

Teacher's  
Handbook of  
Learning  
Outcome  
VIII- Mathematics

Samagra Shiksha, Education Department, UT Chandigarh

## FORWARD

Samagra Shiksha, Education Department, UT Chandigarh has prepared Teachers' handbook based on learning Outcomes at Elementary level in Hindi, English, Mathematics, EVS, Science & Social Science.

This Handbook will enable the teachers to ascertain learning skills more accurately in these subjects. While making the document it has been ensured that the learning need of the children with different learning level- pre Basic, Basic, Proficient & Advanced, are being catered & the academic progress of the students can be monitored by Faculty Incharges, Cluster Resource Coordinators & further by Head of the school.

The material in the document can be used as an assessment tool for Elementary classes & to keep a track of achievement of the learning level.

Teachers' handbook will not only help teachers to focus on teaching learning process but also facilitate State functionaries in their role towards ensuring quality education in schools

To make it user-friendly, simple language has been used as far as possible across the document. To help the teacher understand and achieve the learning outcomes as per the curricular expectations.

This document includes list of learning outcomes (with labeling) and progress sheet for monitoring/ tracking of the progress of the students.

**Question prepared in this document are only suggestive for teachers. The teacher can modify these tools as per the need.**

## ABOUT THE DOCUMENT

This question bank might prove an effective tool in the hands of the educators & evaluators. It aims at assisting teachers to assess and improve the performance of the learners.

### Some features of the documents are as follows:

- \* Proper care has been taken to cover all the learning outcomes.
- \* The questions have been framed focusing upon the learner's mathematical thinking, reasoning and hence ability to solve daily life problems.
- \* The teacher can make relevant changes in question bank according to the needs of different levels of learners.
- \* It provides enrichment material & remedial material for different level of learners.

### RESORURCE GROUP

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## VIII – MATHEMATICS

### MONTH WISE BIFURCATION OF CHAPTERS AND LEARNING OUTCOMES

April	May	June	July	August	September	October	November	December	January	February	March
Chapter	Chapter	SUMMER BREAK	Chapter	Chapter	EXAMINATION	Chapter	Chapter	Chapter	Chapter	REVISION	EXAMINATION
1	3		6	8		9	10	15	11		
2	4		7			14	12	16	13		
	5										
L.O	L.O		L.O	L.O		L.O	L.O	L.O	L.O		
1	12 13		4	10 &		7	14	3	17 18		
2	16		REVISION	9	15		19				
6	20 21			8	5		11				

**Remarks : A little bit variation in achieving Learning Outcomes (Month wise) can be made according to convenience of the concerned teacher.**

## LEARNING OUTCOMES

1. generalises properties of addition, subtraction, multiplication and division of rational numbers through patterns.
2. finds out as many rational numbers as possible between two given rational numbers.
3. proves divisibility rules of 2, 3,4, 5, 6, 9 and 11
4. finds squares, cubes and square roots and cube roots of numbers using different methods.
5. solves problems with integral exponents.
6. solves puzzles and daily life problems using variables.
7. multiplies algebraic expressions e.g expands  $(2x-5)(3x^2 +7)$ .
8. uses various algebraic identities in solving problems of daily life
9. applies the concept of per cent in profit and loss situation in finding discount, VAT and compound interest. e.g. calculates discount per cent when marked price and actual discount are given or finds profit per cent when cost price and profit in a transaction are given.
10. Solves problems based on direct and inverse proportions.
11. Solves problems related to angles of a quadrilateral using angle sum property.
12. verifies properties of parallelograms and establishes the relationship between them through reasoning.
13. represents 3D shapes on a plane surface such as sheet of paper, black board etc. verifies Euler's relation through pattern constructs different quadrilaterals using compasses and straight edge.
14. estimates the area of shapes like trapezium and other polygons by using square grid/graph sheet and verifies using formulas.
15. finds the area of a polygon.
16. finds surface area and volume of cuboidal and cylindrical object.
17. draws and interprets bar charts and pie charts.
18. makes hypotheses on chances of future events on the basis of its earlier occurrences or available data like , after repeated throws of dice and coins.



## PROGRESS SHEET

Name of the School ..... Class VIII (Mathematics) Name of the teacher .....

