MATHEMATICS ACTIVITIES

CLASS XII

MATHEMATICS ACTIVITY 1

OBJECTIVE

To verify that the relation R in the set L of all lines in a plane, defined by
R $= \{(l, m) : l \,||\, m\}$ is an equivalence relation

PRE REQUISITE KNOWLEDGE

Knowledge of relations and their types namely reflexive, symmetric and transitive, equivalence relation.

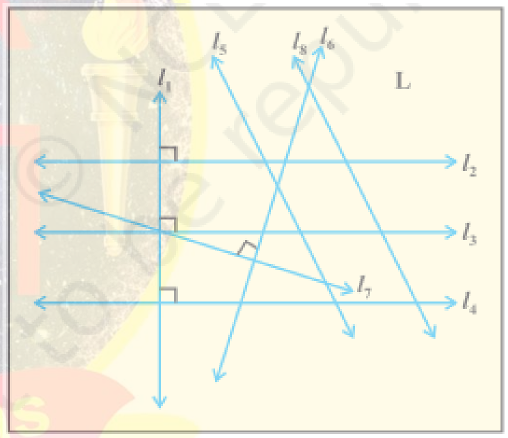
MATERIALS REQUIRED

A blank sheet of paper, geometry box.

PROCEDURE:

(DRAW LINES WITH COLOURED SKETCH PENS]

Draw 8 lines namely $l_1, l_2, l_3, . \; . \; ., l_8$ on the blank sheet of paper as shown in the figure.



DEMONSTRATION

1. l_1 is perpendicular to each of the lines l_2, l_3, l_4.
2. l_6 is perpendicular to l_7
3. l_2 is parallel to l_3, l_3 is parallel to l_4 and l_5 is parallel to l_8 .
4. $(l_1, l_2), (l_3, l_4), (l_5, l_8) \in$ R

OBSERVATION

1. In the figure, every line is parallel to itself. So the relation
   R $= \{(l, m): l \,||\, m\}$ is a reflexive relation
2. In the figure, $l_2 || l_3 \implies l_3 || l_2$
   So $(l_2, l_3) \in$ R $\Rightarrow$ $(l_3, l_2) \in$ R
   Similarly, $(l_3, l_4) \in$ R $\Rightarrow$ $(l_4, l_3) \in$ R
   $(l_5, l_8) \in$ R $\Rightarrow$ $(l_8, l_4) \in$ R
   $\therefore$ The relation R is a symmetric relation
3. In the figure, $l_2 || l_3$ and $l_3 || l_4 \implies l_2 || l_4$
   So $(l_2, l_3) \in$ R and $(l_3, l_4) \in$ R $\implies (l_2, l_4) \in$ R
   Similarly, $(l_3, l_4) \in$ R and $(l_4, l_2) \in$ R $\implies (l_3, l_2) \in$ R
   Thus, the relation R is a transitive relation.

4. From 1, 2 and 3 above, the relation R is reflexive, symmetric and transitive. So, R is an equivalence relation.

CONCLUSION

From the above activity it is verified that the relation 'is parallel to' on the set R of all lines in a plane is an equivalence relation.

CLASS XII

MATHEMATICS ACTIVITY 2

OBJECTIVE

To demonstrate a function which is not one − one but is onto

PRE REQUISITE KNOWLEDGE

Knowledge of relations, functions and their types namely one one (injective)and onto (surjective)

MATERIALS REQUIRED

Coloured chart paper, white sheets of paper, a pair of scissors, gluestick, strings, Geometry box

PROCEDURE:

[USE COLOUR SHEETS FOR THE DIAGRAM AND COLOURED SKETCH PENS OR WOOL/THREAD FOR LINES]

1. From a green chart paper, cut out a rectangular strip of length 15 cm and width 3 cm as shown in the figure 1.
2. From a red chart paper, cut out a rectangular strip of length 10 cm and width 3 cm as shown in the figure 1

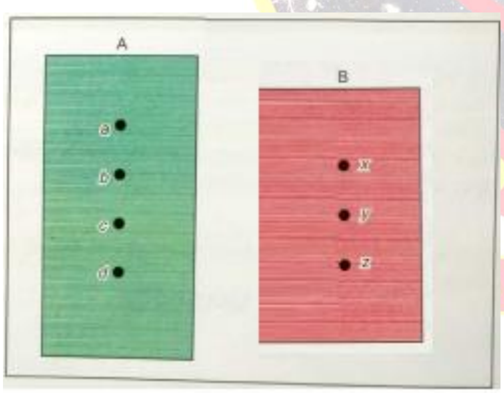


Fig. 1

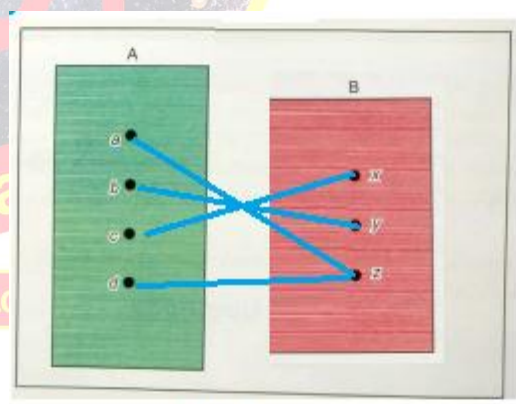


Fig. 2

3. Paste these two strips on a blank sheet of paper side by side and mark A and B on them respectively as shown in figure 1
4. mark 4 points on the green strip and name points as a, b, c and d. Similarly mark 3 points on the red strip and name them as x, y and z as shown in figure 1.
5. Join the points by strings as shown in the figure 2.

