

Master Lesson Plan
for
Coordinate Geometry

Board	Standard	Subject	Chapter	Language
NCERT	STD IX	Mathematics	Coordinate Geometry	English

CURRICULAR GOALS	CG-4: Analyses the characteristics and properties of two-dimensional geometric shapes and develops mathematical arguments to explain geometric relationships
COMPETENCIES AS PER NCF/NIPUN BHARAT	C-4.5: Specifies locations and describes spatial relationships with coordinate geometry, e.g., plotting a pair of linear equations and graphically finding the solution or finding the area of triangle with given coordinates as vertices
SDG(Sustainable Development Goals)	SDG4: Quality Education
Technology aids	PPTs
Learning Teaching Materials (LTM)	Globe
Inter-disciplinary Connections	Integration with Arts and sports
Cross-Cutting Themes	Values and dispositions: VC_Plotting your priorities Educational Technology: PPTs Inclusion - Art Integration and Sports Integration to support varied types of learners

Sri Sathya Sai Central Trust

MS_Objectives_Coordinate Geometry

Objective: The Teacher will be able to get an overview of the asset objectives in the MLP for the chapter 'Coordinate Geometry'.

Notes to the teacher: This asset lays down the proposed plan for transacting this chapter. It states the asset objectives of the MLP. This asset is for the teacher's reference and need not be taught to the students.

Students will be able to –

- infer the need for 2 reference points to locate the position of an object
- devise a method to describe the position of each one in the classroom
- describe the Cartesian plane
- identify the coordinates of the marked points in the Cartesian plane
- identify the relationship between the signs of the coordinates of a point and the quadrant in which it lies
- rank activities based on importance and urgency to arrive at a logical choice
- identify the quadrant in which the given ordered pair will lie
- list different uses of Coordinate Geometry in our daily life
- appreciate the use of coordinates in digital images
- create a design by plotting points of the given ordered pairs
- summarise the chapter 'Coordinate Geometry'.

IQ_Determining a Location

Objective: Students will be able to infer the need for 2 reference points to locate the position of an object.

Teaching Aids: PPT

Notes to the teacher: The teacher may narrate the following situation to the students and then follow it up with the suggested questions to make them arrive at the inference that 2 reference points are needed to locate the position of objects. She may allow them to think and come out with as many answers as possible before arriving at a conclusion. If there is any difficulty getting the answers, the teacher can ask leading questions.

Let us say that Mr. Vijay is the postman for the Gandhi Nagar locality in Coimbatore city.

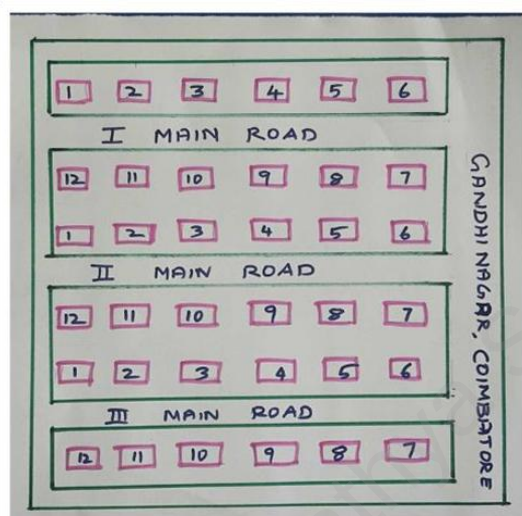


Image source: OC

Mr. Vijay has 3 letters to deliver in this area today. The envelopes bear the following names and addresses.



Image Source:

Envelope: needpix.com/photo/1365393/airmailenvelope-airmail-envelope-modern-blank-white-clipart-scrapbooking-illustration

Attribution: Karen Arnold

Stamp: commons.wikimedia.org/wiki/File:Netaji_Subhas_Chandra_Bose%E2%80%99s_125th_Birth_Anniversary_stamp.jpg

Attribution: India Post, Government of India

Questions:

- Which of the above envelopes will get delivered?
Ans: The envelope addressed to Ms.Sudha
- Why do you think so?
Ans: The address is complete with both door number and Street number.
- What is the difference between the addresses written on the 3 letters?
Clues: Letter 1- Only the door number is given.
Letter 2 - Only the street number is given.
Letter 3 - Both the door number and street number are given.
- If you want to locate a person living in a particular area, what do you need to know?
Clue -door number and street number/name of the building
[Notes to the teacher: There could be different answers which can also be right depending on the place they live in.]
- Now, can you tell how many independent facts are essential to locate an address in a given area?
Ans: 2
So now you understand that at least 2 independent facts are needed to find the exact location of any object or building on a plane surface.
[Notes to the teacher: The students could come up with 2, 3 or 4 .. You could further ask what they are.. and clarify that in a given area or plane we need at least 2 reference points to find a location.]
- Can you think of objects whose positions are determined by 3 independent data?
Clue - points inside three dimensional objects like cube, cuboid etc, objects in space, are some answers.

[Notes to the teacher: The teacher may welcome all answers and enable students to think along these lines. She need not reveal the clue or answers. The students could do some finding on their own and come back with answers the next day.]

Time to teach	Asset type	Theme	Sub Theme
10 minutes	Inquisitive Questions	Co-ordinate Geometry	Locating the position of an object/point in plane

SA_Seating Plan

Objective: Students will be able to devise a method to describe the position of each one in the classroom.