Achievement level as per learning outcomes

(Grading :- A/B/C/D)

**A- Beyond the expected standard**

**B- Approached the expected standard**

**C- Approaching the expected standard**

**D- not meeting the expected standard**

Roll No.	Name of student	OCTOBER			NOVEMBER			DECEMBER	JANUARY			
		CH 9	CH 14		CH 10		CH12	CH 15	CH 16	CH 11		CH 13
		LO 7	LO 8	L0 9	LO 14	LO 15	LO 5	LO 3		LO 17	LO 18	LO 19

**MONTH : APRIL**

**CHAPTER -1 : RATIONAL NUMBERS**

**L.O (I) : Generalise properties of addition, subtraction, multiplication and division of rational numbers through patterns.**

1. The sum of two rational numbers is -5. If one of them is  $\frac{-13}{6}$ , then find the other.
2. Out of 48 m of cloth, 16 skirts can be made of equal sizes. How much cloth is required to make one skirt?
3.
  - i) Which rational number is its own additive inverse ?
  - ii) Which rational number is its own multiplicative inverse ?
4.  $6 \div 2 (1 + 2) = ?$   
a) 9            b) 1
5.  $1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 \times 0 + 1 = ?$
6. Multiply  $\frac{-7}{19}$  by reciprocal of  $\frac{5}{13}$ .
7. Simplify
  - (a)  $(\frac{-7}{18} \times \frac{15}{-7}) - (1 \times \frac{1}{4}) + (\frac{1}{2} \times \frac{1}{4})$
  - (b)  $[\frac{8}{21} \div (\frac{-32}{39} \div \frac{16}{13})] \times \frac{7}{4}$

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**MONTH : APRIL**

**CHAPTER -1 : RATIONAL NUMBERS**

**L.O (2) : Finds out a many rational numbers as possible  
between two given rational numbers.**

1. Find five rational number between 5 and -5.
2. Find three rational number between 4 and 5.
3. Find five rational number between  $\frac{2}{3}$  and  $\frac{3}{4}$ .
4. Find six rational number between  $\frac{-3}{4}$  and  $\frac{5}{6}$ .
5. Find six rational number between  $\frac{-3}{5}$  and  $\frac{-1}{5}$ .

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**MONTH** : **APRIL**  
**CHAPTER -2** : **LINEAR EQUATION IN ONE VARIABLE**  
**L.O (6)** : **Solves puzzles and daily life problems using variables.**

1. Solve  $2y + 9 = 4$

2. Solve  $\frac{15}{4} - 7x = 9$

3.  $\frac{1}{4}x + \frac{1}{6}x = x - 7$

4. Two numbers are in the ratio 5 : 8. If sum of numbers is 182, find the numbers.

5. The sum of three consecutive numbers add upto 36. Find the numbers.

6. The ages of Ram and Rahim are in ration 5 : 7. Four years later, the sum of their ages will be 56 years. What are their present ages?

7. Solve  $15(y-4) - 2(y-9) + 5(y+9) = 0$

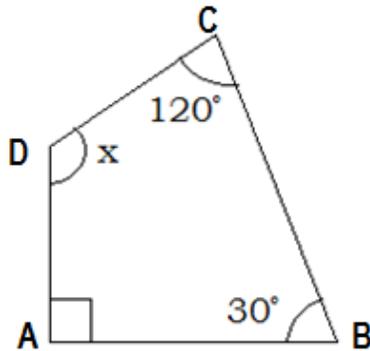
8. A number whose seventh part exceeds its eighth part by 1. Find the number.

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MONTH :  
CHAPTER -3 :  
L.O (12) :

**MAY**  
**UNDERSTANDING QUADRILATERALS**  
**Solve problems related to angles of a quadrilateral using angle sum property.**

1.

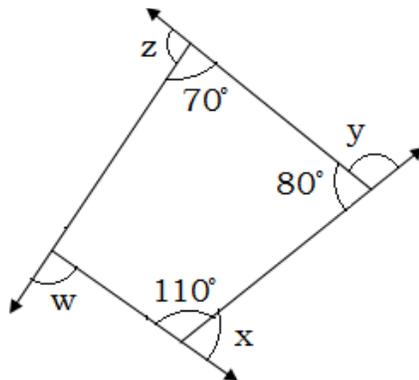


Find x.

2. Angles of quadrilateral are in ratio 3: 5: 7: 9. Find the measure of each of the angles.

3. Three angles of quadrilateral are equal and measure of fourth angle is  $120^\circ$ . Find the measure of each of these equal angles.

4.