OBSERVATION

1. The image of the point a of A in B is z.
2. The image of the point b of A in B is y.
3. The image of the point c of A in B is x.

4. The image of the point d of A in B is z.
5. The pre − image of the element x of B in A is c
6. The pre − image of the element y of B in A is b
7. The pre − image of the element z of B in A is a and b
8. Since the elements a and d in A have the same image z in B. So, the function is many − one and not one − one
9. Also, we see that every element of B is image of one or more element of A. So, the function is onto.
10. From 8 and 9 above we can say that the function shown in figure 5 is not one − one but onto.

CONCLUSION

A function which is not one − one but is onto has been demonstrated

CLASS XII

MATHEMATICS ACTIVITY 3

OBJECTIVE

To sketch the graphs of a^x and $\log_x a$, $a > 0, a \neq 1$ and to examine that they are mirror images of each other

PRE REQUISITE KNOWLEDGE

Knowledge of exponential functions and logarithmic functions and their properties and graphs

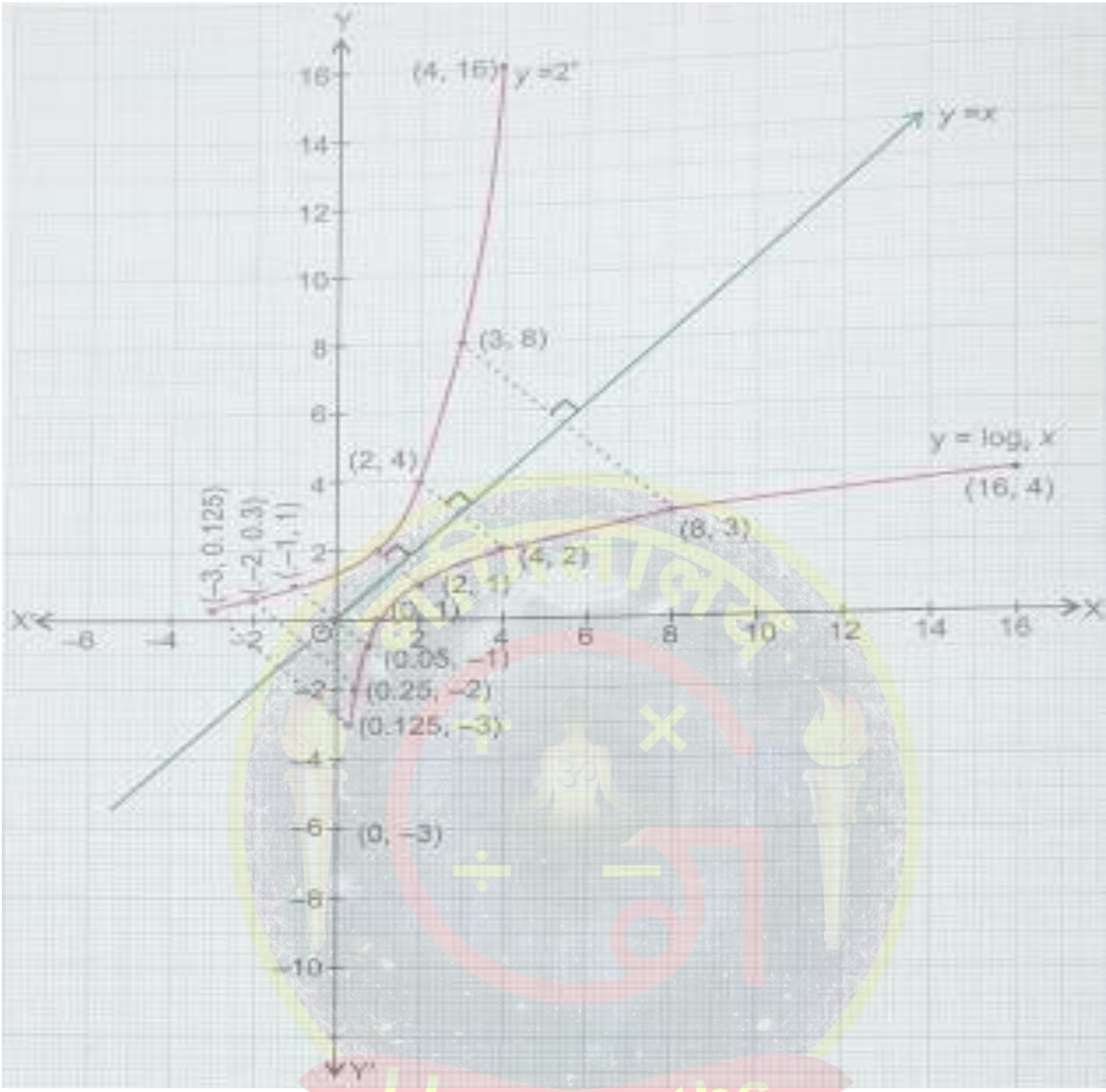
MATERIALS REQUIRED

A blank sheet of paper, graph paper, plane mirror, glue stick, sketch pens, geometry box.