Teaching Aids: PPT

Notes to the teacher: The teacher may use the PPT to understand the activity and conduct it in the classroom as per the activity procedure.

Aim: To introduce the concept of Coordinate geometry.

Resources Required: Paper slips, cellophane tape.

Setting for the Activity: Indoors

Type of Activity: Experiment

Preparation for the Activity:

1. Suppose there are 5 rows of student benches in the class. Write 'Row 1', 'Row 2', 'Row 3', 'Row 4' and 'Row 5' on 5 different slips of coloured paper and stick them on the side wall of the class. When the teacher is facing the class, the farthest row should be labelled as 'Row 1'.
2. Suppose that 2 students are seated on each bench and there are 4 benches in each row, then it follows that the students are seated in 8 columns in the class. So, write numbers 1 to 8 on different slips of coloured paper and stick them on the back wall of the class just across each column of students. When the teacher is facing the class, the first column to her right is to be numbered as column 1.

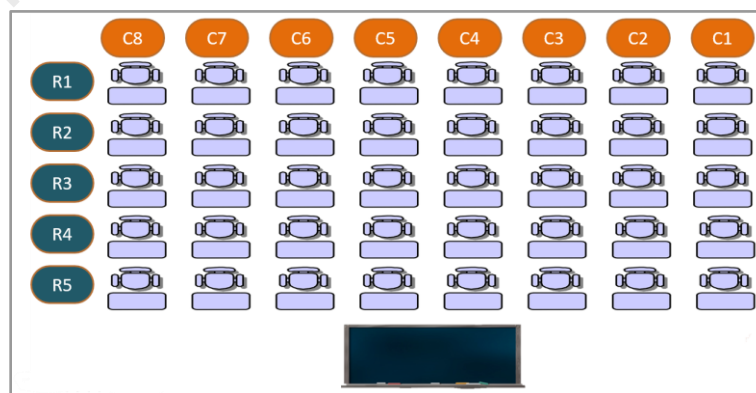


Image Source: Classroom: pixabay.com/vectors/classroom-students-sitting-three-36509/

Attribution: Clker-Free-Vector-Images

Blackboard: freepik.com/free-vector/blue-school-board-with-wooden-frame-chalk_386295008.htm

Attribution: upklyak

3. The teacher may then draw the following grid on the blackboard.

R5								
R4								
R3								
R2								
R1								
	C1	C2	C3	C4	C5	C6	C7	C8

Role of the Teacher: Demonstrator, questioner and observer.

Procedure:

1. Call out the name of any student randomly and ask him/her to tell the number of his/her column first and then the number of his/her row. Let us say that student P. Anil sits on the 3rd column, 1st row. Then the teacher will make the following entry on the grid.

R5								
R4								
R3								
R2								
R1			PA(3, 1)					
	C1	C2	C3	C4	C5	C6	C7	C8

2. The teacher should continue to call out the names randomly till all the entries are filled in the grid. If 2 or more students have identical initials, the first one to be called out may be denoted by his/her initials with two-letters. For the others with the same initials, another letter from their names may be added to show the difference.

Observation

1. The grid finally looks like this. (The student initials are representative)

R5	SA(1, 5)	TR(2, 5)	CP(3, 5)	KA(4, 5)	MB(5, 5)	GT(6, 5)	SG(7, 5)	PG(8, 5)
R4	DG(1, 4)	DS(2, 4)	RS(3, 4)	KS(4, 4)	PN(5, 4)	MS(6, 4)	KR(7, 4)	TS(8, 4)
R3	SE(1, 3)	BR(2, 3)	BS(3, 3)	SS(4, 3)	DC(5, 3)	MM(6, 3)	KP(7, 3)	MN(8, 3)
R2	JG(1, 2)	PNS(2, 2)	NR(3, 2)	GI(4, 2)	HR(5, 2)	JU(6, 2)	YS(7, 2)	AS(8, 2)
R1	PP(1, 1)	AR(2, 1)	PA(3, 1)	JS(4, 1)	KD(5, 1)	PNR(6, 1)	NM(7, 1)	MZ(8, 1)
	C1	C2	C3	C4	C5	C6	C7	C8

2. Each student's position is represented by a unique pair of numbers.

3. The positions (1, 3) and (3, 1) are not the same. They refer to the positions of 2 different students.

Conclusion:

In the seating plan, we needed the column number and the row number to define the position of each seat. Similarly the position of any object lying in a plane can be represented with the help of two perpendicular lines.

[Notes to the teacher: The teacher can then say that this idea developed into a very important branch of Mathematics known as Coordinate Geometry.]

Follow-up Questions:

1. Which student's seat is represented by (3, 5)? Please stand up. Why is your seat labelled (3, 5)?

Clue: I sit in the 3rd column, 5th row.

2. Why are the seats (2, 4) and (4, 2) different?

Clue: Seat (2, 4) is in the 2nd column, 4th row, whereas seat (4, 2) is in the 4th column, 2nd row.

3. Name some places where seats are assigned such numbers.

Possible Answers: Cinema halls, flights and so on.

[Notes to the teacher: The teacher may welcome all answers and enable students to think on those lines.]