Find (i) x, y, z, w

(ii)  $x + y + z + w$

5. Find the number of sides of regular polygon whose exterior angle has a measure of  $45^\circ$ .

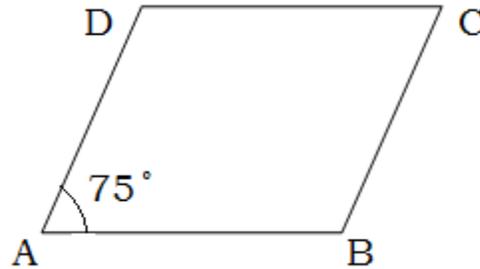
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**MONTH** : **MAY**

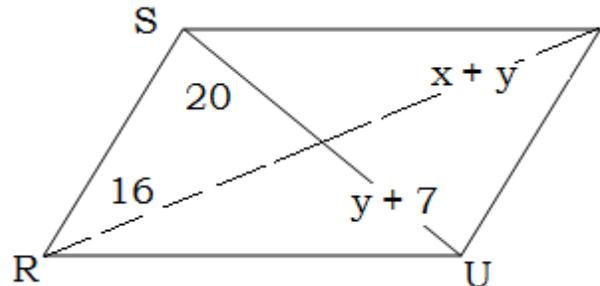
**CHAPTER -3** : **UNDERSTANDING QUADRILATERALS**

**L.O (13)** : **Verifies properties of ll gm and establishes the relationship between them through reasoning.**

1. In the adjoining figure, ABCD is a parallelogram in which  $\angle A = 75^\circ$ . Find the measure of each of the angles  $\angle B$ ,  $\angle C$  and  $\angle D$ .

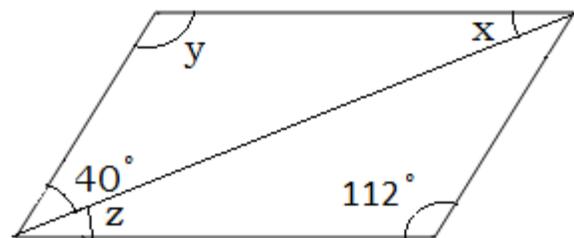


2. Find  $x$  &  $y$  in the given figure RUNS (Parallelogram).



3. The ratio of two of a llgm is 4:3. If its perimeter is 56 cm, find the length of sides.

4. Find the value of  $x$ ,  $y$ ,  $z$  in the given parallelogram.



5. Two adjacent angles of a parallelogram are  $(3x-4)^\circ$  &  $(3x+16)^\circ$ . Find the value of  $x$  and hence find the measure of each of its angles.

6. Sum of two opposite angles of a parallelogram is  $130^\circ$ . Find the measure of each angle of parallelogram.

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**MONTH** : **MAY**  
**CHAPTER -4** : **PRACTICAL GEOMETRY**  
**L.O (16)** : **Constructs different quadrilaterals using  
compass and straight edge.**

- 1.** Construct following quadrilateral (JUMP)  
JU = 3.5 cm, UM = 4cm, MP = 5cm, PJ = 4.5 cm, PU = 6.5 cm
  
- 2.** Rhombus BEND ;- BN = 5.6cm , DE = 6.5cm
  
- 3.** Parallelogram HEAR :- HE = 5cm , EA = 6cm,  $\angle R = 85^\circ$
  
- 4.** Quadrilateral TRUE :- TR = 3.5 cm, RU = 3cm, UE = 4cm,  
 $\angle R = 75^\circ$   $\angle U = 120^\circ$

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**MONTH** : **MAY**

**CHAPTER -5** : **DATA HANDLING**

**L.O (20)** : **Draw and interprets bar charts and pie charts.**

**1.** In a study of number of road accidents in a city , the

observations for the 30 days of April 2003, were :

4, 3, 5, 6, 4, 3, 2, 5, 4, 2, 6, 1, 2, 2, 0, 5, 4, 6, 1, 3, 0, 5, 3, 6, 1, 5, 5, 2, 6, 4

- (i) Prepare a frequency distribution table ,
- (ii) Bar graph

**2.** Pulse rate (per minute) of 30 persons were recorded as :

61, 76, 72, 73, 71, 66, 78, 73, 68, 81, 78, 63, 72, 75, 80, 68, 75, 62, 71, 81, 73, 60, 79, 72, 73,  
74, 71, 64, 76, 71

- (i) Construct a frequency table using class – intervals of equal width (60-65).
- (ii) Construct bar graph.

**3.** On a particular day, the sales (in rupees) of different items are given below :-

Banana	:	320
Apple	:	80
Grapes	:	160
Mango	:	120
Orange	:	40
<b>Total</b>	<b>:</b>	<b>720</b>

Draw a pie chart for the given data.

4. Adjoining pie chart gives expenditure (in percentage) on various items and savings of a family during a month.

- (i) On which item the expenditure was maximum?
- (ii) Expenditure on which item is equal to the total savings of family?
- (iii) If monthly savings of family is Rs. 3000/- what is monthly expenditure on clothes?



