CLASS - VIII

PROJECTS IN MATHEMATICS

PROJECT: Set of activities in which pupils discover experiment and collect information by themselves in a natural situation to understand a concept and arrive at a conclusion may be called a PROJECT.

Project work will develop the skills in academic standards such as problem solving, logical thinking, mathematical communication, representing data in various forms in daily life situations. This approach is to encourage the pupils to participate, discuss (articulation) and take active part in class room processes.

Project work essentially involves the students in a group work and submitting a report by the students on a given topic, after they worked on it, discussed it and analyzed it from various angles and perspectives.

ASSIGNING PROJECTS – TEACHER'S ROLE

1. Teachers must have a thorough awareness on projects to be assigned to the students.
2. Teachers must give specific and accurate instructions to the students.
3. Teachers must see that all the students must take part in the projects assigned.
4. Allot the projects individually on the basis of student's capabilities and nature of the projects.
5. Teachers must see that children with different abilities are put in each group and give opportunity to select division of work according to their interesting task at the time of allotment of the project.
6. Teachers must analyze and encourage the pupil, while they work on the project.
7. Teachers should act as facilitators.
8. Proper arrangements must be made for the presentation and discussion of each student's project, when the students must be told whom to meet to collect the information needed.
9. Allow the students to make use of the library, computer lab etc.
10. Give time and fix a date to present the project. Each project should be submitted within a week in the prescribed Proforma.
11. Each project can be allotted to more number of pupils just by changing the data available in and around the school.
12. The projects presented should be preserved for future reference and inspection.
13. Every mathematics teacher is more capable to prepare projects based on the Talent/Interest/Capability of students.
14. Teacher also ideal to the students by adopting one difficult project from each class.
15. Procedure of the project should be expressed by the students using his own words.
16. Each student should submit 4 projects in an academic year.

Welcome your comments and suggestions.

CLASS – VIII : MODEL PROJECT

PROFORMA

Preliminary Information

Class : 8

Subject : Mathematics

Name of the Lesson/Unit : SURFACE AREAS AND VOLUME

No. of the Project : 1

Allotment of work :

(i) Preparation/collection of models
- Master Manikanta Reddy & Prem kumar

(ii) Measuring & recording of dimensions
- Master Venkatesh

(iii) Preparation of tables
- Master Masthan

(iv) Presentation of the project
- Master Chakravarthy

DETAILED INFORMATION OF THE PROJECT

1. **Title of the Project :**

   Prepare the models of Cube, Cuboid and find the formula for LSA and TSA. Find LSA and TSA by measuring the dimensions of collected cube and cuboids from daily life situations.

2. **Objectives of the project :**

   (i) Identification of cube and cuboid shaped articles.

   (ii) Preparation of cube and cuboid.

   (iii) Find the formula for finding of LSA & TSA of cube and cuboid.

   (iv) Find the LSA and TSA by collecting different boxes which are in the shape of cube and cuboid.

3. **a) Materials used :**

   Card board, Gum, White papers, Scale, Scissors, Sketch Pens, Books.

   b) Materials collected :

   Dice, chalk piece box, brick, duster

4. **Tools :**

   (i) Material Collected – Preparation of cube and cuboid and collection of some models of cube and cuboid.

   (ii) Identification – Identify all sides are equal in cube.

   (iii) Comparison – Identify the similar faces and their dimensions

5. **Procedure :**

   1. Introduction : 1. I prepared the models of cube and cuboid.

   2. Denote ***l*** cm***, b*** cm***, h*** cm on cuboid and ***s*** cm on cube.

   2. Process : Identify the lateral surfaces and similar surfaces

S.No.	Cube	Cuboid
1	Area of each surface = s^2 Sq.cm	Area of opposite similar lateral surfaces = lh + lh = 2 lh Sq.cm →(1) and bh + bh = 2 bh Sq.cm →(2)
2	Area of 4 equal surfaces LSA = 4 s^2 Sq.cm	Sum of all lateral surface areas LSA = 2lh + 2bh = 2h(l+b) Sq.cm
3	Area of all (6) equal surfaces TSA = 6 s^2 Sq.cm	Area of remaining opposite surfaces = lb + lb = 2lb Sq.cm Area of all surfaces TSA = 2lb + 2bh + 2hl = 2(lb+bh+hl) Sq.cm

3. Recording the data – Cube shapes

(i) Measure and record each side of cube

(ii) Record the lengths of all sides of cube in a tabular form.

