ACTIVITES (TERM-I)
(Any Eight)

Activity1: To find the HCF of two Numbers Experimentally Based on Euclid Division Lemma

Activity2: To Draw the Graph of a Quadratic Polynomial and observe:

i. The shape of the curve when the coefficient of x^2 is positive

ii. The shape of the curve when the coefficient of x^2 is negative

iii. Its number of zero

Activity3: To obtain the zero of a linear Polynomial Geometrically

Activity4: To obtain the condition for consistency of system of linear Equations in two variables

Activity5: To Draw a System of Similar Squares, Using two intersecting Strips with nails

Activity6: To Draw a System of similar Triangles Using Y shaped Strips with nails

Activity7: To verify Basic proportionality theorem using parallel line board

Activity8: To verify the theorem: Ratio of the Areas of Two Similar Triangles is Equal to the Ratio of the Squares of their corresponding sides through paper cutting.

Activity9: To verify Pythagoras Theorem by paper cutting, paper folding and adjusting (Arranging)

Activity10: Verify that two figures (objects) having the same shape (and not Necessarily the same size) are similar figures. Extend the similarity criterion to Triangles.

Activity11: To find the Average Height (in cm) of students studying in a school.

Activity12: To Draw a cumulative frequency curve (or an ogive) of less than type .

Activity13: To Draw a cumulative frequency curve (or an ogive) of more than type.

ACTIVITES (TERM-II)
(Any Eight)

Activity1: To find Geometrically the solution of a Quadratic Equation ax^2+bx++c=0, a≠0 (where a=1) by using the method of computing the square.

Activity2: To verify that given sequence is an A.P (Arithmetic Progression) by the paper Cutting and Paper Folding.

Activity3: To verify that$\sum n = \frac{n(n+1)}{2}$ by Graphical method

Activity4: To verify experimentally that the tangent at any point to a circle is perpendicular to the Radius through that point.

Activity5: To find the number of Tangent from a point to the circle

Activity6: To verify that lengths of Tangents Drawn from an External Point, to a circle are equal by using method of paper cutting, paper folding and pasting.

Activity7: To Draw a Quadrilateral Similar to a given Quadrilateral as per given scale factor (Less than 1)

Activity8: (a) To make mathematical instrument clinometer (or sextant) for measuring the angle of elevation/depression of an object

(b) To calculate the height of an object making use of clinometers(or sextant)

Activity9: To get familiar with the idea of probability of an event through a double color card experiment.

Activity10: To verify experimentally that the probability of getting two tails when two coins are tossed simultaneously is ¼=(o.25) (By eighty tosses of two coins)

Activity11: To find the distance between two objects by physically demonstrating the position of the two objects say two Boys in a Hall, taking a set of reference axes with the corner of the hall as origin.

Activity12: Division of line segment by taking suitable points that intersects the axes at some points and then verifying section formula.

Activity13: To verify the formula for the area of a triangle by graphical method .

Activity14: To obtain formula for Area of a circle experimentally.

Activity15: To give a suggestive demonstration of the formula for the surface Area of a circus Tent.

Activity16: To obtain the formula for the volume of Frustum of a cone.

PROJECTS

Project 1 :	Efficiency in packing
Project 2 :	Geometry in Daily Life
Project 3:	Experiment on probability
Project 4:	Displacement and Rotation of a Geometrical Figure
Project 5:	Frequency of letters/ words in a language text.
Project 6:	Pythagoras Theorem and its Extension
Project 7:	Volume and surface area of cube and cuboid.
Project 8:	Golden Rectangle and golden Ratio
Project 9 :	Male-Female ratio
Project 10 :	Body Mass Index(BMI)
Project 11 :	History of Indian Mathematicians and Mathematics
Project 12 :	Career Opportunities
Project 13 :	π(Pie)

Project Work Assignment (Any Eight)

ACTIVITY- 1

TOPIC:- Prime factorization of composite numbers.

OBJECTIVE:- To verify the prime factorization 150 in the form
5^2x3x2 i.e 150=5^2x3x2.

PRE-REQUISITE KNOWLEDGE:- For a prime number P, P^2 can be represented by the area of a square whose each side of length P units.