**MONTH** : **MAY**

**CHAPTER -5** : **DATA HANDLING**

**L.O (21)** : **Makes hypothesis on chances of future events on the basis of its earlier occurrences on available data like after repeated throws of dice & coins.**

1. A coin is flipped to decide which team starts the game. What is the probability that your team wins? Give reason- why a coin is tossed to start the game?
  
2. A bag contains 5 white , 6 red and 5 green balls. One ball is drawn at random. What is the probability that the ball drawn is :  
(i) green                      (ii) white                      (iii) non –red
  
3. A die is thrown at random. Find the probability of getting :  
(i) 2,                      (ii) a number less than 3                      (iii) a composite number  
(iv) a number not less than 4                      (v) an even number
  
4. A card is drawn at random from a well- shuffled deck of 52 cards. Find the probability that the card drawn is  
(i) an ace                      (ii) a red card                      (iii) a heart of spade  
(iv) a black king                      (v) a card of club                      (vi) a card of 2
  
5. List all outcomes when two coins are tossed simultaneously.

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<b>MONTH</b>	<b>:</b>	<b>JULY</b>
<b>CHAPTER - 6</b>	<b>:</b>	<b>SQUARE &amp; SUQARE ROOTS</b>
<b>CHAPTER – 7</b>	<b>:</b>	<b>CUBE &amp; CUBE ROOTS</b>
<b>L.O (4)</b>	<b>:</b>	<b>Finds squares, cubes and square roots and cube roots of numbers using different methods.</b>

1. Find square root of 1764.
2. Find square root of 1.96
3. Find the least number which must be subtracted from 2509 to make it a perfect square.
4. What least number must be added to 526 to make it perfect square.
5. Find the value of  $\sqrt{10 + \sqrt{25 + \sqrt{108 + \sqrt{154 + \sqrt{225}}}}}$
6. Evaluate  $\sqrt[3]{\frac{125}{216}}$
7. By what least number should 1536 be divided to get a perfect cube.

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**MONTH** : **AUGUST**

**CHAPTER – 8** : **COMPARING QUANTITIES**

**L.O (10)** : **Applies the concept of percent in profit and loss situations in finding discount, VAT and compound interest. eg. calculate, discount percent when marked price and actual discount are given or finds profit percent when cost price and profit in a transaction are given.**

1. The marked price of a book is Rs. 100. The shopkeeper gives 25% discount on it. What is the sale price of the book?
2. Sapna purchased a cycle for Rs. 1000 and sold it for Rs. 1200. Find her gain %.
3. The fraction  $\frac{1}{4}$  converted to percentage is
  - a) 12 %
  - b) 25 %
  - c) 8%
  - d) 16%
4. Convert the ratio 3: 4 to percentage.
5. Ranbir bought a T.V. for Rs. 13500. If 8% VAT/GST is included in the price, find the original price of T.V.
6. Kareena borrows Rs. 12500 at 12% per annum for 3 years at simple interest and Radha borrows the same amount for the same time period at 10% per annum compound annually. Who pays more interest and by how much?

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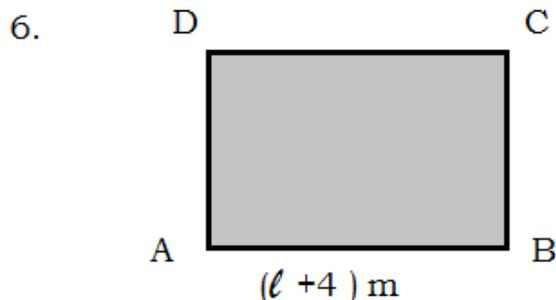
**MONTH** : **OCOTOBER**  
**CHAPTER – 9** : **ALGEBRAIC EXPRESSION & IDENTITIES**  
**L.O (7)** : **Multiplies Algebraic Expression.**

1. Find the product : (i)  $m, 2m, 6m, 3$   
(ii)  $xy, -xy, 2xyz$
2. Find the product : (i)  $a, -a^2, a^3$   
(ii)  $0, 3x, -2x, -4x^2$
3. Find the area of rectangle whose sides are  $\frac{4x}{5}$  and  $15y$ .
4. Find the volume of cuboid whose sides are  $xy, 2x^2y, 2xy^2$
5. The product of two polynomials is  $-15x^2y$ . If one of the polynomial is  $-5x$ , find the other polynomial.
6. Find the product of (i)  $pq + qr + rp, 0$   
(ii)  $(\frac{-10pq^3}{3}) \times (\frac{6p^3q}{5})$