Time to teach	Asset type	Theme	Sub Theme
15 minutes	Suggested Activity	Co-ordinate	Basic idea about

		Geometry	Coordinate Geometry
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MS_Cartesian System

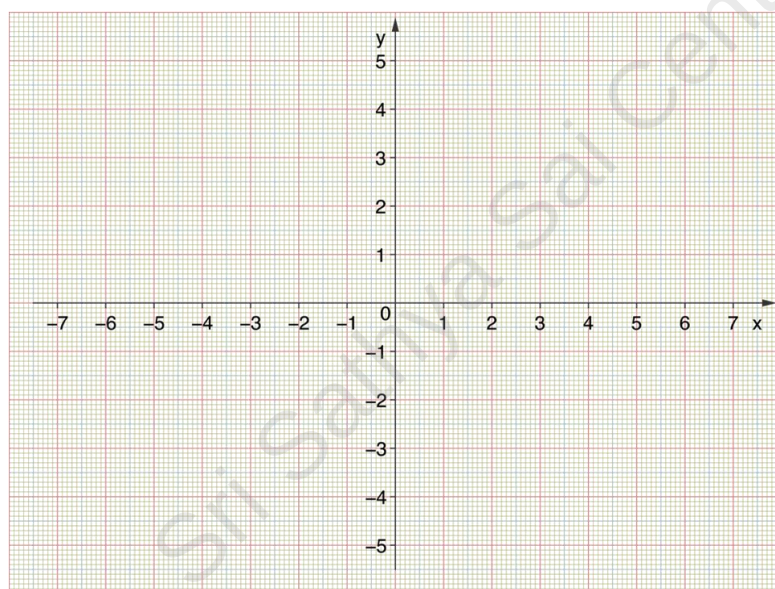
Objective: Students will be able to describe a Cartesian plane.

Teaching Aids Provided: PPT

Notes to the teacher: The teacher may introduce this concept by quickly recalling what they usually learn in Geometry and proceed with the concept as given below.

Geometry can only describe the dimensions of an object, but not the position of an object. So, a French mathematician Rene Descartes had invented a system called the Cartesian system to describe the location of a point on the plane using number lines.

What is a Cartesian system?



Graph: pixabay.com/illustrations/coordinate-system-four-quadrants-2342859/
Attribution: mbnachhilfe_de

In this system, we place two number lines perpendicular to each other and locate the points on the plane by referring them to these number lines.

The two number lines are placed in a way that one number line will be horizontal and the other line will be vertical. The number '0' of the two number lines also should coincide with each other.

DESCRIBING CARTESIAN PLANE

[Notes to the teacher: Teacher can point out the respective parts of the Cartesian plane in the PPT while explaining the points given.]

- The horizontal line $X'X$ is called the X-axis, and the vertical line $Y'Y$ is called the Y-axis
- The point where $X'X$ and $Y'Y$ intersect each other is called the origin. It is denoted by O
- OX and OY are called the positive directions of the X-axis and Y-axis, respectively
- $X'O$ and $Y'O$ are called the negative directions of the x-axis and y-axis, respectively
- These 2 axes divide the plane into 4 parts. These 4 parts are called the quadrants
- They are numbered as I, II, III and IV, anticlockwise from OX

The plane that consists of these 2 axes and the four quadrants is called the Cartesian plane. This plane is also called the coordinate plane or the xy-plane. The two axes are called the coordinate axes.

[**Notes to the teacher:** Note that the spelling of axis changes to axes when it is referred to in plural form. The teacher may clarify to the students that the plural of the word 'axis' is 'axes'.]

Abscissa and Ordinate:

Let us plot a point P on the Cartesian plane which is 2 cm from Y-axis and 3 cm from X-axis.

For this,

1. From the origin, move to the 2 cm mark on X-axis. At the 2 cm mark, draw a perpendicular line of 3 cm.
2. From the origin, move to the 3 cm mark on the Y-axis. At the 3 cm mark, draw a perpendicular line of 2 cm.

The two perpendicular lines meet at the point which is P .

So, the X-coordinate of a point is its perpendicular distance from the Y-axis measured along the X-axis. The X-coordinate is called the **Abscissa**.

So, the X-coordinate or the abscissa of P is 2.

Similarly, the Y-coordinate of a point is its perpendicular distance from the X-axis measured along the Y-axis. The Y-coordinate is called the **Ordinate**. So, the Y-coordinate or the ordinate of P is 3.

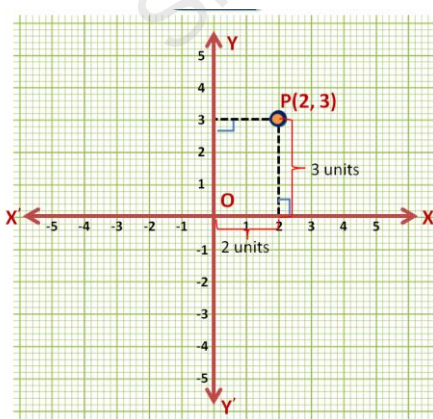


Image Source: OC

Coordinates of a point are placed in brackets. So, coordinates of P are (2,3).

ORDERED PAIR

The coordinates of a point describe the location of a point.

If $x \neq y$, the locations of (x, y) and (y, x) are not the same in the Cartesian plane. So, we refer to the coordinate pair (x, y) as the ordered pair.