MATERIALS REQUIRED:-

i. A sheet of graph paper (Pink / Green)

ii. Colored (black) ball point pen.

iii. A scale

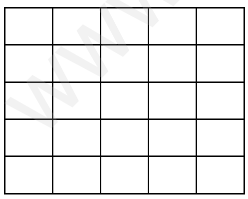
TO PERFORM THE ACTIVITY:-

Steps:-

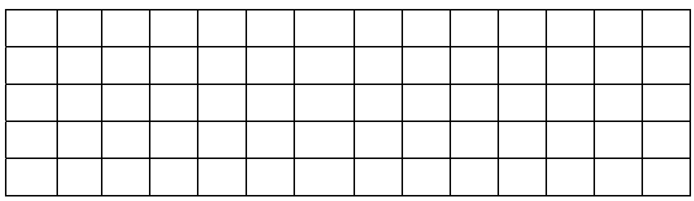
1. Draw a square on the graph paper whose each side is of length 5 cm and then make partition of this square into 25 small squares as shown in fig 1.1 each small square has its side of length 1cm.

   Here, we observe that the area of the square having side of length 5 cm =5^2 cm^2=25cm^2

2. As shown in Fig 1.2 draw there equal squares where each square is of same size as in figure 1.1 then the total area in the fig1.2
   =5^2+5^2+5^2 cm^2
   =5^2x3cm^2 ie,75 cm^2



Fig=1.1



Fig=1.2

3. As shown in fig 1.3 draw six equal square where each square is as same size as in Fig 1.1 Here , three squares are in one row and three squares in the second row.

   We observe that the total area of six squares

   =5^2x(3+3)cm^2
   = 5^2x3x2 cm^2

Also observe that the total area

$=75cm^2+75cm^2=150cm^2$

Hence, we have verified that

$150=5^2x3x2$

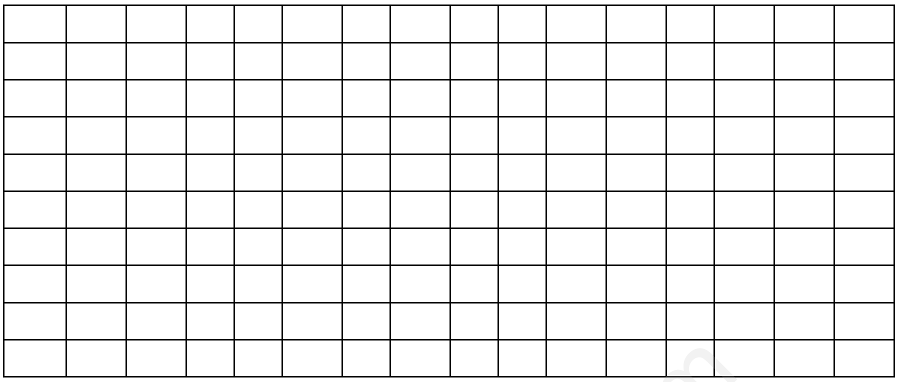


Fig-1.3

ACTIVITY-2

TOPIC:- Ratio of the areas of two similar triangles

STATEMENT:- The ratio of the area of two similar triangle is equal to the ratio of the squares of their corresponding sides.

OBJECTIVE:- To verify the above statement through activity.

PRE-REQUISITE KNOWLEDGE:-

1. The concept of similar triangles.
2. Division of a line segment into equal parts.
3. Construction of lines parallel to given line.

MATERIAL REQUIRED:-

1. White paper sheet
2. Scale /Rubber
3. Paint box
4. Black ball point pen or pencil

TO PERFORM THE ACTIVITY:-

STEPS:-

1. On the poster paper sheet, draw two similar triangle ABC and DEF. We have the ratio of their corresponding sides same and let as have

   AB: DE= BC: EF=CA: FD=5:3

   ie , AB/DE=5/3 , BC/EF=5/3 , CA/FD =5/3,

   ie DE =3/5 AB, EF=3/5 BC,FD=3/5 CA

2. Divide each side of ΔABC into 5 equal parts and those of ΔDEF into 3 equal parts as shown in Fig (i) and (ii).
3. By drawing parallel lines as shown in Fig (i) and (ii)., we have partition ΔABC into 25 smaller triangle of same size and also each smaller triangle in fig (i) has same size and as that of the smaller triangle fig (ii).
4. Paint the smaller triangle as shown in Fig (i) and (ii)..

OBSERVATION:-

1. Area of ΔABC= Area of 25 smaller triangle in fig (i)=25 square unit

Where area of one smaller triangle in fig (i)=P (square unit)

2. Area of ΔDEF=Area of a smaller triangle in Fig (ii)=9p where area of one smaller triangle in fig (ii)=P square units.

3. $\frac{\text{Area of } \Delta \text{ ABC}}{\text{Area of } \Delta\text{DEF}} = \frac{25\text{ P}}{9\text{P}} = \frac{25}{9}$

4. $\frac{(AB)^2}{(DE)^2} = \frac{(AB)^2}{(3/5AB^2)} = \frac{(AB)^2}{9/25(AB)^2} = \frac{25}{9}$