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**MONTH** : **AUGUST**  
**CHAPTER – 9** : **ALGEBRAIC EXPRESSION & IDENTITIES**  
**CHAPTER -14** : **FACTORISATION**  
**L.O (8)** : **Expands (2x-5) (3x2 +7)**

1. (i) Find the product  $a-b, 7a^2b^2$   
(ii) Simplify  $(x^2 -5) (x + 5) +25$
2. (i) Simplify  $(a + b) (c-d) + (a-b) (c+ d) + 2 (ac +bd)$   
(ii) Simplify  $(a +b) (2a -3b +c) - (2a -3b) c$
3. (i) Add  $p(p-q) , q(q-r), r(r-p)$   
(ii) Subtract  $3\ell (\ell -4m + 5n)$  from  $4 \ell (10n -3m + 2 \ell)$
4. (i) Factorise  $4x^2 - 8x +4$   
(ii) Factorise  $x^2 - 9$
5. (i) Simplify  $(10x -25) \div (2x -5)$   
(ii) Simplify  $5pq (p^2 - q^2) \div 2p (p +q)$



$$\text{Area of rectangle} = (\ell^2 + 6\ell + 8)m^2$$

$$\text{one side} = (\ell + 4) m$$

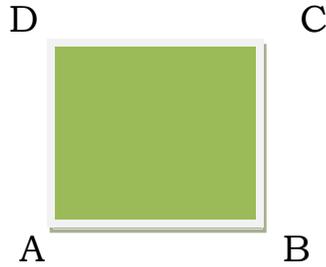
$$\text{other side} = ?$$

**MONTH** : **AUGUST**

**CHAPTER – 9** : **ALGEBRIC EXPRESSION & IDENTITIES**

**L.O (9)** : **uses variables in solving problems in daily life.**

1. Rahim has garden of square shape with side  $(2x + 5)$  m. Find the area of his garden.



2. Simplify (i)  $(2x + 5)^2 - (2x - 5)^2$

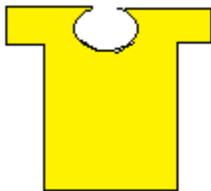
(ii)  $(5x^2 + \frac{3}{4}y^2)(5x^2 - \frac{3}{4}y^2)$

3. Evaluate (i)  $(\frac{a}{2} + \frac{2}{a})^2$  (ii)  $(2a - 5)^2$

4. Find the area of black board with dimensions  $(\frac{2}{3}x + 4y)$ m and  $(\frac{2}{3}x - 4y)$ m

5. Using identity, find (i)  $71^2$  (ii)  $78 \times 82$  (ii)  $51^2 - 49^2$

6.



Cost = Rs.  $x^2 - xy - y^2$



Cost = Rs.  $2x^2 + 8x - 2y^2$



Cost = Rs.  $x^2 + 3xy + 4y^2$

How much amount Reena should pay to buy all these items?

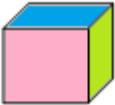
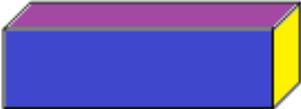
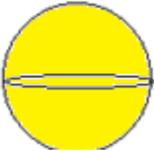
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**MONTH** : **NOVEMBER**

**CHAPTER – 10** : **VISUALISING SOLID SHAPES**

**L.O (14)** **Represents 3 D shapes on a plane surface such as a sheet of paper, blackboard etc.**

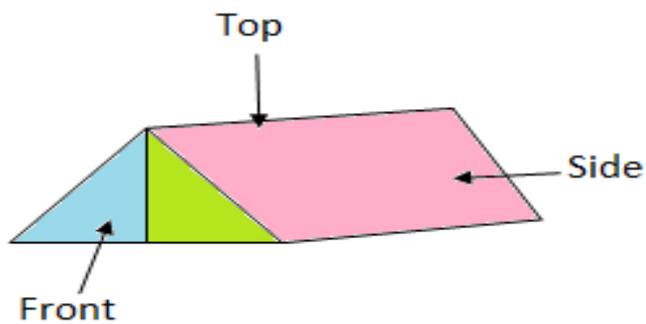
1. Match the following :

Shape	Type of shape	Name of shape
	3- dimensional	Sphere
	2- dimensional	Cylinder
	3- dimensional	Square
	2- dimensional	Circle
	3- dimensional	cuboid
	3- dimensional	Cube
	2- dimensional	Cone
	3- dimensional	Triangle

2. Complete the following table :

S.No.	Name of the solid	Number of faces	Number of vertices	Number of edges
1	Cuboid	6	8	12
2	Cube			
3	Triangular Pyramid			
4	Triangular Prism			
5	Pyramid with square base			
6	Prism with square base			

3. Draw top view and side view of the given object :



**MONTH** : **NOVEMBER**  
**CHAPTER – 10** : **VISUALISING SOLID SHAPES**  
**L.O (15)** : **Verifies Euler’s relation through pattern.**

1. Write Euler’s relation for 3- dimensional figure.
2. A polyhedron has 20 faces and 12 vertices. Find the number of edges of polyhedron,
3. Using Euler’s formula, find

Faces	?	5	20
Vertices	6	?	12
Edges	12	9	?