S.No.	Name of the cube	Length of Side	LSA=4s^2	TSA = 6s^2
1	Dice	S=2 cm		
2	Chalk piece box	S=12 cm		
3	Prepared model	S=14 cm		

Recording the data – Cuboid shapes

(i) Measure and record each side of cuboid.

(ii) Record the lengths of all sides of cuboid in a tabular form.

S.No.	Name of the cuboid	Length (l)	Breadth (b)	Width (w)	LSA=2h(l+b)	TSA = 2 (lb+bh+lh)
1	Brick	22cm	10cm	7 cm		
2	Duster	15cm	9.5cm	5 cm		
3	Prepared model	15cm	11cm	6.5 cm		

4. Analysis :

We can use the above formulae in daily life to find out total cost of painting/white wash/area of paper required for packing of gift boxes/ manufacturing the new boxes

5. Conclusion :

S.No.	**Cube**	**Cuboid**
1	LSA = 4 s^2 Sq.units	LSA =2h (l + b) Sq.units
2	TSA = 6 s^2 Sq.units	TSA = 2 (lb + bh + hl) Sq.units

6. **Experiences of the students :**

   (i) I observed a box by opening its sides and learn how to prepare the boxes of cube and cuboid shapes.
   (ii) I used cellophane tape to join the edges of sides instead of gum.
   (iii) I asked a person to give me one brick, but he refused to give. Then I requested him, that I want to use it for doing projects in mathematics. He accepted and give me a brick. I felt very happy that I convinced him to get that in a requested manner. It makes me satisfaction.

7. **Doubts & Questions :**

   1. While preparing the top and bottom positions of cuboid, I confused to take the lengths.
   2. I feel difficult to close the all sides.
   3. How the big size boxes prepared to carry heavy heights?

8. **Acknowledgement :**

   1. Convey my sincere thanks to who are cooperate and putting their earnest efforts in completing the project.

9. **Reference Books/Resources :**

   1. Class–VIII Mathematics text book
   2. Class – IX Mathematics text book

10. **Signature of the student(s) :**

CLASS - VIII : LESSON WISE PROJECTS

S. No.	Name of the Lesson	Title of the Project
1	Rational Numbers	1. Collect some quotient numbers and verify the properties of quotient numbers by using a tabular form. 2. Collect some quotient numbers from our daily life situations and represent them on the number line.
2	Linear Equations in one Variable	1. Develop any two verbal form linear equations having one variable on both sides from our daily life situations and solve. (some riddles may be prepared) 2. Develop any two linear equations which are reducible into linear form, from our daily life situations and solve by using cross multiplication.
3	Construction of Quadrilaterals	1. Identify and write the properties of the figures formed by joining the midpoints of all types of quadrilaterals.
4	Exponents and Powers	1. Collect some very large and very small numbers in different fields such as Astronomy, Geography, Number facts and Science text books from class-VI to lass-X and write these into exponential form. 2. Write laws of indices on a chart. Express the products which contain two or more identical quantities in exponential notation by taking 5 different illustrations from our daily life situations.
5	Comparing Quantities using Proportion	1. Collect different types of pictures with respect to the Golden Ratio and paste on a chart. Verify the Golden Ratio in different parts of these pictures. 2. Identify the different types of situations in our day-to-day activities about compound ratio and compare the quantities. 3. Identify the different types of situations (like discount and partnership in various aspects such as shop keepers offer rebate to the customers) and find the percentage of profit or loss or discount. 4. Identify the different types of situations in our day-to-day activities relating to simple interest and compound interest, find total amount in each case and suggest which is preferable to the lender/borrower.

