CLASS - 1X

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 – IX : MODEL PROJECT

PROFORMA

Preliminary Information

Class	**:**	9
Subject	**:**	Mathematics
Name of the Lesson/Unit	**:**	SURFACE AREAS AND VOLUME
No. of the Project	**:**	1
Allotment of work	**:**	

(i) Preparation of models
- Masters Manikanta Reddy & Prem kumar

(ii) Measuring and 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 :

Identify / collect / prepare the models of Cylinder and Cone . Find the formula for its CSA, TSA and Volume. Find CSA, TSA and Volume of collected models by measuring the required dimensions.

2. Objectives of the project :

(i) Identification of cylinder, cone.

(ii) Find the formula for LSA, TSA and Volume of cylinder and cone.

(iii) Find the LSA, TSA and Volume of collected articles which are in the shape of cylinder & cone.

3. a) Materials used :

Charts, Scale, Scissors, Pencil, cellophane tape, long scale etc.

b) Materials collected :

Water drum, bucket, tea cups, joker's cap, ice-cream cup

4. Tools :

(i) Preparation of materials – Prepared cylinder and cone.

(ii) Identification – Volume of Cube is ⅓rd volume of cylinder.

(iii) Comparison – Identification of all measurements.

5. Procedure :

1. Introduction : CYLINDER

I prepare a cylinder model by using the rectangular shaped sheet.

2. Process :

Take a rectangular sheet of length *l* and breadth *b* units.

Prepare a cylinder by joining the breadths of rectangule.

'b' becomes 'h' of cylinder

'l' becomes circumference of the cylinder = 2πr.

Here 'r' is the radius of the cylinder

LSA of cylinder = Area of rectangle = l x b = 2πr x h = 2πrh

$$\boxed{\text{LSA of cylinder} = 2\pi rh \text{ Sq.units}}$$

TSA of cylinder = LSA + Areas of top & bottom ($2\pi r^2$)

$= 2\pi rh + 2\pi r^2 = 2\pi r(h + r)$

$$\boxed{\text{TSA of cylinder} = 2\pi r\,(h + r)\ \text{Sq.units}}$$

Volume : Volume of cylinder = Area of base x height

$= \pi r^{2} \times h = \pi r^2 h$

$$\boxed{V = \pi r^2 h\ \text{Cubic units}}$$

1. Introduction : CONE

1. Draw a circle and separate a sector from circle. Prepare another same as above.
2. Take one sector and prepare a cone by joining the radii.
3. Take another sector and cut small sectors as many as you can.
   These portions are almost like small triangles with base b_1, b_2, b_3 .... b_n and height equal to slant height ' l ' of the cone.

2. Process:

Curved Surface Area of cone = Sum of areas of all triangles

$= \frac{1}{2} b_1 l + \frac{1}{2} b_2 l + \ldots\ldots\ldots$

$= \frac{1}{2} l\,(b_1 + b_2 + \ldots\ldots\ldots\ b_n)$

$= \frac{1}{2} l$ (circumference of cone)

$= \frac{1}{2} l \times 2\pi r$

$= \pi r l$

$$\boxed{\text{CSA of cone} = \pi r l\ \text{Sq. units}}$$

TSA of cone = CSA + Area of its base

$= \pi r l + \pi r^2 = \pi r\,(l + r)$

$$\boxed{\text{TSA of cone} = \pi r\,(l + r)}$$

<u>VOLUME OF CONE</u> :

1. Prepare a cylinder and a cone of equal radius and heights.
2. Take the sand into a cone and fill the cylinder.
3. Observe and note how many times you fill the sand into cylinder using cone.
   i.e. 3 times volume of cone = 1 cylinder volume = $\pi r^2 h$

$$\boxed{\text{Volume of cone } V = \tfrac{1}{3}\pi r^2 h\ \text{Cubic units}}$$

3. Recording the data:

S. No.	Name of the cylinder	Dimensions	CSA = $2\pi rh$	TSA = $2\pi r\,(h+r)$	Volume $V = \pi r^2 h$
1	Water drum	r = h =			
2	Bucket	r = h =			
3	Tea cup	r = h =			