4. Can a polyhedron have 10 faces, 20 edges and 15 vertices ?

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**MONTH** : **NOVEMBER**  
**CHAPTER – 12** : **Exponents & Powers**  
**L.O (5)** : **Solves problem with integral exponents.**

1. Find the value of (i)  $(3^0 + 4^{-1}) \times 2^2$

(ii)  $(3^{-1} + 4^{-1} + 5^{-1})^0$

2. Simplify (i)  $\left(\frac{1}{4}\right)^{-2} + \left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2}$

(ii)  $\left(\left(\frac{-2}{3}\right)^{-2}\right)^3 \times \left(\frac{1}{4}\right)^{-4} \times 3^{-1} \times \frac{1}{6}$

3. Simplify  $\frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}}$

4. Find the value of m if  $5^m + 5^{-3} = 5^5$

5. By what number  $(-6)^{-1}$  must be multiplied so that the product becomes  $9^{-1}$ .

6. (i) Speed of light is 300,000,000 m/sec. Convert this expression in standard form.

(ii) Express  $5.8 \times 10^{-12}$  in usual form.

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- MONTH** : **DECEMBER**
- CHAPTER – 15** : **INTRODUCTION TO GRAPH**
- CHAPTER - 16** : **PLYAING WITH NUMBERS**
- L.O (3)** : **Proves divisibility rules of 2, 3, 4, 5, 6, 9 and 11.**

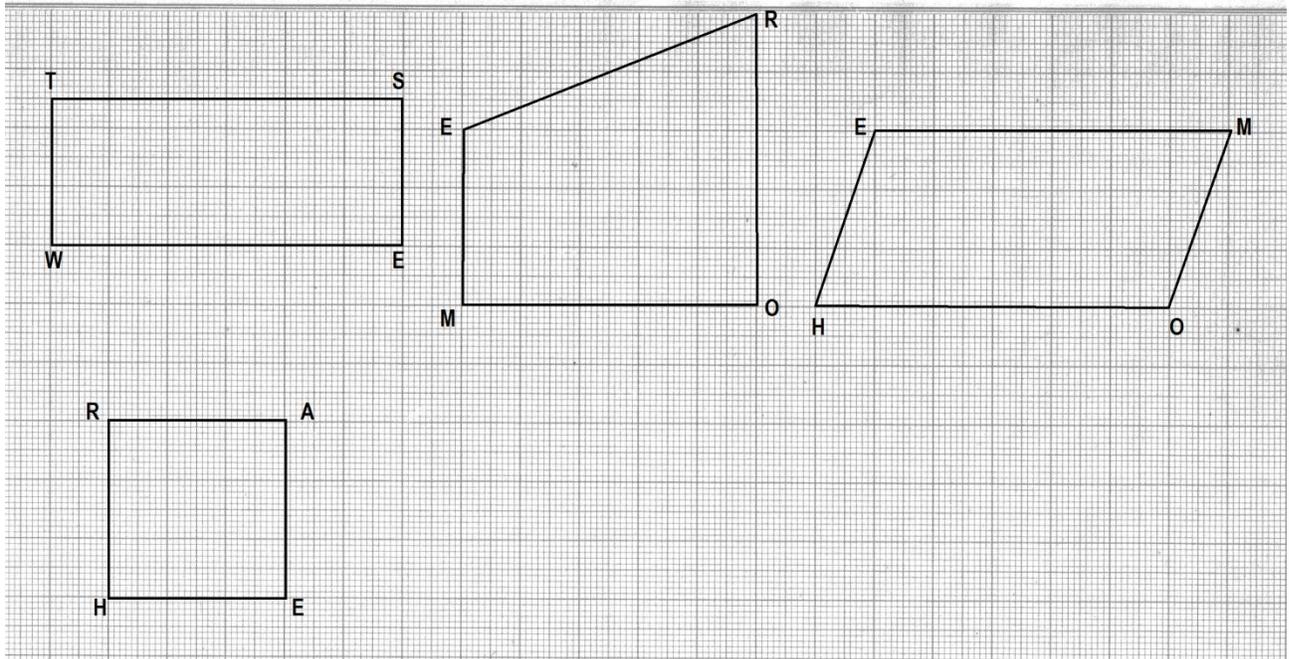
1. If  $31x5$  is multiple of 3 where  $x$  is digit, then find the value of  $x$ .
2. Find the value of  $z$ , for which the number  $471z8$  is divisible by 9, where  $z$  is digit.
3. If the number  $1372x413$  is divisible by 11, where  $x$  is digit, find the value of  $x$ .
4. Which of the following is divisible by 2  
(i) 192            (ii) 917            (iii) 2398            (iv) 517921
5. Name the quadrant where, the following points lie.  
(i)  $P(2,3)$             (ii)  $Q(2, -3)$             (iii)  $(-1,2)$             (iv)  $(-2, -3)$
6. Write abscissa and ordinate of point  $P(5,7)$
7. Donald Duck went to shop to buy candies. She bought 15 candies and paid Rs. 15. The shopkeeper told her that if she gives back 3 rappers, she will get a free candy. How many total candies will she get for Rs. 15 ?  
a) 15            b) 20            c) 25            d) 22