S. No.	Name of the Lesson	Title of the Project
6	Square roots and Cube roots	1. Collect different patterns of numbers and Palindrome numbers, explain on these numbers by writing on a chart. For example (i) Product of two consecutive even or odd natural numbers $11 \times 13 = (12-1)(12+1) = 12^2 - 1$ $13 \times 15 = (14-1)(14+1) = 14^2 - 1$ $29 \times 31 = (30-1)(30+1) = 30^2 - 1$ $44 \times 46 = (45-1)(45+1) = 45^2 - 1$ So in general we can say that $a \times (a+2) = [(a+1)-1][(a+1)+1] = (a+1)^2 - 1$ (ii) Another Interesting pattern as follows:- $7^2 = 49$ $67^2 = 4489$ $667^2 = 444889$ $6667^2 = 44448889$ $66667^2 = 4444488889$ $666667^2 = 444444888889$ [The fun is being able to find out why this happens. May be it would be interesting for you to explore and think about such questions even if the answers come some years later.] (iii) Observe the square of numbers 1, 11, 111, 1111, 11111, ………… etc., They give a beautiful pattern as follows:- $1^2 = 1$ $11^2 = 1\ 2\ 1$ $111^2 = 1\ 2\ 3\ 2\ 1$ $1111^2 = 1\ 2\ 3\ 4\ 3\ 2\ 1$ $11111^2 = 1\ 2\ 3\ 4\ 5\ 4\ 3\ 2\ 1$ $111111^2 = 1\ 2\ 3\ 4\ 5\ 6\ 5\ 4\ 3\ 2\ 1$ $1111111^2 = 1\ 2\ 3\ 4\ 5\ 6\ 7\ 6\ 5\ 4\ 3\ 2\ 1$ $11111111^2 = 1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 7\ 6\ 5\ 4\ 3\ 2\ 1$ [These Numbers are called Palindrome Numbers or Numerical Palindrome] 2. Find the square root of the number by subtraction of successive odd natural numbers, factorization and long division method by taking any 4-digit numbers or by taking daily life examples. 3. Take any two numbers (3-digit or 4-digit) and estimate the cube root of a number by the method of subtraction, method of unit digit and factorization method. 4. Find the Pythagorean Triplets by using the eternal triangle.

S. No.	Name of the Lesson	Title of the Project
		Useful information:

About 2500 years ago, the famous mathematician Pythagoras found an amazing fact about triangles. Such as "The area of the square on the hypotenuse of a right - angled triangle is equal to the sum of the areas of the squares on the other two sides".

The Pythagorean Property relates the lengths ***a*** and ***b***, of the two legs of a right triangle with the length ***c*** of the of the hypotenuse by the equation $a^2 + b^2 = c^2$.

Suppose one leg $a = m^2 - n^2$, second leg $b = 2mn$ and hypotenuse $c = m^2 + n^2$, when the numbers ***m*** and ***n*** are integers which may be arbitrarily selections.

Using the above data, fill the following table. This table gives Pythagorean Triplets.

m	n	$b = 2mn$	$a = m^2 - n^2$	$c = m^2 + n^2$	***Pythagorean Triplets***
2	1	4	3	5	(3, 4, 5)
3	1	6	8	10	(6, 8, 10)
3	2				
4	1				
4	2				
4	3				
5	1				
5	2				
5	3				
5	4				
6	5				
7	6				
8	4				
9	8				
10	7				