S. No.	Name of the Cone	Dimensions	$l = \sqrt{r^2 + h^2}$	CSA = πrl	TSA = $\pi r\,(l+r)$	Volume $V = \frac{1}{3}\pi r^2 h$
1	Joker's cap	r = 7 cm h = 24 cm				
2	Ice cream cup	r = 3 cm h = 4 cm				
3	Funnel	r = 6 cm h = 8 cm				

4. Analysis :

If we take a cylinder and a cone of equal height and radius

Volume of cylinder $V = \pi r^2 h$

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Ratio of volumes of cylinder and cone = $\pi r^2 h : \frac{1}{3}\pi r^2 h$

$$= 1 : \tfrac{1}{3} = 3 : 1$$

5. Conclusion :

S.No.	Cylinder	Cone
1	LSA = $2\pi rh$ Sq.units	CSA = πrl Sq.units
2	TSA = $2\pi r\,(h + r)$ Sq.units	TSA = $\pi r\,(l + r)$ Sq.units
3	$V = \pi r^2 h$ Cubic units	$V = \frac{1}{3}\pi r^2 h$ Cubic units

6. Experiences of the students :

(i) We enjoy while preparing the models i.e.

1. Cylinder from a rectangle.

2. Cone from a sector

(ii) We find out CSA, TSA and Volume of cylinder very easily.

(iii) We feel difficult in finding CSA of cone while cut the sector into smaller triangles.

(iv) We enjoy while finding the volume of cone, filling the cylinder by using cone with same height and radius.

(v) It is very difficult to prepare a cone with equal height and radius of a cylinder.

(vi) It is easy to prepare a cylinder with equal radius and height of a cone.

7. Doubts & Questions :

1. We cut a sector into small sectors but we take it as triangles, while finding the CSA of a cone.
2. Cane we prepare a cone with equal height and radius of cylinder?

8. Acknowledgement :

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

9. Reference Books/Resources :

1. Class–VIII & IX Mathematics text books

10. Signature of the student(s) :

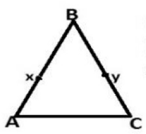
CLASS – IX : LESSON WISE PROJECTS

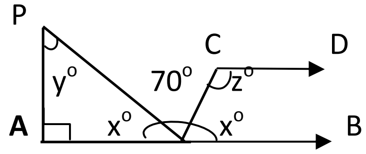
Sl. No.	Name of the lesson	Title of the Project
01	Real Numbers	1. Collection of information about Irrational Numbers- History of Irrational Numbers - give daily life examples. 2. Representation of Irrational Numbers on the number line. 3. Construction of "square root spiral". 4. Collect and identify any five real numbers in our daily life situation which contains at least three decimal places and represent on the number line by using the process of successive magnification. 5. List out and verify all the operations on Real Numbers by taking own examples.
02	Polynomials and Factorization	1. Formation of Polynomials by using daily life situations – Degree - zeroes of a polynomial. 2. Factorization of Polynomials using Remainder theorem and Factor theorem. 3. Geometrical proof of Identities. 4. Factorization of Polynomials using Algebraic identities. 5. Find the dimensions of rectangle whose areas are x^2+5x+6, $x^2+24xy+9y^2$, $4x^2 -(y^2/25)$, $25a^2 - 35a +12$ etc. 6. Find the dimensions of the cuboids whose volumes are $3x^2 - 12x$, $12y^2 +8y-20$, $x^3 - 23x^2 +142x -120$ etc.
03	The elements of Geometry	1. Development of Geometry – Euclid's contribution
04	Lines and Angles	1. Draw different types of lines and angles by observing the surroundings (by using geo-board also) and write its concept map. 2. Observe the surroundings and draw the parallel lines and transversal. Identify the different types of angles formed and write about these angles.(supporting rods of window etc.. or by using Geo-board.) 3. Self generating Golden Triangle – Golden ratio.
05	Co-ordinate Geometry	1. Locating of points in a plane and find the area of different types of figures if the points are joined in an order.(use daily life examples, surroundings and geo board etc.)
06	Linear equations in two variable	1. Formation of Linear Equations in two variables by using daily life situations and find solutions. 2. Graphical representation of Linear equations in two variables and identify the solutions (all points lies on the line, are solutions) 3. Formation of Linear Equations in two variables which are parallel to x and y axes from daily life situations and its graphical representation.