PROCEDURE:

[GRAPH TO BE DRAWN WITH SHARP PENCIL ON THE GRAPH PAPER ONLY. NOTE THAT THE TWO PARTS OF THE GRAPH ARE MIRROR IMAGES OF EACH OTHER W.R.T. THE LINE $y = x$]

1. On the blank sheet of paper fix a graph paper with glu stick
2. draw the co − ordinate axis XOX′and YOY′. Mark graduations on both the axes as shown in the figure
3. Find some ordered pairs satisfying $y = a^x$.
4. For a^x, take $x =$ and find the ordered pair 2^x for different values of x. The values may be tabulated as below:



x	0	1	-1	2	-2	3	-3	4
2^x	1	2	0.5	4	0.25	8	0.125	16

5. Plot the points $(0,1), (1,2), (-1,0.5), (2,4), (-2,0.25), (3,8), (-3,0.125), (4,16)$ on the graph.

6. Join the points by a free hand curve. Thus curve gives the graph of 2^x

7. Fnd some ordered pairs satisfying $y = \log_2 x$. If $y = \log_2 x$ then $x = 2^x$.

8. Find the ordered pairs $(x, 2^y)$ for different values of y. The values may be tablated as below:

x	1	2	0.5	4	0.25	8	0.125	16
$\log_2 x$	0	1	-1	2	-2	3	-3	4

9. Plot the points $(1,0), (2,1), (0.5,-1), (4,2), (0.25,-2), (8,3), (0.125,-3), (16,4)$ on the graph.

10. Join the points by a free hand curve this curve gives the graph of

11. Draw the graph of line $y = x$ on the sheet.

12. Place a mirror along the thread on the line representing $y = x$.

OBSERVATIONS

From the figure we observe that.

1. The image of the point (1,2) on the graph of $y = 2^x$ in the line $y = x$ is (2,1). (2, 1)lies on the graph of $y = \log_2 x$.

2. The image of the point (4,2) on the graph $y = \log_2 x$ in the line $y = x$ is (2, 4). (2,4) lies on the graph of $y = 2^x$.

3. The image of the point (3,8) on the graph $y = 2^x$ in the line $y = x$ is (8,3). (8, 3)lies on the graph of $y = \log_2 x$.

CONCLUSION

In the above activity, by drawing the graph of 2^x and $\log_2 x$, it has been verified that the two graphs are mirror images of each other in the line $y = x$.

CLASS XII

MATHEMATICS ACTIVITY 4

OBJECTIVE

To find analytically the limit of a function $f(x)$ at $x = c$ and also to check the continuity of the function at that point

PRE REQUISITE KNOWLEDGE

Knowledge of the concepts of limit and continuity of a function at a point

MATERIALS REQUIRED

Paper, pencil, calculator

PROCEDURE

1. Let the given function be $f(x) = \begin{cases} \dfrac{x^2 - 4}{x - 2}, & x \neq 2 \\ 4, & x = 2 \end{cases}$

2. Take some points on the left side of c (x = 2)which are very near to c.

3. For the points on the left side of $c(= 2)$, find the values of $f(x)$

$$\Rightarrow f(x) = \frac{x^2 - 4}{x - 2} = \frac{(x + 2)(x - 2)}{(x - 2)} = (x + 2) \qquad (\because x \neq 2)$$

4. The values may be tabulated as below:

x	1.9.	1.99	1.999	1.9999	1.99999	1.999999
$f(x)$	3.9	3.99	3.999	3.9999	3.99999	3.999999

5. Now take some points on the right side of c $(x = 2)$ which are very near to c.

6. For trhe points on the right side of $c(= 2)$, find the values of $f(x)$

7. The values may be tabulated as below:

x	2.1	2.01	2.001	2.0001	2.00001	2.000001
$f(x)$	4.1	4.01	4.001	4.0001	4.00001	4.000001

OBSERVATIONS

1. The value of $f(x)$is approaching to 4, as $x \longrightarrow 2$ from the left.
2. The value of $f(x)$is approaching to 4, as $x \longrightarrow 2$ from the right.
3. So, $\lim_{x \to 2^-} f(x) = 4$ and $\lim_{x \to 2^+} f(x) = 4$
4. $\lim_{x \to 2} f(x) = 4$ and $\mathrm{f}(2) = 4$
5. $\lim_{x \to 2} f(x) = \mathrm{f}(2)$
6. Since, $\lim_{x \to 2} f(x) = f(2)$, so the function is continuous at $x = 2$.

CONCLUSION

From the above activity we found the limit of a function $f(x)$at $x = c$ analytically and checked whether the function is continuous or not.

CLASS XII

MATHEMATICS ACTIVITY 5

OBJECTIVE

To verify that amongst all the rectangles of the same perimeter, the square has the maximum area.