$(x, y) \neq (y, x)$

For example: $(2, 3) \neq (3, 2)$

[Notes to the teacher: Here the teacher may explain that in an ordered pair where $x \neq y$, the order of the coordinates is important and cannot be interchanged. When we interchange the x- coordinate and y- coordinate, the position changes.]

Special Coordinates

Origin

The origin O is at zero distance from the X-axis and the Y-axis. So both the abscissa and ordinate of origin O are zero.

Origin O = (0, 0)

Point on the X- Axis

The Y-coordinate of the points on the x-axis will be 0. The coordinates of a point on X-axis are of the form $(x, 0)$

Point on the Y-Axis

The X-coordinate of the points on the Y-axis will be 0. The coordinates of a point on Y-axis are of the form $(0, y)$

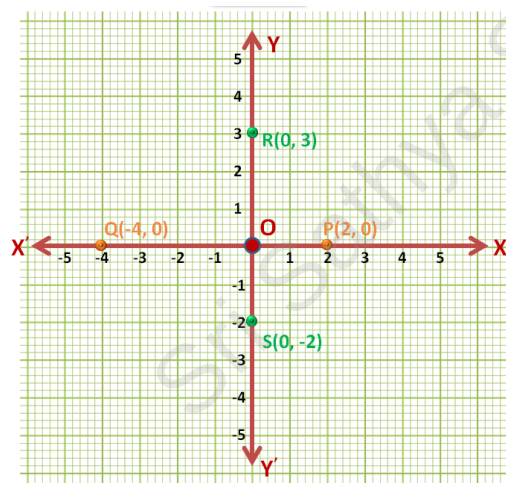


Image Source: OC

[Notes to the teacher: While explaining the coordinates of a point on the axes, the teacher may show that it has 0 distance to the other axis. Therefore there can be no perpendicular line and hence it will lie on the axis itself with only its distance from the origin.]

Time to teach	Asset type	Theme	Sub Theme
15 minutes	Main Script	Co-ordinate	Abscissa and Ordinate

		Geometry	Cartesian system(origin, axes, quadrants and cartesian plane)
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QA_Identify the coordinates

Objective: Students will be able to identify the coordinates of the marked points in the Cartesian plane.

Teaching Aids: PPT

Notes to the teacher: The teacher may present the questions and allow the students to write or say the answers before revealing them.

I. Fill in the blanks

1. The point at which two coordinate axes meet is called ____.
2. The two coordinate axes divide the Cartesian plane into 4 parts called ____.
3. The point (3, 0) lies on the ____.
4. If the coordinates of two points are P (-3, 3) and Q (-4, 5) respectively, the abscissa of P) - (abscissa of Q) is ____.
5. The coordinates of the point which lies on the Y-axis and whose ordinate is 'a' is ____.

Answers:

- 1) Origin 2) Quadrants 3) X-axis 4) 1 5) (0, a)

II. Choose the correct answer:

1. If the Y-coordinate of a point is zero and the X-coordinate is non-zero, then this point always lies on ____.
a) X-axis b) Y-axis c) Origin d) none
2. The perpendicular distance of the point P(4, 5) from the Y-axis is ____.
a) 5 b) 4 c) 6 d) 7
3. Which of the points P(4, 2), Q(1, 0), R(0, 6) and S(0, 3) lie on the X-axis?
a) P and R b) R and S c) Only Q d) Q and S
4. The point which lies on Y-axis at a distance of 7 units in the negative direction of Y-axis is ____.
a) (0, 7) b) (7, 0) c) (0, -7) d) (-7, 0)

Answers:

1. a 2. b 3. c 4. c

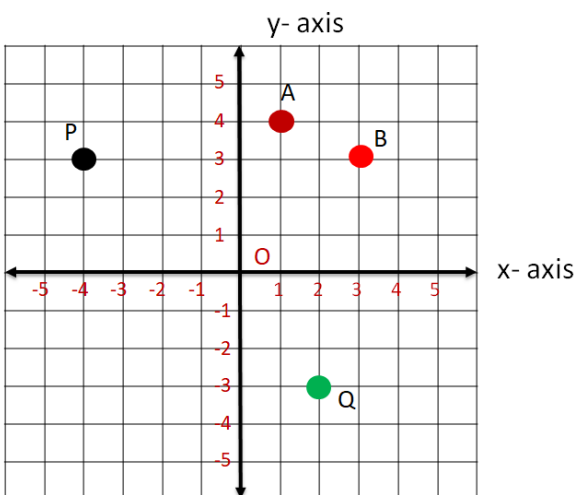
III. Identify the coordinates of the given 4 points