Sl. No.	Name of the lesson	Title of the Project
07	Triangles	1. CPCT & Congruency Rules of triangles by preparing models. 2. Properties of Triangles by preparing and using models. 3. Inequalities of triangles by preparing and using models.
08	Quadrilaterals	1. Identification of different types of quadrilaterals in our surroundings and draw in a flow chart name wise. 2. Midpoint Theorem of Triangle through activity or models. 3. Observe and write the properties of parallelogram through activities or by preparing models. (by using broom sticks, match sticks, empty refills and cycle valve tubes etc.)
09	Statistics	1. Collect the data (it may be heights, weights, marks, consumption of different types of provisions in a month or which are available in our surroundings) and construct a grouped frequency distribution table and find the range. 2. Collect the data and find all types of Measures of Central Tendency for ungrouped data. 3. Collect the data and prepare Ungrouped Frequency Distribution Table and find the Mean through Deviation Method. 4. Collect the data and prepare the Frequency Distribution table and represent this information through Bar- Graphs.
10	Surface areas and Volumes	1. Identify /collect/prepare models of cube, cuboid , prism and pyramid, find formula for volume and find the volumes of the above collected models by measuring the required measurements. 2. Identify /collect/prepare models of Cylinder and Cone, find the formula for Lateral surface area , Total surface area and Volume and find LSA, TSA of collected models by measuring the required measurements. 3. Identify /collect/prepare models of Sphere and Hemi sphere and find formulas for Lateral surface area, Total surface area and Volume. Find LSA, TSA and Volume of collected models by measuring the required measurements. 4. i) Identify /collect/prepare models of a pyramid and a right prismof same base and height ,verify the relation between its volumes. ii) Identify /collect/prepare models of Cylinder and Cone of same height and verify the relation between its volumes. 5. Prepare the magic squares of order 3x3, 4x4, 5x5, 6x6, … etc. Note: The teacher is requested to allot the Projects by splitting or by changing at his convenience.

Sl. No.	Name of the lesson	Title of the Project
11	Areas	1. Find the area of the rectangle by dividing the rectangle into equal compartments. Prepare the flow chart of Area of Planar Regions. 2. Prove the Theorems on areas by using the graph sheets. 3. State the Pythagoras theorem and prove it by using models. 4. Prepare puzzles on areas.
12	Circles	1. Identify from our surroundings the shape of a circle, semicircle, congruent circles, concentric circles, minor arc, major arc, minor segment of circle, major segment of circle. Draw in a flow chart and prepare these models. 2. Construct different Circumcircles and identify the circumcentre. 3. Identify the following by preparing the models (i) The relation between angle subtended by an arc at the centre and angle subtended by it on the remaining arc of the circle. Ii) Angles subtended by an arc in the same segment of a circle. 4. Prepare the different models and observe about i) The sum of all angles of a cyclic quadrilateral Ii) The sum of opposite angles of a cyclic quadrilateral
13	Geometrical constructions	1. Construction of triangles when the following measurements are given i) Base, a base angle and the sum of other two sides Ii) Base, a base angle and the difference of other two sides. iii) The perimeter and its two base angles. 2. Construction of segment of circle, if length of chord and one angle in a segment of a circle were given. 3. What happen if the angle in the segment of circle is right angle? Draw the figure and give reason. Teacher is requested to allot the above projects with different measurements for each student.
14	Probability	1. Understanding of Probability – through daily life situations. 2. Finding of the probability of different situations (tossing of two coins – rolling of a die etc)
15	Proofs in Mathematics	1. Prepare the list about i) Mathematical statements ii) Conjectures iii) Axioms iv) Theorems 2. Write the logical arguments in mathematical proof and give one proof of any theorem.