PRE REQUISITE KNOWLEDGE

Knowledge of the perimeter and area of a rectangle and square. Knowledge of differentiation and its application

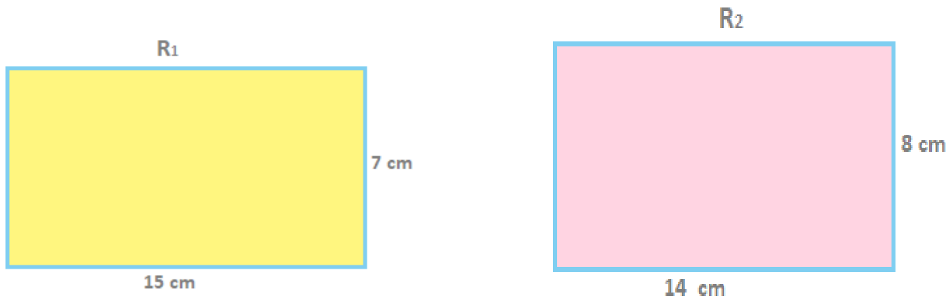
MATERIALS REQUIRED

Chart paper, paper cutter, scale, pencil, eraser , gluestick

PROCEDURE

[PASTE THE RECTANGLES CUT FROM DIFFERENT COLOURED SHEETS OF THE SAME LENGTH AND BREADTH AS GIVEN]

1. Make rectangles each of perimeter say 44 cm on a chart paper. Rectangles of different
2. dimensions are as follows:



R_1 : 15 cm × 7 cm, R_2 : 14 cm × 8 cm
R_3 : 13 cm × 9 cm, R_4 : 12 cm × 10 cm
R_5 : 11 cm × 11cm, R_6 : 12.5 cm × 9.5 cm
R_7 : 13.5 cm × 8.5 cm

3. Cut out these rectangles and paste them on the white paper
4. Repeat step 1 for more rectangles of different dimensions each having perimeter 44 cm
5. Paste these rectangles on the sheet of paper.

OBSERVATION

1. Area of rectangle R_1 : 15 cm × 7 cm = 105cm^2
   Area of rectangle R_2 : 14 cm × 8 cm = 112 cm^2
   Area of rectangleR_3 : 13 cm × 9 cm = 117 cm^2
   Area of rectangleR_4 : 12 cm × 10 cm = 120 cm^2
   Area of rectangleR_5 : 11 cm × 11cm = 121 cm^2
   Area of rectangleR_6 : 12.5 cm × 9.5 cm = 118.75 cm^2
   Area of rectangleR_7 : 13.5 cm × 8.5 cm = 114.75 cm^2

2. Perimeter of each rectangle is same but their area are different. Area of rectangle R_5 is the maximum. It is a square of side 11 cm

CONCLUSION

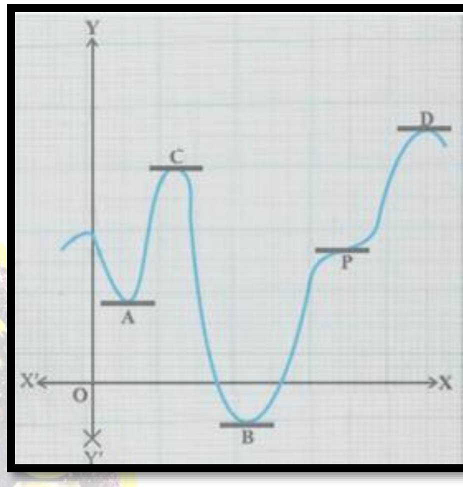
Amongst all the rectangles of the same perimeter, the square has the maximum area.

CLASS XII

MATHEMATICS ACTIVITY 6

OBJECTIVE:
To understand the concepts of local maxima, local minima and point of inflection.

PRE REQUISITE KNOWLEDGE:
Knowledge of increasing and decreasing functions in terms of sign of derivatives.



MATERIALS REQUIRED:
Graph paper, Geometry Box etc.

PROCEDURE:
[USE SHARP PENCIL TO DRAW THE CURVE ON GRAPH SHEET]

1. Draw the XY-plane on the graph sheet.
2. Make a curve on the sheet as shown in the figure.
3. Mark the critical points A, B, C, D, P on the curve as shown in the figure.
4. Make small horizontal lines at the points A, B, C, D and P as shown in the figure.

DEMONSTRATION:

1. In the figure, horizontal lines at the points A, B, C and D represent tangents to the curve and are parallel to the axis. The slopes of tangents at these points are zero, i.e., the value of the first derivative at these points is zero. The tangent at P intersects the curve.
2. At the points A and B, sign of the first derivative changes from negative to positive. So, they are the points of local minima.
3. At the point C and D, sign of the first derivative changes from positive to negative. So, they are the points of local maxima.
4. At the point P, sign of first derivative does not change. So, it is a point of inflection.

OBSERVATION:

1. Sign of the slope of the tangent (first derivative) at a point on the curve to the immediate left of A is $-$ ve.
2. Sign of the slope of the tangent (first derivative) at a point on the curve to the immediate right of A is $+$ ve.
3. Sign of the first derivative at a point on the curve to immediate left of B is $-$ ve .
4. Sign of the first derivative at a point on the curve to immediate right of B is $+$ ve.
5. Sign of the first derivative at a point on the curve to immediate left of C is $+$ ve.
6. Sign of the first derivative at a point on the curve to immediate right of C is $-$ ve.
7. Sign of the first derivative at a point on the curve to immediate left of D is $+$ ve.
8. Sign of the first derivative at a point on the curve to immediate right of D is $+$ ve.
9. Sign of the first derivative at a point immediate left of P is $+$ ve and immediate right of P is $-$ ve.
10. A and B are points of local minima.
11. C and D are points of local maxima.
12. P is a point of inflection.