S. No.	Name of the Lesson	Title of the Project
7	Frequency Distribution Tables and Graphs	1. Collect different kinds of data (heights of students, marks of students etc.,) and prepare a grouped frequency distribution table and find greater than cumulative frequency and less than cumulative frequency. 2. Collect the information (like marks/runs scored in a cricket game/ weights etc.,) and write it in the form of grouped data and draw frequency polygon, frequency curve, less than cumulative frequency curve and greater than cumulative frequency curve. (Teacher may allot this project by splitting)
8	Exploring Geometrical Figures	1. Collect different types of geometrical figures and draw all possible lines of symmetry. Observe the point symmetry for these figures and write all the symmetries in a tabular form. 2. Draw different types of geometrical figures on graph sheets and then draw its dilations. 3. Collect some congruent figures/mirror images and prepare tessellations.
9	Area of Plane Figures	1. Identify the field which is in the shape of Hexagon and measure the dimensions. Draw the picture of it on a chart and find the area of that field. 2. Find the formula for area of a circle in any one/two methods and find the area of any circular shaped field in your surroundings. 3. Collect different types of pictures contained shaded region and find the area of shaded region.
10	Direct and Inverse Proportions	1. Collect some daily life situations and prepare some problems related to direct and inverse proportions (like no. of articles and its cost, no. of students and quantity of rice required to them, time and distance, men and work) and solve these if one item increased and decreased.
11	Algebraic Expressions	1. Prove the identities by using models 2. Multiplication of algebraic expressions by taking some daily life situations (monomial/binomial/trinomial)
12	Factorization	1. Collect some algebraic expressions of 2^{nd} degree and factorize them by using different methods. 2. Verify the Gold Bach conjecture upto 100 numbers.
13	Visualizing 3D in 2D	1. Collect some 3D figures and represent them on isometric dot sheet and verify Euler's formula (V+F=E+2) by using tabular form.
14	Surface Areas and Volumes	1. Collect some cube and cuboid shaped boxes and find the formula for Lateral Surface Area and Total Surface Area. Find LSA and TSA by measuring the dimensions. 2. Collect some cube and cuboids shaped boxes and find the formula for its Volume and find volumes by measuring the dimensions.
15	Playing with Numbers	1. Prepare a chart of divisibility rules with examples. 2. Collect different types of puzzles and number games and write on a chart.

LESSON WISE ASSIGNMENTS

UNIT – 1 : RATIONAL NUMBERS

ASSIGNMENT – 1

01. Name the Property involved in the following

(i) $\left(\frac{5}{8}\right) + 0 = \frac{5}{8} = 0 + \left(\frac{5}{8}\right)$

(ii) $4\left[\left(\frac{5}{3}\right)+\left(\frac{2}{5}\right)\right] = 4\left(\frac{5}{3}\right)+4\left(\frac{2}{5}\right)$

(iii) $\left(\frac{7}{3}\right) \times 1 = \frac{7}{3} = 1 \times \left(\frac{7}{3}\right)$

(iv) $\left(\frac{-5}{2}\right)\times 1=\left(\frac{-5}{2}\right)=1\times\left(\frac{-5}{2}\right)$

(v) $\left(\frac{5}{2}\right)+\left(\frac{3}{7}\right)=\left(\frac{3}{7}\right)+\left(\frac{5}{2}\right)$

(vi) $\left(\frac{2}{5}\right) \times \left(\frac{7}{3}\right) = \frac{14}{15}$

(vii) $11a + (-11a) = 0$

(viii) $b \times \left(\frac{1}{b}\right) = 1 \ (b \neq 0)$

(ix) $(7 \times c) + (7 \times 6) = 7 \times (c + 6)$

02. Write 10 rational numbers between $\frac{-3}{4}$ and $\frac{5}{6}$

ASSIGNMENT – 2

01. Express the following on Number Line.

$\frac{5}{7}$; $\frac{4}{3}$; $\frac{5}{7}$ $\frac{3}{5}$; $\frac{4}{3}$ $\frac{-7}{4}$; $\frac{3}{5}$

02. Express the decimals $\frac{-7}{4}$ 0.6, 4.5, 1.42 and 1.732 on Number Line.

ASSIGNMENT – 3

01. Express each of the following in the rational form.

a) 0.5757…… b) 0.72929……

02. Find the area of rectangular park which is $18\frac{3}{5}$ m long and $8\frac{2}{3}$ m broad.

UNIT – 2 : LINEAR EQUATIONS IN ONE VARIABLE

ASSIGNMENT – 1

1. A man left One-Fourth of his money to his wife, Two Fifth to his Son and donated balance amount of Rs. 2100 to a Charitable Fund. How much money did he have? How much money was received by his wife son separately?
2. Arjun is twice as old as Shriya. Five years ago his age was three times Shriya's age. Find their present age.

ASSIGNMENT -2

Solve the following equations:

(i) $\frac{x-3}{5} + \frac{x-4}{7} = 6 - \frac{2x-1}{35}$.

(ii) If train runs at 40 km/ph it reaches its destination late by 11 minutes but if it runs at 50 km/ph it is late by 5 minutes only. Find the distance to be covered by the train?