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MONTH : JANUARY

CHAPTER – 11 : MENSURATION

L.O (17) : Estimates the area of shapes like trapezium and other polygons by using square grid / graph sheet and verify using formulas.



Find the area of the given figures using square grid and also verify using formulas.

1. Fig 1  
WEST

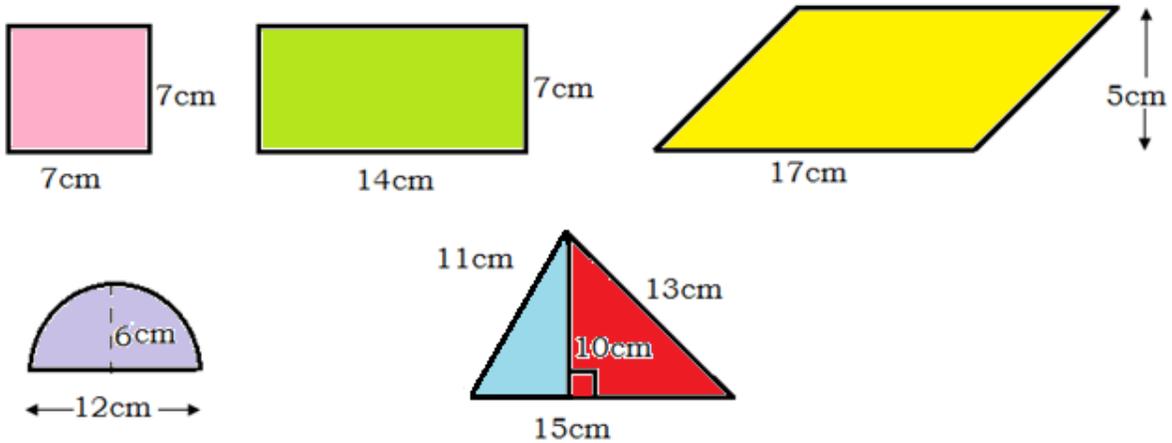
2. Fig 2  
MORE

3. Fig 3  
HOME

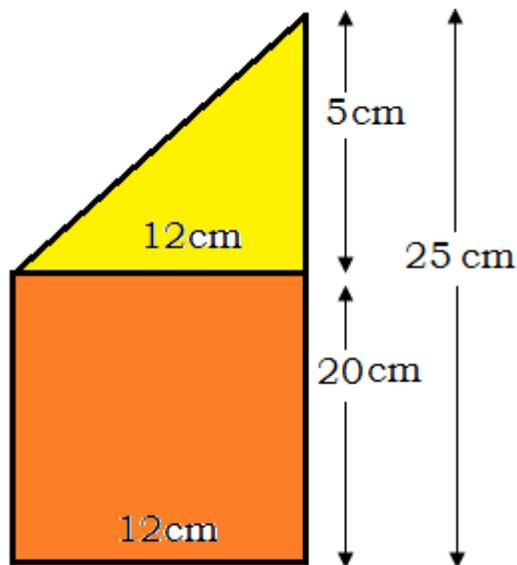
4. Fig 4  
HEAR

**MONTH** : **JANUARY**  
**CHAPTER – 11** : **MENSURATION**  
**L.O (18)** : **Find the area of polygon.**

1. Find the area and perimeter of given figures.



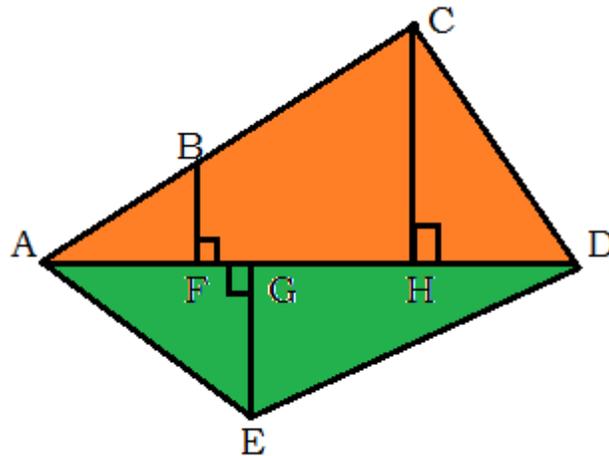
2. Find the area and perimeter of Asha's garden.



3. The diagonals of a rhombus are 7.5 cm and 12 cm. Find its area.

4. Find the area of a rhombus whose side is 6 cm and whose altitude is 4cm. If one of the diagonals is 8cm long, find the length of the other diagonal.

5. Aman's field is as shown below. He wants to grow pulses in his field. Find the total area where he can grow the pulses?



Given that  $AF = 9\text{cm}$ ,  $AG = 13\text{cm}$ ,  $AH = 19\text{cm}$ ,  $AD = 24\text{cm}$ ,  
 $BF = 6\text{cm}$ ,  $CH = 8\text{cm}$ ,  $EG = 9\text{cm}$ .

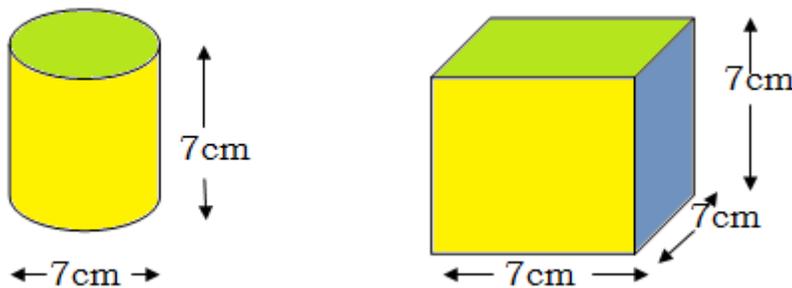
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**MONTH** : **JANUARY**

**CHAPTER – 11** : **MENSURATION**

**L.O (11)** : Find surface area and volume of cuboidal and cylindrical objects.

1. Find the volume, the total surface area and the lateral surface area of a cuboid which is 8m long, 6m broad and 3.5m high.
2. Find the volume, lateral surface area and total surface area of a cube each of whose sides measure 8cm.