CONCLUSION:
From the above activity the concepts of local maxima, local minima and point of inflection has been understood clearly.

CLASS XII

MATHEMATICS ACTIVITY 7

OBJECTIVE:
To construct an open box of maximum volume from a given rectangular sheet by cutting equal squares from each corner.

PRE REQUISITE KNOWLEDGE:
The method to find the dimensions of an open cuboid formed by cutting a square from each corner of a rectangular sheet The formula for finding volume of a cuboid.

MATERIALS REQUIRED:
Chart papers, scissors, cello-tape, calculator.

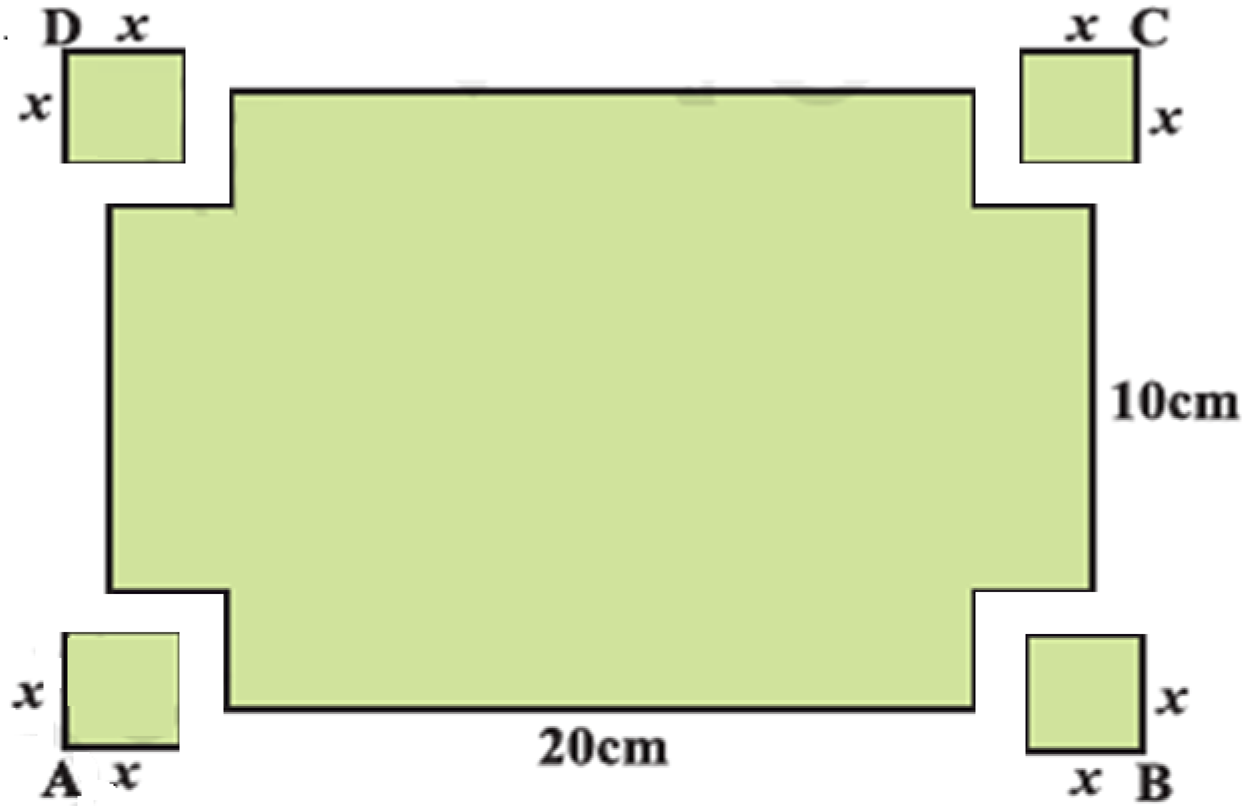
METHOD OF CONSTRUCTION

1. Take a rectangular chart paper of size 20 cm × 10 cm and name it as ABCD.
2. Cut four equal squares each of side x cm from each corner A, B, C and D.
3. Repeat the process by taking the same size of chart papers and different values of x.
4. Make an open box by folding its flaps using cello-tape/adhesive

DEMONSTRATION:

1. When $x = 1$, Volume of the box = 144 cm^3
2. When $x = 1.5$, Volume of the box = 178.5 cm^3
3. When $x = 1.8$, Volume of the box = 188.928 cm^3
4. When $x = 2$, Volume of the box = 192 cm^3
5. When $x = 2.1$, Volume of the box = 192.444 cm^3
6. When $x = 2.2$, Volume of the box = 192.192 cm^3
7. When $x = 2.5$, Volume of the box = 187.5 cm^3
8. When $x = 3$, Volume of the box = 168 cm^3

Clearly, volume of the box is maximum when $x = 2.1$.



