	
—	38		
17			$5 + 4 = 9$

Exercise 3.2

1. Circle the multiples of 9 (by using casting out nine).

   a) 9443   b) 1008   c) 24689   d) 23769   e) 13476

2. Circle the correct addition fact (by using casting out nine).

   a) $4355 + 5369 = 9724$

   b) $7632 + 2213 = 9845$

   c) $6023 + 3203 = 9220$

   d) $2436 + 5315 = 7701$

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3. Circle the correct subtraction fact (by using casting out nine).

a) $7420 - 3625 = 3795$ c) $6732 - 4361 = 2371$

b) $2362 - 632 = 1720$ d) $3264 - 1063 = 2200$

3.2.2 To check any multiplication problem using the method of casting out nine.

EXAMPLE

Note: Cross out the 9 and components of 9.

Multiplicand	Multiplier		Product
3 2̶ 7̶	X 4 2	=	1 3 7 3 4
3	4 + 2	=	1 + 3 + 7 + 3 + 4
③	X ⑥	=	18
18		=	18
1 + 8		=	1 + 8
9		=	9

In division problem, we can check the quotient by method of costing out nine.

(Remember that division is the reverse of multiplication).

EXAMPLE

Dividend = Divisor × Quotient + Remainder

$$525 \div 15 = 35$$
$$\downarrow\downarrow \qquad \downarrow\downarrow \qquad \downarrow\downarrow$$

$5 + 2 + 5$	$1 + 5$	=	$3 + 5$
12	$\div$ 6	=	8
	12	=	8×6
	12	=	48
	12	=	12
	$1 + 2$	=	$1 + 2$
	3	=	3

Note: If the problem has remainder, we will subtract it from the Dividend.

1. Circle the correct multiplCition fact (by using method of casting out nine).

   a) $312 \times 36 = 11232$ c) $132 \times 43 = 5676$

   b) $723 \times 24 = 17508$

2. Circle the correct division fact (by using method of casting out nine).

   a) $728 \div 4 = 182$ c) $7785 \div 9 = 865$

   b) $1580 \div 20 = 78$

Able to identify patterns in multiplication and division by 10s and 100s.

EXAMPLES

$57 \times 10 = 570$

$57 \times 100 = 5700$

$9 \times 400 = 3600$

$80 \times 700 = 56000$

$10 \div 2 = 5$

$100 \div 2 = 50$

$1000 \div 2 = 500$

$10000 \div 2 = 5000$

Activity 1

x 200	x 3	x 10	x 9
3 → ☐	60 → ☐	7 → ☐	20 → ☐
2 → ☐	200 → ☐	60 → ☐	400 → ☐
4 → ☐	30 → ☐	6 → ☐	30 → ☐
5 → ☐	500 → ☐	100 → ☐	500 → ☐

Activity 2

Complete the following.

a. $54 \div 9 = 6$ **b.** $540 \div 9 = 60$

c. $5400 \div 9 =$ _____ **d.** _____ $\div 9 = 6000$

Activity 3

Create a magic square by using multiples of 10, 20, 30, 40, 50, 60, 70, 80 and 90.

20	90	40	
70	50	30	150
60	10	80	

150

Exercise 3.4

A. **Fill in the blanks.**

  i. 90, 180, 270, ____, ____, ____.

  ii. A9, B18, C27, D36, ____, ____, ____.

B. **Circle the multiples of 9**

  25, 27, 35, 36, 45, 46, 54, 55

C. **Complete the following sequence.**

  1. 125, 150, 175, ____, ____, ____.

  2. 100, 400, 700, ____, ____, ____.

  3.

A100	C300	E50				

  4.

200	400	600				

D. Complete the following sequence.

1. $9 \times 6 = 54$ $9 \times 66 = 594$

$9 \times 666 = 5994$ $9 \times 6666 = 5$ _____ 4

$9 \times 666666 =$ _____

2. 9×111 $=$ 999 9×222 $=$ 1998

9×333 $=$ 2997 9×444 $=$ _____

9×555 $=$ _____ 9×666 $=$ _____

E. Answer the following questions.

1. The school bell rings once in an hour, to indicate that the session ends/next session begins. And for break, it will be 20 minutes. Shall we try to fill this up.

Here is the time table.

Period 1	Period 2	Break	Period 3	Period 4	Break	Period 5	Period 6
9:00	10:00	11:00					2:40

2. Imagine you are a traffic inspector. You are asked to design the traffic signal timings. Can you design it?

Red	Yellow/orange	Green	Red	Green
7:30 am				

3. A city is planned in such a way that every 5km has a circle and has 4 signals around.

So, can you guess where the signals and circle are there?
How many signals are needed for a 20 km distance?

Try This

Create magic squares by using,

1. Multiples of nine
2. Multiples of hundred

G176K

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