CLASS – IX : LESSON WISE ASSIGNMENTS

SL. NO.	Name of the lesson	ASSIGNMENTS
1	Real Numbers	A1- 1. How Irrational numbers differ from rational numbers, explain with suitable examples? 2. Find the value of $\sqrt{7}$ upto six decimal places by long division method? A2- 1. Simplify $\sqrt[4]{81}$ - 8 $\sqrt[3]{343}$ +15 $\sqrt[5]{32}$ +225 2. Find the values of a and b i) $(\sqrt{3}+\sqrt{2})/(\sqrt{3}-\sqrt{2}) = a+b\sqrt{6}$ ii) $(\sqrt{5}+\sqrt{3})/(2\sqrt{5}-3\sqrt{3}) = a-b\sqrt{15}$
2	Polynomials and Factorization	A1-1. If -5 is a zero of a polynomial $p(x) = 5x^2-11x+2a$, find the value of a? 2. If 5 and -5 are the zeroes of the polynomial $f(x) = 2x^3+x^2-ax+b$, find the values of a and b? A2-1. Find the remainder when $9x^3-3x^2+x-5$ is divided by $(x-2/3)$? 2. If the polynomials $2x^3+9x^2+3x-5$ and x^3+x^2-4x+a leave the same remainder when divided by x-2 find the value of a? A3-1. If (x-2) and (x-1/2) are factors of px^2+5x+r, show that p=r. 2. If (x^2-1) is a factor of $ax^4+bx^3+cx^2+dx+e$, show that a+c+e=b+d=0. 3. If x^2-x-6 and $x^2+3x-18$ have a common Factor (x-a), then find the value of a? A4-1. Factorize $9a^2+4b^2+16c^2+12ab-16bc-24ca$? 2. Factorize $27x^3+y^3+z^3-9xyz$? A5-1. Verify that $x^3+y^3+z^3-3xyz= ½ (x+y+z) [(x-y)^2 +(y-z)^2 +(z-x)^2]$ 2. If x+y+z=0 then show that $x^3+y^3+z^3=3xyz$.
3	The Elements of Geometry	A1-1. Write some of Euclid's axioms? 2. Write Euclid's postulates. A2-1. Draw an equilateral triangle whose sides are 5.6cms. 2.  In the adjacent figure,we have BX=½ AB,BY= ½ BC and AB=BC.Show that BX=BY.

SL. NO.	Name of the lesson	ASSIGNMENTS
4	Lines and Angles	1.  In the above figure AB‖CD, find the values of x, y and z? 2. If a side of a triangle is produced, then the exterior angle so formed is equal to the sum of the two interior opposite angles.
5	Co-ordinate Geometry	A1- 1. Plot the points (1,0), (3,0), (-2,0), (-5,0) what do you observe? 2. Plot the points (0,1),(0,3),(0,-2),(0,-5) what do you observe ? A2 - 1. Plot the points (0,0), (0,3),(3,4),(4,0) and join them with straight lines to make a rectangle and find the area of the rectangle? 2. Plot the points (2,3), (6,3) and (4,7) on a Graph sheet. Join them to make it a triangle. Find the area of the triangle?
6	Linear Equation in two variables	A1 - 1. Draw the graph of the equation 2x+3y=12, find co-ordinates of the points where the graph cuts the co-ordinate axes and also find the solutions from the graph 1. whose y-co-ordinate is 3 and 2. x co-ordinate is -3. 2. When Rupa was born, his father was 25 years old. Form an equation and draw a graph for this data. From the graph find i) The age of the father when Rupa is 25 years old. ii) Rupa's age when her father is 40 years old. A2- 1. Draw the graph of X=3 and y=5 and write the nature of the lines. 2. Draw the graph of y=0 and x=0 and what do you notice from the graph?
7	Triangles	A1-1. If in two right triangles the hypotenuse and one side of one triangle are equal to the hypotenuse and one side of the another triangle, then the two triangles are congruent. 2. If two sides of a triangle measure 4 cm and 6 cm find all possible measurements (positive integers) of the third side. How many distinct triangles can be obtained?