Image Source: OC

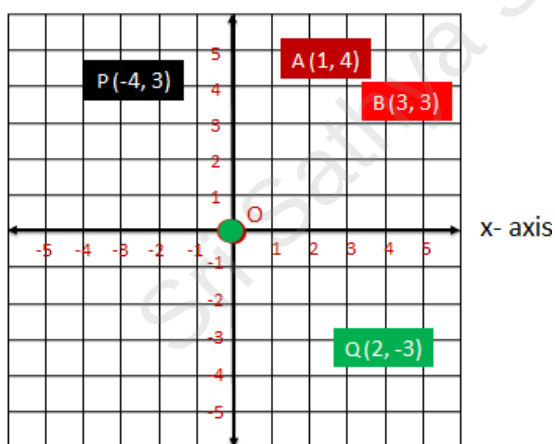
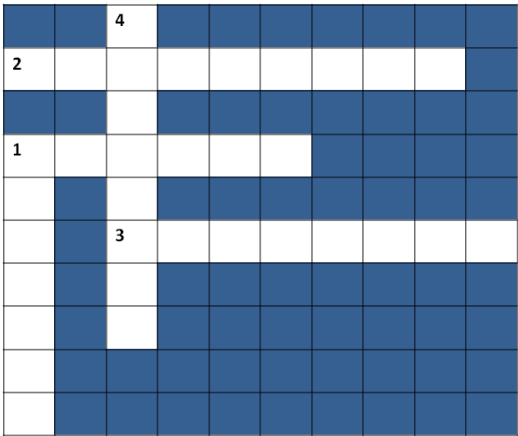
Answers:

Image Source: OC

IV. Solve the puzzle

[Notes to the teacher: A crossword puzzle with clues is given below. The teacher may ask the students to write the words in their notes and then ask a few of them to say the answer. She can then reveal the filled-in puzzle.]



Hints: Across:

1. The coordinates of ____are (0, 0). (6)
2. The plane that consists of 2 coordinate axes and quadrants.(9)
3. The X-coordinate is called as the_____.(8)

Down:

1. A coordinate pair is also referred to as____pair.(7)
4. The ____of all points on X-axis is zero.(8)

Time to teach	Asset type	Theme	Sub Theme
10 minutes	Questions to Assess	Co-ordinate Geometry	Abcissa and Ordinate Cartesian system(origin, axes, quadrants and cartesian plane)

MS_Signs of the Coordinates

Objective: Students will be able to identify the relationship between the signs of the coordinates of a point and the quadrant in which it lies.

Teaching Aids: PPT

Teaching Learning Material (TLM): Chart

What do you need?: A chart, coloured pens, a ruler, pencil.

Get Ready: Draw a Cartesian plane on the chart with the following specifications:

1. Draw the rays OX and OY in red colour; draw the rays OX' and OY' in blue colour.
2. Mark the numbers on rays OX and OY in red; mark the numbers on rays OX' and OY' in blue.
3. Draw an arc from quadrant 1 to quadrant 4 as shown in the image.
4. Name the quadrants and write the signs as shown in the figure. Make sure that the signs and quadrant names are big and bold for students to see. The chart is now ready for use in the classroom.

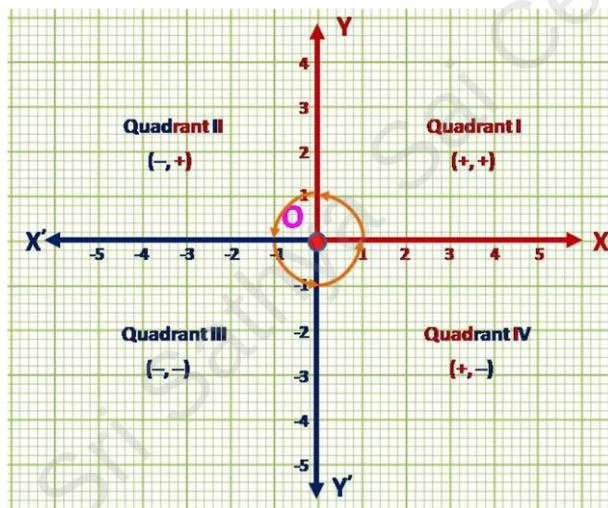


Image Source: OC

Notes to the teacher: The teacher may first explain the concept using the PPT provided. Finally the chart may be used to reiterate the concept firmly. The chart may be hung in the classroom for a few weeks till students become quick in plotting points in the correct quadrant.

Observe the figure given.

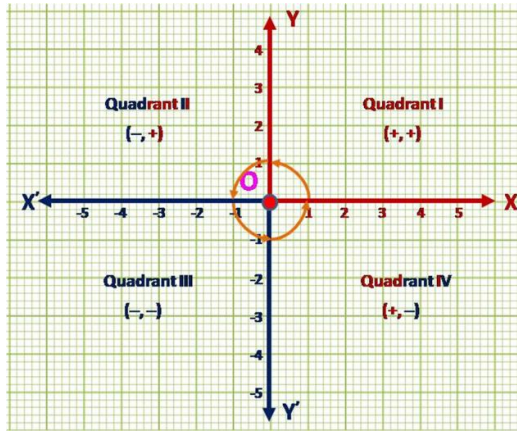


Image Source: OC

Rays OX and OY represent the positive sides of the X and Y axes respectively.

Rays OX' and OY' represent the negative sides of the X and Y axes respectively.

The quadrants are numbered from 1 to 4 consecutively in anticlockwise direction beginning from the region bounded by the rays OX and OY.

Consider any point in the first quadrant.

What will be the sign of its abscissa? (Answer: +)

What will be the sign of its ordinate? (Answer: +)

The first quadrant is the region between the positive X-axis and positive Y-axis. Hence, for every point in the first quadrant, both the X and Y coordinates are always positive. The point will be of the form $(+, +)$. It also follows that if both the coordinates are positive, then the point lies only in the first quadrant.

Now consider any point on the second quadrant.