OBSERVATION: **[CUT THE RECTANGLE FROM COLOURED SHEET AND PASTE. DRAW SQUARES OF THE SAME SIZE AT THE CORNERS]**

1. V_1 = Volume of the open box (when x = 1.6) = 182.784 cm^3
2. V_2 = Volume of the open box (when x = 1.9) = 190.836 cm^3
3. V = Volume of the open box (when x = 2.1) = 192.444 cm^3
4. V_3 = Volume of the open box (when x = 2.2) = 192.192 cm^3
5. V_4 = Volume of the open box (when x = 2.4) = 189.696 cm^3
6. V_5 = Volume of the open box (when x = 3.2) = 156.672 cm^3
7. Volume V_1 < volume V.
8. Volume V_2 < volume V.
9. Volume V_3 < volume V.
10. Volume V_4 < volume V.
11. Volume V_5 < volume V.

So, Volume of the open box is maximum when x = 2.1 cm.

CONCLUSION:
The concept of maxima/minima of a function has been demonstrated.7

CLASS XII

MATHEMATICS ACTIVITY 8

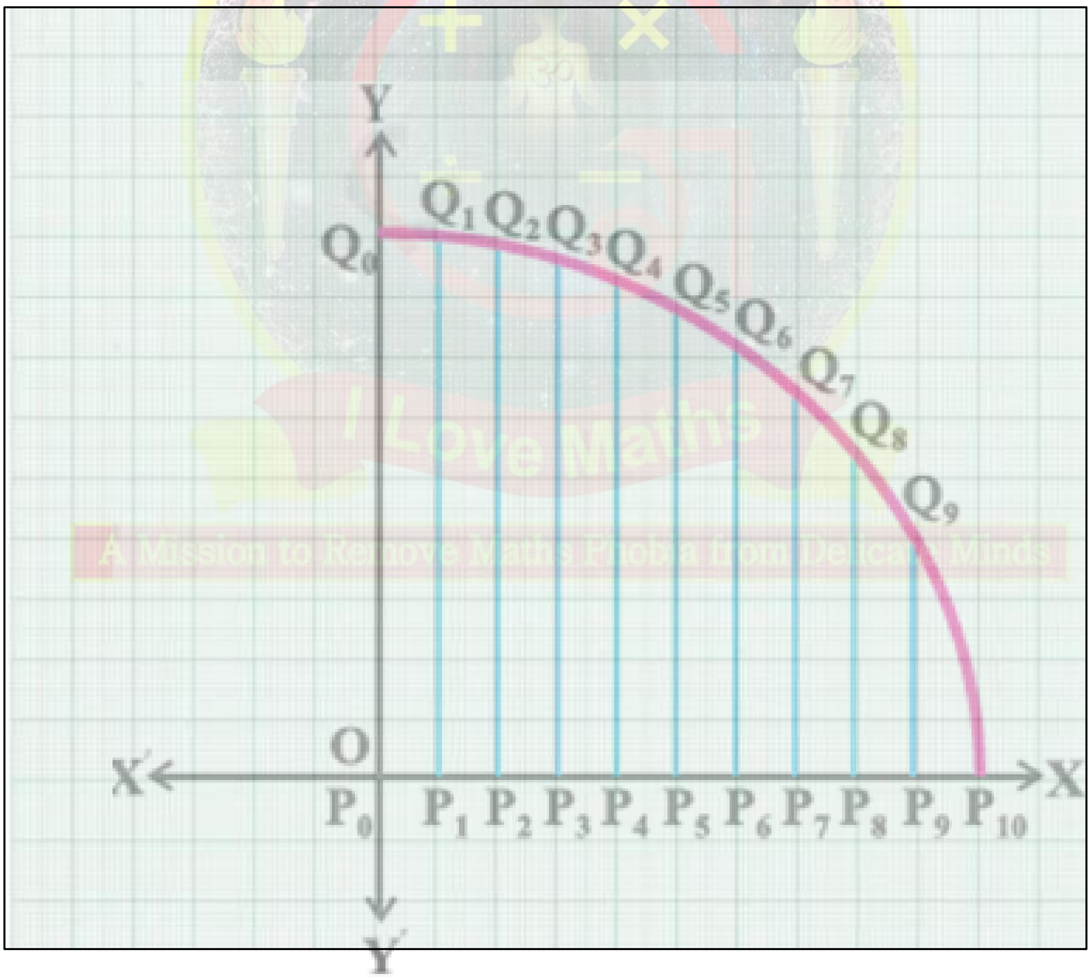
OBJECTIVE:

To evaluate the definite integral $\int_a^b \sqrt{(1 - x^2)}\, dx$ as the limit of a sum and verify it by actual integration.

PRE REQUISITE KNOWLEDGE:
The concept and calculation of Definite integrals.
The concept of finding area of a figure from geo board.

MATERIALS REQUIRED:
White paper, scale, pencil, graph paper

METHOD OF CONSTRUCTION
[THE FIGURE TO BE DRAWN ON A GRAPH PAPER WITH SHARP PENCIL, USE COMPASS (ROUNDER) TO DRAW QUADRANT OF THE CIRCLE]



To done on GRAPH PAPER

1. On the white sheet draw two perpendicular lines to represent coordinate axes XOX′ and YOY′.
2. Draw a quadrant of a circle with O as centre and radius 1 unit (10 cm) as shown in the Fig.
3. The curve in the 1st quadrant represents the graph of the function $\sqrt{(1-x^2)}$ in the interval [0, 1].