UNIT – 3 : CONSTRUCTION OF QUADRILATERALS

ASSIGNMENT -1

1. Construct a Parallelogram ABCD in which AB = 4cm, BC= 3cm, $\angle A = 60^0$.
2. Construct a Rhombus ABCD in which AC = 7cm, and BD = 5cm.

UNIT – 4 : EXPONENTS AND POWERS

ASSIGNMENT -1

1. Express the number appearing in the following statements in standard form.

(i) Charge of Electron is 0.000,000,000,000,000,000,16 coulomb.

(ii) An ounce of gold contains approximately 865000000000000000000 atoms.

(iii) The unit measure of wave length is called the `Angstrom`, denoted by

$A^C = \frac{1}{10000000000}$ metres.

ASSIGNMENT - 2

1. Simplify the following

$\frac{5}{6}\left[\left(\frac{9}{11}\right)^{-3} \times \left(\frac{9}{11}\right)^{-7}\right] \div \left(\frac{9}{11}\right)^{-3}$ $\quad \left[\left\{(-2/3)^{-3}\right\}^{-4}\right]^{-2}$

2. Simplify:

   (i) $(25 \times t^{-4}) / (5^{-3} \times 10 \times t^{-8})$

   (ii) $(3^{-5} \times 10^{-5} \times 125) / (5^{-7} \times 6^{-5})$

UNIT – 5 : COMPARING QUANTITIES USING PROPORTION

ASSIGNMENT - 1

1. Find the ratio of number of vowels in the word ' MISSISSIPPI' to the number of consonants in the simplest form.
2. A farmer obtained a yielding of 1720 bags of cotton last year. This year she expects her crop to be 20% more. How many bags of cotton does she except this year?

ASSIGNMENT - 2

1. A table was sold for Rs. 2142 at a gain of 5%. At what price should it be sold to gain 10%?
2. In a laboratory the count of bacteria in a certain experiment was increasing at the rate of 2.5% per hour. Find the bacteria at the end of 2 hours if the count was initially 5,06,000.

UNIT – 6 : SQUARE ROOTS AND CUBE ROOTS

ASSIGNMENT -1

1. Estimate the value of the following numbers to the nearest whole number.

   (i) $\sqrt{250}$ (ii) $\sqrt{780}$

2. A gardener wishes to plant 8289 plants in the form of a square and found that there were 8 plants left. How many plants were planted in each row.

ASSIGNMENT -2

1. Find the cube root of the following.

   (i) 2197 (ii) 5832

2. Ravi made a cuboid of plastic of dimensions 12 cm, 8 cm and 3 cm. How many minimum numbers of such cuboids will be needed to form a cube?

UNIT – 7 : FREQENCY DISTRIBUTION TABLES AND GRAPHS

ASSIGNMENT-1

1. 100 plants each were planted in 100 schools during Vana mahotsav. After one month, the number of plants that survived recorded as:

95	67	28	32	65	65	69	33	98	96
76	42	32	38	42	40	40	69	95	92
75	83	76	83	85	62	37	65	63	42
89	65	73	81	49	52	64	76	83	92
93	68	52	79	81	83	59	82	75	82
86	90	44	62	31	36	38	42	39	83
87	56	58	23	35	76	83	85	30	68
69	83	86	43	45	39	83	75	66	83
92	75	89	66	91	27	88	89	93	42
53	69	90	55	66	49	52	83	34	36

Construction a frequency distribution table for the above data by using inclusive class intervals and find Greater than Cumulative Frequency and Less than Cumulative Frequency.

ASSIGNMENT-2

1. A random survey of the number of children of various age group playing in a park was found as follows.

Section - A		Section - B	
Marks	Frequency	Marks	Frequency
0 — 10	3	0 — 10	5
10 — 20	9	10 — 20	19
20 — 30	17	20 — 30	15
30 — 40	12	30 — 40	10
40 — 50	9	40 — 50	1

Draw a Histogram to represent the data above. And draw the frequency polygon by using the Histograms.