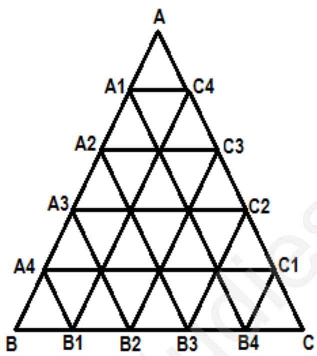
Similarly

$\frac{(BC)^2}{(EF)^2} = \frac{25}{9}$ and $\frac{(CA)^2}{(FD)^2} = \frac{25}{9}$

5. From steps (3) and (4) , we conclude that

$$\frac{\text{Area of } \Delta \text{ ABC}}{\text{Area of } \Delta\text{DEF}} = \frac{(AB)^2}{(DE)^2} = \frac{(BC)^2}{(EF)^2} = \frac{(CA)^2}{(FD)^2}$$

Hence the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.



Fig(i)

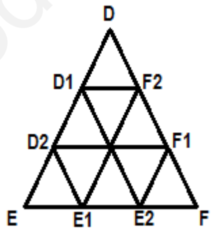


Fig (ii)

ACTIVITY-3

TOPIC:- Trigonometric identities.

STATEMENT:- $\sin^2\theta + \cos^2\theta = 1, 0^0 < \theta < 90^0$

OBJECTIVE: - To verify the above identity

PRE-REQUISITE KNOWLEDGE:- In a right angled triangle.

$$\sin\theta = \frac{\text{Side opposite to angle } \theta}{\text{Hypotenuse of the triangle}}$$

$$\cos\theta = \frac{\text{Side adjacent to angle } \theta}{\text{Hypotenuse of the triangle}}$$

MATERIAL REQUIRED:-

1. Drawing sheet
2. Black ball point pen
3. Geometry box
4. Scale

TO PERFORM THE ACTIVITY

Step:-

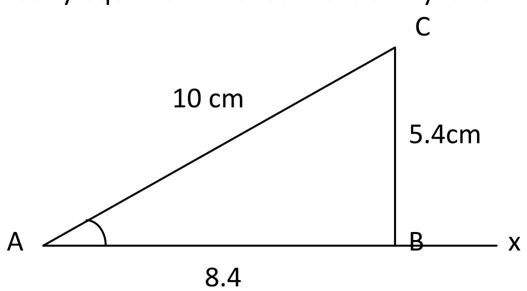
1. On the drawing sheet, draw horizontal ray AX .
2. Construct any arbitrary $\angle$CAX= O(say)
3. Construct AC=10 cm.
4. From C draw CB$\perp$ AX.
5. Measure the length sides of sides AB and BC of the right angled Δ ABC (see fig)
6. We measure that AB=8.4 cm (approx) and BC=5.4 cm (approx)

OBSERVATION

1. Sin θ= BC/AC=5.4/10=.54 (Approx)
2. Cosθ=AB/AC=8.4/10=.84(approx)
3. $\text{Sin}^2\theta + \cos^2\theta = (.54)^2 + (.84)^2$

$$= .2916 + .7056$$
$$= .9972 \text{(Approx)}$$

Ie. $\text{Sin}^2\theta + \text{Cos}^2\theta$ is nearly equal to 1. Hence the identity is verified.



ACTIVITY-4

Topics:- Measure of the central tendencies of a data.

STATEMENT:- We have an empirical relationship for statistical data as 3 x median=Mode+2 x mean.

OBJECTIVE :- To verify the above statement for a data.

PRE-REQUISITE KNOWLEDGE:-

Method to find central tendencies for grouped data.

MATERIAL REQUIRED:-

1. A data about the heights of students of a class and arranged in grouped form.
2. A ball point pen.
3. A scale.

TO PERFORM THE ACTIVITY:-

Step:-

1. Count the number of girl students in the class. The number is 51
2. Record the data about their height in centimeter.
3. Write the data in grouped form as below:-

Height in cm	135-140	140-145	145-150	150-155	155-160	160-165	Total no of girls
Number of girls	4	7	18	11	6	5	51

4. On three different sheets of paper find mean height on the sheet of paper , median height on the second and the modal height on the third sheet of paper.