What will be the sign of its abscissa? (Answer: -)

What will be the sign of its ordinate? (Answer: +)

The second quadrant is the region between the negative X-axis and positive Y-axis. Hence, for every point in the second quadrant, the X coordinate is always negative and the Y coordinate is always positive. The point will be of the form $(-, +)$. It also follows that if the X-coordinate is negative and the Y-coordinate is positive, then the point lies only in the second quadrant.

Now, consider any point in the third quadrant.

What will be the sign of its abscissa? (Answer: -)

What will be the sign of its ordinate? (Answer: -)

The third quadrant is the region between the negative X-axis and negative Y-axis. Hence, for every point in the third quadrant, both the X and Y coordinates are always negative. The point will be of the form $(-, -)$. It also follows that if both the coordinates are negative, then the point lies only in the third quadrant.

Finally consider any point on the fourth quadrant.

What will be the sign of its abscissa? (Answer: +)

What will be the sign of its ordinate? (Answer: -)

The fourth quadrant is the region between the positive X-axis and negative Y-axis. Hence, for every point in the fourth quadrant, the X coordinate is always positive and the Y coordinate is always negative. The point will be of the form $(+, -)$. It also follows that if the X-coordinate is positive and the Y-coordinate is negative, then the point lies only in the fourth quadrant.

$(0, 0)$ is the origin. It lies at the point of intersection of the X and Y axes.

All points whose Y coordinate is 0, lie on the X axis.

All points whose X coordinate is 0, lie on the Y axis.

[Notes to the teacher: The teacher may now show the chart TLM to the students and summarise the concept. She may remind the students that the coordinates are respectively of the forms $(+, +)$, $(-, +)$, $(-, -)$ and $(+, -)$ in the first, second, third and fourth quadrants. She may then hang it on a wall for students' visual recollection. After that she may continue with the PPT to help the students learn the short verse.]

The following lines will help in recalling the signs of the coordinates in the different quadrants.

Pranky Panda in Q1 becomes

Naughty Panda in Q2 while

Naughty Nanda in Q3 becomes

Pranky Nanda in Q4.

In the above lines, the words beginning with letter 'P' refer to positive(+) signs and those beginning with the letter 'N' refer to negative(-) signs. Q1, Q2, Q3 and Q4 refer to quadrants.

Time to teach	Asset type	Theme	Sub Theme
8 minutes	Main Script	Co-ordinate Geometry	Abscissa and Ordinate Basic idea about Coordinate Geometry

			Cartesian system(origin, axes, quadrants and cartesian plane) Relation between signs of coordinate of a point and quadrant of a point
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VC_Plot Your Priorities

Objective: Students will be able to rank activities based on importance and urgency to arrive at a logical choice.

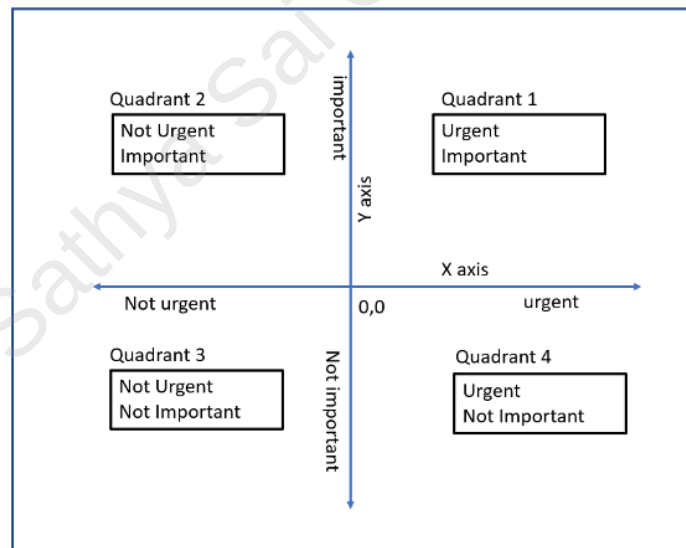
Teaching Aids: PPT

Notes to the teacher: The teacher recalls the concept about quadrants and signs and relates them to the value as given in the asset below. The teacher may conduct the activity suggested in the asset to bring out the value in the students.

Concept- Value Connection: We know that the signs of the coordinates in the 4 quadrants are as follows-Quadrant 1 - $(+, +)$; Quadrant 2 - $(-, +)$; Quadrant 3 - $(-, -)$ and quadrant 4 - $(+, -)$. We plot a point in the respective quadrants based on its value and sign. Similarly, let us try to understand if we can set our priorities and give them their due place and position.

Activity: Brainstorming

Teacher draws the following picture on the board as shown below:



Quadrants-Source: OC

Procedure for the activity:

1. Divide the class into 4 groups. Inform each group to amicably choose a leader for their group. Each group can have the above diagram drawn on a chart or graph paper.
2. Display the following list of tasks on the slide Or you may write it on the board.
 - A. Weekly catch-up with friends

- B. Finishing the previous week's homework due for submission on Monday
 - C. Sorting out their own clothes in the cupboard
 - D. Buying the medicine requested by grandmother
 - E. Weekend coaching class (cricket, music, dance)
3. Explain the activity to the students
 - Imagine you have this list of to-do activities for Sunday and it is already Saturday evening.
 - You need to quickly organise the activities to fit into one of the four quadrants that is displayed.
 - Discuss with your friends and start placing them in the quadrant as per your best fit decision. For example, a situation where a family member is sick and needs to go to the doctor - that is urgent and important. Hence, it will be placed in Quadrant 1. It is okay if each group has filled the tasks in quadrants differently.
 - You have 3 minutes to finish this task.
 4. At the end of the allotted time, ask each group leader to announce the details of placing tasks 'A' to 'E'.
 5. After the activity, the following questions could be asked and the teacher can engage in a discussion.
 6. Allow students to express themselves freely. There is no right and wrong answer as it all depends on the context
 7. The main objective is to let the students think about the necessity and importance of any activity they engage in and prioritise their time accordingly.