DEMONSTRATION:

1. Let origin O be denoted by P_0 and the points where the curve meets the x-axis and y-axis be denoted by P_{10} and Q, respectively.
2. Divide P_0P_{10} into 10 equal parts with points of division as, $P_1, P_2, P_3, ..., P_9$.
3. From each of the points, P_i , i = 1, 2, ..., 9 draw perpendiculars on the x-axis to meet the curve at the points, $Q_1, Q_2, Q_3, \ldots, Q_9$. Measure the lengths of P_0Q_0, $P_1Q_1, \ldots$, P_9Q_9 and call them as $y_0, y_1, \ldots, y_9$ whereas width of each part, P_0P_1, $P_1P_2, \ldots$, is 0.1 units.

4. $y_0 = P_0Q_0 = 1$ units
   $y_1 = P_1Q_1 = 0.99$ units
   $y_2 = P_2Q_2 = 0.97$ units
   $y_3 = P_3Q_3 = 0.95$ units
   $y_4 = P_4Q_4 = 0.92$ units
   $y_5 = P_5Q_5 = 0.87$ units
   $y_6 = P_6Q_6 = 0.8$ units
   $y_7 = P_7Q_7 = 0.71$ units
   $y_8 = P_8Q_8 = 0.6$ units
   $y_9 = P_9Q_9 = 0.43$ units
   $y_{10} = P_{10}Q_{10}$ = which is very small near to 0.

5. Area of the quadrant of the circle (area bounded by the curve and the two axis) = sum of the areas of trapeziums.

$$= \frac{1}{2} \times 0.1 \begin{bmatrix} (1+0.99) + (0.99+0.97) + (0.97 + 0.95) + (0.95\ 0.92) + (0.92 + .87) + \\ (0.87+0.8) + (0.8 + 0.71) + (0.71+0.6) + (0.6 + 0.43) + (0.43) \end{bmatrix}$$

$$= 0.1\,[0.5 + 0.99 + 0.97 + 0.95 + 0.92 + 0.87 + 0.80 + 0.71 + 0.60 + 0.43]$$

$$= 0.1 \times 7.74 = 0.774 \text{ sq. units. (approx.)}$$

6. Definite Integral $= \int_0^1 \sqrt{1-x^2}dx = [\frac{x\sqrt{1-x^2}}{2} + \sin^{-1}x]_0^1 = \frac{1}{2} \times \frac{\pi}{2} = \frac{3.14}{4}$
   $= 0785$ sq. units

Thus, the area of the quadrant as a limit of a sum is nearly the same as area obtained by actual integration.

OBSERVATION:

1. Function representing the arc of the quadrant of the circle is $y = \sqrt{1-x^2}$.
2. Area of the quadrant of a circle with radius 1 unit $= \int_0^1 \sqrt{1-x^2}\,dx$
3. Area of the quadrant as the limit of a sum = 0.774 sq. units.
4. The two areas are nearly equal.

CONCLUSION:
The concept of area bounded by a curve has been demonstrated.

CLASS XII

MATHEMATICS ACTIVITY 9

OBJECTIVE:

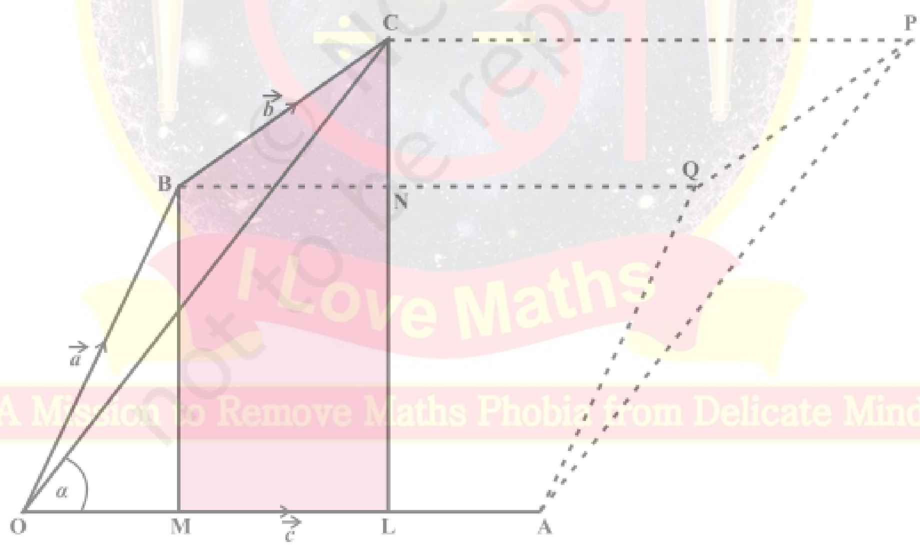
To verify geometrically that $\vec{c} \times (\vec{a} + \vec{b}) = \vec{c} \times \vec{a} + \vec{c} \times \vec{b}$.