<table>
<tr><th>SL. NO.</th><th>Name of the lesson</th><th>ASSIGNMENTS</th></tr>
<tr><td>8</td><td>Quadrilaterals</td><td>A1 – 1. Show that the angle bisectors of a parallelogram form a rectangle.
2. AB and DC are two parallel lines and a transversal l, intersects AB at P and DC at R. Prove that the bisectors of the interior angles form a rectangle.
A2- 1. The line drawn through the midpoint of one of the sides of a triangle and parallel to another side will bisect the third side.
2. In triangle ABC, D,E and F are the midpoints of sides AB, BC and CA respectively. Show that triangle ABC is divided into four congruent triangles, when the three midpoints are joined to each other.</td></tr>
<tr><td>9</td><td>Statistics</td><td>A1- 1. Centuries scored and number of cricketers in the World are given below. Find the mean, median and mode of the given data.
<table>
<tr><td>No. of centuries</td><td>5</td><td>10</td><td>15</td><td>20</td><td>25</td></tr>
<tr><td>No. of cricketers</td><td>56</td><td>23</td><td>39</td><td>13</td><td>8</td></tr>
</table>
2. If the mean of the following frequency distribution is 7.2, find the value of k
<table>
<tr><td>X</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td></tr>
<tr><td>Y</td><td>4</td><td>7</td><td>10</td><td>16</td><td>k</td><td>3</td></tr>
</table></td></tr>
<tr><td>10
`</td><td>Surface areas and volumes</td><td>A1- 1. The volume of a cylinder is 308 cm^3. Its height is 8 cm. Find it's lateral surface area and total surface area?
2. One side open cylindrical drum has inner radius 28 cm and height 2.1 m. How much water you can store in the drum? Express in litres?
A2-1. The height of a tent is 9m. Its base diameter is 24m.What is its slant height? Find the cost of canvas cloth required, if it costs Rs 14 per sq.m?
2. A joker's cap is in the form of right circular cone of basic radius 7 cm and height 27 cm. Find the area of the sheet required to make 10 such caps?
A3-1. A metallic cylinder of diameter 5 cm and height 10/3 cm is melted and cast into a sphere. What is its diameter?
2. A hemispherical bowl has diameter 9cm.The liquid is poured into cylindrical bottles of diameter 3 cm and height 3cm. If a full bowl of liquid is filled in the bottles, find how many bottles are required?</td></tr>
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SL. NO.	Name of the lesson	ASSIGNMENTS
11	Areas	A1-1. Find the area of the figure formed by joining the mid points of the adjacent sides of a rhombus with diagonals 12 cm and 16 cm? 2. In triangle ABC, D,E,F are the mid points of sides BC,CA and AB respectively. show that i) BDEF is a parallelogram. ii) Area of DEF =1/4(area ABC). iii) Area of BDEF=1/2(area ABC).
12	Circles	A1-1. Construct a Circumcircle of triangle ABC where AB=5 cm and LB=75^0 and BC=7cm. 2. The pairs of opposite angles of a cyclic quadrilateral are supplementary
13	Geometrical constructions	A1-1. Construct a triangle ABC given BC=5cm, AB+AC=8 cm and LABC=60^0 2. Constuct triangle ABC in which BC=4.2cm LB=30^0 and AB-AC=1.6 cm. A-2.1. Construct a triangle ABC with LB=60^0 LC=45^0. and AB+BC+CA=11 cm. 2. Construct a segment of circle on a chord of length 7 cm and containing an angle of 60^0
14	Probability	A-1.1. A coin is tossed 100 times and the following outcomes are recorded Head 45 times and tails 55 times from the experiment i) compute the probability of each outcomes ii) find the sum of probabilities of all outcomes 2. A bag contains 5 green marbles ,3 blue marbles, 2 red marbles and 2 yellow marbles. one marble is drawn out randomly i) Are the four different colour outcomes equally likely? Explain. ii) Find the probability of drawing each colour marble? iii) Find the sum of their probabilities ?
15	Proofs in mathematics	A1-1. The sum of three interior angles of a triangle is 180^0. 2. Prove that if x is odd ,then x^2 is also odd.