Discussion Questions:

1. Why are priorities different for each person?
2. What were the points that you discussed the most before placing in a quadrant?
3. Ideally, in which of the quadrants do you think more of your activities should be?

Points to ponder/reflect:

- Time Management is all about prioritisation.
- Priorities may differ for different people, as you would have noticed.
- At the end of the day, though, when you plan and prioritise, there is a higher likelihood of you feeling satisfied at having done your best.
- The exercise of slotting the activities would be highly illuminating, since you would understand more about what matters a lot to you as a person.

Students! Try to practise these actions in your life regularly. You could even maintain a diary for yourselves to prioritise your time and keep checking if you are on the right track.

Time to teach	Asset type	Theme	Sub Theme
15 minutes	Value Content	Right Action	Proper utilization of time

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SA_Play on the Quadrants

Objective: Students will be able to identify the quadrant in which the given ordered pair will lie.

Notes to the teacher: After teaching about the signs of coordinates in the different quadrants, the teacher may take the students to the playground and play this game to help the students identify the quadrants of the ordered pairs in an enjoyable way. There is no PPT or MM aid provided as this is an outdoor activity.

Aim: To make the students familiar with the signs of the coordinates in each quadrant.

Materials required: 2 cardboard boxes, twenty-one blue-coloured and twenty one pink coloured paper slips.

Setting for the activity: Outdoors (the playground)

Preparation for the activity:

1. Write numbers from -10 to +10 on each one of the blue and pink slips.
2. Label box 1 as X(abscissa) and place the blue slips in it.
3. Label box 2 as Y(ordinate) and place the pink slips in it.

[Notes to the teacher: The teacher may use any two colours instead of pink and blue. The above given range of numbers, -10 to +10 is for a class with 42 students. The teacher may modify the range according to the number of students.]

4. Mark the axes and name the quadrants on the ground or floor using chalk powder.

Role of the teacher: Facilitator and observer.

Procedure:

1. The teacher divides the students into 2 groups.
2. Students of each group stand in a line.
3. The 2 boxes with the slips are placed outside the Cartesian-Plane in a place that is equidistant from both groups.
4. Let A be a student from team 1 and B be a student from team 2. A and B run up to the boxes. Each one of them has to pick up 2 slips (one from box X and one from box Y). Now A will have a blue slip and a pink slip with him/her. Similarly B will have a blue slip and a pink slip with him/her.
5. They determine on which quadrant their coordinates will lie, and run and stand in that quadrant.
 - If a student picks up (0, 0), he has to stand on the origin.
 - Similarly if he/she picks up a point lying on any of the axes, he/she will have to

stand on the corresponding part of the axes, namely, OX, OX', OY or OY'.

6. A time of 30 secs is given for the students to run to the quadrant. The student from whichever group is able to do this quickly and correctly will secure 1 point for his group.
7. The slips that are already picked up can be collected in a separate box.
8. The game is repeated until all the students have got a chance to play.
9. Finally the teacher may declare the winning group.

Observation:

1. Each point has a position in one of the four quadrants or on either of the 2 axes.

Conclusion:

1. The sign of the coordinates in the first quadrant is (+, +)
2. The sign of the coordinates in the second quadrant is (-, +)
3. The sign of the coordinates in the third quadrant is (-, -)
4. The sign of the coordinates in the fourth quadrant is (+, -)
5. If the X-coordinate is 0, the point lies on the Y axis.
6. If the Y-coordinate is 0, the point lies on the X axis.
7. (0, 0) is the origin. It lies on the point of intersection of the 2 axes.

Follow up questions:

1. Where do the following points lie?

a. (-20, 20)

[Answer: 2nd Quadrant]

b. (9, 4)

[Answer: 1st Quadrant]

c. (11, -10)

[Answer: 4th Quadrant]

d. (-6, -8)

[Answer: 3rd Quadrant]

e. (0, 0)

[Answer: Origin]

f. (5, 0)

[Answer: X axis]

g. (0, 12)

[Answer: Y axis]

Time to teach	Asset type	Theme	Sub Theme
20 minutes	Suggested Activity	Co-ordinate Geometry	Abscissa and Ordinate Basic idea about Coordinate Geometry Cartesian system(origin, axes, quadrants and cartesian plane) Relation between signs of coordinate of a point and quadrant of a point

DD_Uses of Coordinate Geometry

Objective: Students will be able to list different uses of 'coordinate Geometry' in our daily life.

Teaching Aids: PPT

Teaching Learning Material (TLM):

TLM - Globe

What do you need?: Globe

Get Ready: Keep the globe ready for taking to class

Notes to the teacher: This asset presents a few applications or uses of 'Coordinate Geometry' in the real world. The teacher can use the PPT and the TLM, along with a little interaction with the students, to present the content.