PRE REQUISITE KNOWLEDGE:
Formula for finding area of a parallelogram.
Knowledge of the magnitude and direction of the cross product of two vectors

MATERIALS REQUIRED:
Geometry box, white paper, sketch pen, etc

METHOD OF CONSTRUCTION

1. Fix a white paper on the cardboard
2. Draw a line segment OA (= 6 cm, say)and let it represent $\vec{c}$.
3. Draw another line segment OB (= 4 cm, say) at an angle (say 60°) with OA. Let $\overrightarrow{OB} = \vec{a}$



4. Draw BC (= 3 cm, say)making an angle (say 30°)with $\overrightarrow{OA}$. Let $\overrightarrow{BC} = \vec{b}$
5. Draw perpendiculars BM, CL and BN.
6. Complete parallelograms OAPC, OAQB and BQPC.

DEMONSTRATION:

1. $\overrightarrow{OC}\ \overrightarrow{OB} + \overrightarrow{BC} = \vec{a} + \vec{b}$ and let $\angle$ COA = α.
2. $|\vec{c} \times (\vec{a} + \vec{b})| = |\vec{c}||\vec{a} + \vec{b}|\sin\alpha =$ area of parallelogram OAPC.
3. $|\vec{c} \times \vec{a}| =$ area of parallelogram OAQB.

4. $|\vec{c} \times \vec{b}|$ area of parallelogram BQPC.
5. Area of parallelogram OAPC = (OA)(CL) = (OA)(LN + NC) = (OA)(BM + NC)\
   = (OA)(BM) + (OA)(NC) = Area of parallelogram OAQB + Area of parallelogram BQPC
   $= |\vec{c} \times \vec{a}| + |\vec{c} \times \vec{b}|$.
6. So, $|\vec{c} \times (\vec{a} + \vec{b})| = |\vec{c} \times \vec{a}| + |\vec{c} \times \vec{b}|$
7. Direction of each of these vectors $\vec{c} \times (\vec{a} + \vec{b}), \vec{c} \times \vec{a}, \vec{c} \times \vec{b}$ is perpendicular to the same plane.
8. So, $\vec{c} \times (\vec{a} + \vec{b}) = \vec{c} \times \vec{a} + \vec{c} \times \vec{b}$.

OBSERVATION:

$|\vec{c}| = |\overline{OA}| = OA = 6$ cm
$|\vec{a} + \vec{b}| = |\overline{OC}| = OC = 6.4$ cm
CL = 4.9 cm
$|\vec{c} \times (\vec{a} + \vec{b})|$. Area of parallelogram OAPC = (OA)(CL) = 29.4 sq. units (i)
$|\vec{c} \times \vec{a}|$ = Area of parallelogram OAQB = (OA)(BM) = 6 cm × 3.4 cm = 20.4 sq. units (ii)
$|\vec{c} \times \vec{b}|$ = Area of parallelogram BQPC = (OA)(CN) = 6 cm × 1.5 cm = 9 sq. units (iii)
From (i), (ii) and (iii)
Area of parallelogram OAPC = Area of parallelgram OAQB + Area of Parallelgram BQPC.
Thus, $|\vec{c} \times (\vec{a} + \vec{b})| = |\vec{c} \times \vec{a}| + |\vec{c} \times \vec{b}|$

CONCLUSION:
Through the activity, distributive property of vector multiplication over addition has been explained.

CLASS XII

MATHEMATICS ACTIVITY 10

OBJECTIVE:
To explain the computation of conditional probability of a given event A, when event B has already occurred, through an example of throwing a pair of dice

PRE REQUISITE KNOWLEDGE:
The concept of conditional probability.

MATERIALS REQUIRED:
White paper, pen/pencil, scale, a pair of dice.

METHOD OF CONSTRUCTION
[USE DIFFERENT COLOURED PAPERS OR COLOURED PENCILS TO SHOW DIFFERENT COLOURED BOXES]
1. Paste a white paper on a piece of plywood of a convenient size.
2. Make a square and divide it into 36 unit squares of size 1cm each
3. Write pair of numbers as shown in the figure

DEMONSTRATION:

1. The figure gives all possible outcomes of the given experiment. Hence, it represents the sample space of the experiment.
2. Suppose we have to find the conditional probability of an event A if an event B has already occurred, where A is the event "a number 4 appears on both the dice" and B is the event "4 has appeared on at least one of the dice" i. e, we have to find P(A | B).
3. From Fig. 1 number of outcomes favourable to A = 1

   Number of outcomes favourable to B = 11

   Number of outcomes favourable to A ∩ B = 1.

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

4. (**i**) $P(B) = \frac{11}{36}$

   (**ii**) $P(A \cap B) = \frac{1}{36}$

   (**iii**) $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{1}{36}}{\frac{11}{36}} = \frac{1}{11}$

OBSERVATION:

1. Outcome(s)favourable to A : (4,4),
n (A) = 1

2. Outcomes favourable to B : (1,4), (2,4), (3,4), (4,4), (5,4), (6,4), (4,1), (4,2), (4,3), (4,5), (4,6),
n (B) = 11.

3. Outcomes favourable to A ∩ B : (4,4),
n (A ∩ B) = 1.

4. $P(A \cap B) = \frac{n(A \cap B)}{n(S)} = \frac{1}{36}$.

5. $P(A | B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{1}{36}}{\frac{11}{36}} = \frac{1}{11}$.

CONCLUSION:

The concept of conditional probability and method to obtain its value has been understood. This is further used in Bayes' theorem.