2. The following table gives the distribution of students of two sections according to the marks obtained by them:

Age (in years)	Number of children
1 - 2	5
2 - 3	3
3 - 5	6
5 - 7	12
7 -10	9
10 -15	10
15 -17	4

Represent the marks of the students of both the sections on the same graph by two Ogives. From these two ogives, compare the performance of the two sections.

UNIT – 8 : EXPLORING GEOMETRICAL FIGURES

ASSIGNMENT-1

1. Draw a polygon on a square dot sheet. Also draw congruent figures in different directions and mirror image of it.
2. Draw a Quadrilateral of any measurement. Construct a dilation of scale factor 3. Measure their corresponding sides and verify whether they are similar?

ASSIGNMENT-2

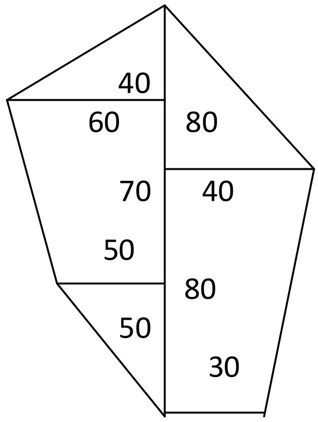
1. Draw three tessellations and name the basic shapes used on your tessellation.

UNIT – 9 : AREA OF PLANE FIGURES

ASSIGNMENT-1

1. The floor of a building consists of around 3000 Tiles which are Rhombus Shaped and each of its diagonal s are 45 cm and 30 cm in length. Find the total cost of the flooring if each tile costs Rs. 20 per m^2.

2. Find the area of the following filed.



1. Four equal circles each of radius ‘a’ touch one another. Find the area between them.
2. A horse is place for grazing inside a rectangular field 70 m by 52 m and is tethered to one corner by a rope 21 m long. How much area can it graze?

UNIT – 10 : DIRECT AND INVERSE PROPORTIONS

ASSIGNMENT-1

1. 5 pumps are required to fill a tank in 1 ½ hours. How many pumps of the same type are used to fill the tank in half an hour?
2. 24 men working at 8 hours per day can do a piece of work in 15 days. In how many days 20 men working at 9 hours per day do the same work.

UNIT – 11 : ALGEBRAIC EXPRESSIONS

ASSIGNMENT-1

1. Find the values of the following by using identities.
   (i) 505^2 (ii) 397^2 (iii) $588^2 - 12^2$ (iv) 502×508

UNIT – 12 : FACTORISATION

ASSIGNMENT-1

1. Factorise the algebraic expression. $15\,y^2z^3 - 20\,y^3z^4 + 35\,y^2z^2$
2. Find the values of *m* for which $x^2 + 3xy + x + my - m$ as two linear factors in *x* and *y* with integer coefficients.
3. Factorise the expression and divide them as directed.
   (i) $15\,ab\,(a^2 - 7a + 10) \div 3b\,(a - 2)$
   (ii) $15\,lm\,(2p^2 - 2q^2) \div 3l\,(p + q)$

ASSIGNMENT-2

UNIT – 13 : VISUALIZING 3 - D IN 2 - D

1. Complete the following table and verify 'Euler's Relation'.
2. Draw any 3-D Shape in our daily life on a Isometric Dot Sheet

UNIT – 14 : SURFACE AREAS AND VOLUME (CUBE AND CUBOID)

ASSIGNMENT-1

1. Find the cost of painting of a cuboid with dimensions 20 cm x 15 cm x 12 cm at the rate of Rs.5 per square meter.
2. How many cubes of edge 4 cm, each can be cut out from cuboid whose length, breadth and height are 20 cm, 18 cm and 16 cm respectively.

UNIT – 15 : PLAYING WITH NUMBERS

ASSIGNMENT-1

1. Is $1^{11} + 2^{11} + 3^{11} + 4^{11}$ divisible by 5? Explain?
2. If 21358AB is divisible by 99, find the values of A and B.
3. Find the sum of integers from 1 to 100 which are divisible by 2 or 3.

Name of the Object	Number Faces (F)	Number of Vertices (V)	Number of Edges (E)	F + V	E + 2
Cube					
Cuboid					
Pentagonal Prism					
Tetrahedron					
Pentagonal Pyramid					
Octahedron					
Dodecahedron					