5. Let us find mean by step deviation method:-

Class of heights (in cm)	Frequency p	Class mark x_i	$U1=\frac{x1-147.5}{5}$ a= 147.5,h=5	Fi x ui
135-140	4	137.5	-2	-8
140-145	7	142.5	-1	-7
145-150	18	147.5	0	0
150-155	11	152.5	1	11
155-160	6	157.5	2	12
160-165	5	162.5	3	13
	$\sum fi = 51$			$\sum fiui = 51$

Mean=a+h x $\frac{\sum fiui}{\sum fi}$ =147.5+5 x 23/51 =147.5+115/51

=(147.5+2.255)cm=149.755cm

6. Let us find median of the data:-

Class of height (in cm)	Frequency number of girls	Cumulative frequency
135-140	4	4
140-145	7	11=cf
145-150	18=f	29
150-155	11	40
155-160	6	46
160-165	5	51
Total	n$\sum fi = 51$	

n/2=25.5

we have median class (145-150) it gives l=145,h=5,f=18,cf=11

median=l+$\left\{\frac{\frac{n}{2}-cf}{f}\right\}$ x h=145 +$\left\{\frac{25.5-11}{18}\right\}$ x5

=145+14.5 x5 / 18

=145+4.028

=149.028cm

7. Let us find mode of the data:-

	Class of heights (in cm)	FREQUENCY (No of Girls)
	135-140	4
	140-145	7=f1
(Modal class)	145-150	18=fm
	150-155	11=f2
	155-160	6
	160-165	5
	Total	51

Modal class is 145-150
Thus l=145, h=5, fm=18, f1=7, f2=11

Mode=H $\left\{\frac{fm-f1}{2fm-f1-f2}\right\}$ xh=145 +$\left\{\frac{18-7}{36-7-11}\right\}$ x 5

=145+55/18 =145+3.055

=148.055 cm

8. CONCLUSION:-

Mean=149.755, median=149.028 and mode=148.055
3x median=3x149.028=447.084
Mode + 2 x mean=148.055+2x149.755
=148.055+299.510=447.565

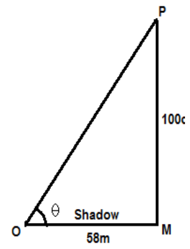
Thus we have verified that 3x median =mode + 2 x mean(Approx)

ACTIVITY – 5

TOPIC : Angle of Elevation

OBJECTIVE : To find the angle of elevation of the sun at a particular time on a sunny day.

PRE-REQUISITE KNOWLEDGE: knowledge of trigonometric ratios.



MATERIAL REQUIRED :
1. A metre rod
2. Measuring tape
3. Table for tangent of angles .

TO PERFORM THE ACTIVITY:
STEPS :
1. On the particular sunny day at the given time, put the metre rod on the level ground with one end on the ground and the other vertically upward.
2. Measure the length of the shadow of the metre rod from the beginning to the end. Let the length of the shadow be 58cm = 0.58m.
3. The length of the metre rod = 1m or 100cm.

OBSERVATION:
1. If θ be the angle of elevation of the sun at the given moment, then we have the following figure on a sheet of paper by taking a suitable scale.
2. From the right angle ΔOMP drawn in figure, we have

$$\text{Tan } \theta = \frac{MP}{OM} = \frac{100}{58} = 1.724(approx)$$

Tan θ = √3 (approx.)

i.e. tan θ = tan 60^o

θ = 60^o

Hence, the required angle of elevation of the sun is 60^o. For better result, we can take the help of the table of tangent of angles.

ACTIVITY – 6

TOPIC - Probability of events of a random experiment.

STATEMENT: For an event E of a random experiment, P(not E) = 1 – P(E).

OBJECTIVE: To verify the above statement by tossing three coins of different denominations simultaneously for head and tail. Event E happens if we get at least two heads and the event not-E happens if we do not get two or more than two heads.

PRE-REQUISITE KNOWLEDGE:
1. Probability of an event : $\frac{\text{Number of outcome which favour the happening of the event E}}{\text{Total number of outcome}}$
2. Event not-E happens when the outcome is not favourable for the event E to happen.

TO PERFORM THE ACTIVITY:
STEPS:
1. Take three fair coins of different denominations and toss these coins simultaneously.
2. We imaging about the possible outcomes as below.
   HHH, HHT, HTH, THH, HTT, TTH, TTT
   i.e. there can be 8 possible outcomes
   favourable outcomes to the event E are
   HHH, HHT, HTH, THH
   Then P(E) = 4/8= ½
   Now, favourable outcomes to the event not-E are HTT, THT, TTH, TTT
   Then P(not-E) = 1- ½ = 1-P(E)

3. Repeating above random experiment, we record the observation of 20 trials as below:

Number of Heads:	0	1	2	3
Number of times out of 20 trials :	4	7	5	4

4. From table in step 3, we observe that for 2 heads or for 3 heads, the event E happens i.e. there are 5+4=9 chances out of 20 which favour E
   Thus, we have P(E) = $\frac{9}{20}$
   Also we observe that for 0 head or for 1 head the event not-E happens. There are 4+7=11 chances out of 20 which favour not-E.
   So, P(not-E) = 11/20 = 1- 9/20 = 1-P(E).