3. Describe how the two figures given are alike & how they are different. Which box has larger surface area?



4. A cuboid is of dimension 60cm X 54cm X 30 cm. How many small cubes with side 6cm can be placed in the given cuboid?
5. The curved surface area of a cylinder is  $4400\text{cm}^2$  & circumference of base is 110cm, Find the volume of cylinder.
6. A road roller takes 750 complete revolutions to move once to level a road. Find the area of the road if the diameter of the road roller is 84cm & its length is 1m.
7. A bucket is in the form of cylinder. Rahul wants to paint its outer surface. He also wants to fill it upto the brim. How much water it can hold? How he can find?

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**MONTH** : **JANUARY**

**CHAPTER – 13** : **DIRECT AND INVERSE PROPORTION**

**L.O (11)** : **solves problems based on direct and inverse proportions.**

**1.** If  $x$  and  $y$  are directly proportional, find the values of  $x_1$ ,  $x_2$  and  $y_1$  in the table given below :

$x$	3	$x_1$	$x_2$	10
$y$	36	60	96	$y_1$

**2.** If  $x$  and  $y$  are inversely proportional, find the values of  $x_1$ ,  $x_2$ ,  $y_1$  and  $y_2$  in the table given below :

$x$	8	$x_1$	16	$x_2$	80
$y$	$y_1$	4	5	2	$y_2$

**3.** A machine in a soft drink factory fills 840 bottles in six hours. How many bottles will it fill in five hours?

**4.** A farmer has enough food to feed 20 animals in his cattle for 6 days. How long would the food last if there were 10 more animals in his cattle?

**5.** In a model of a ship, the mast is 9cm high while the mast of the actual ship is 12 m high. If the length of the ship is 28m, how long is the model ship?

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