1. Locating your seat in a theatre



Movie theatre: pixabay.com/photos/movie-theater-room-movie-2502213/
Attribution: Derks24

If you go to a movie theatre you are given a seat. The seats are named using alphabets and numbers. If your seat is C-3, then C is the row of seats we need to go to and 3 is the seat number. Here, C and 3 are the two coordinates for the seat which give us the exact seat we need to occupy.

2. Mapping of places on a map/globe:

Mapping of places is also made using latitude and the longitude values. Mapping of places is very essential for professions like surveying and oil exploration.

[Notes to the teacher: Here the teacher can use the TLM - Globe.

How to use the TLM - Globe.

1. Teacher can keep the globe on the classroom table. The students may be allowed to come in small groups during their free time. They can choose a place on the globe and find its location.
2. If that is not possible, she can take the globe around the class and point out the latitude and longitude of the place.]

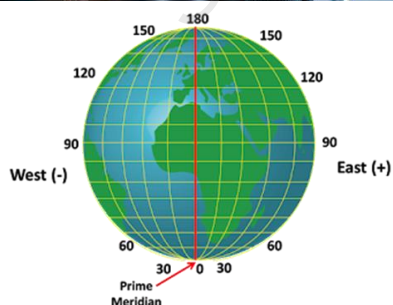


Globe: pixabay.com/photos/globus-earth-world-map-geography-2534766/
Attribution: MiM326

3. Locating a place - Using GPS (Global Positioning System)

You may have seen maps in your phone or on the navigation system in vehicles. These are based on satellite information to locate a place and help us reach there by showing us the route. It is based on a technology called GPS. In GPS, the coordinates of a place are its latitude and longitude values. We can locate a particular place in a given area using the latitude and the longitude values.

[Notes to the teacher: The teacher may help the students to read the latitudinal and longitudinal values of the location of their school address through her phone GPS.]



GPS: pixabay.com/photos/navigation-car-drive-road-gps-1048294/

Attribution: DariuszSankowski

GPS Satellite: pixabay.com/fr/vectors/gps-lieu-satellite-terre-6327896/

Attribution: VirtuAlpReality

Longitude and latitude globe – SSSVV Gallery – longitude and latitude map

4. In computing: Computer programmers also use 'coordinate geometry'. For example, in a PDF file, the printed page is one big coordinate plane. The PDF files contain text, images and line drawings, all of which are placed in position using 'coordinate geometry'.

5. Scanning of images: Scanners also make use of 'coordinate geometry' to reproduce the exact image of the selected picture in the computer. Each point in the original document is manipulated and reproduced in the soft copy using its x and y coordinate values.

Time to teach	Asset type	Theme	Sub Theme
5 minutes	Day-to-day Relevance	Co-ordinate Geometry	Abscissa and Ordinate Cartesian system(origin, axes, quadrants and cartesian plane)

IA_Pixel Coordinates

Objective: Students will be able to appreciate the use of coordinates in digital images.

Teaching Aids: PPT

Notes to the teacher: The teacher introduces the asset by showing the pictures as shown in slide 1 and pointing out the difference.

You may have seen prints of photographs in a photo album. Did you know that in earlier days, that is before the year 2000, photos would be developed from film reels loaded in the camera.



Image Sources:

Photos: OC

Camera: pixabay.com/photos/roll-movie-vintage-photography-3651407/

Attribution: parblusa

Reel: pixabay.com/photos/film-kodak-photography-old-2725286/

Attribution: philm1310

Nowadays, pictures can be captured on mobile or cameras from which they can be directly transferred to the computer. These are known as Digital Images.



Image Sources:

Computer: pixabay.com/photos/laptop-workstation-browsing-tablet-1483974/

Attribution: Monoar_CGI_Artist

Mobile: pixabay.com/photos/smartphone-photo-phone-mobile-623722/

Attribution: Firmbee

A digital image is an image that can be stored on a computer.

If we enlarge any portion of an image and look closely, we see that the image is made up of

some thousands of tiny squares. Each one of these squares is a pixel. A pixel is the smallest element/unit of a digital image. Pixel is the short form for Picture Element.

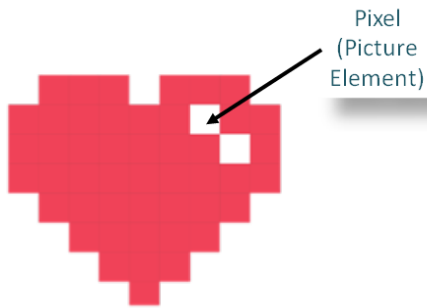


Image Source: pixabay.com/vectors/heart-pixel-square-love-red-1847868/
Attribution: David Rock Design

Each pixel has a specific RGB value that defines the colour to be rendered by that pixel.

[Notes to the teacher: RGB refers to the colour combinations Red, Green and blue.]

Pixels are uniformly arranged in a two- dimensional grid.

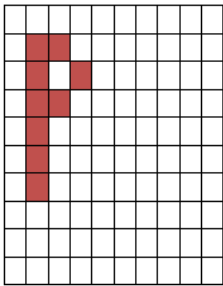


Image source: OC

A pixel can be identified by its coordinates. For example a pixel with coordinate (3, 4) would be in column 3 and row 4.

0	1	2	3	4	5	6	7	8	9
1									
2									
3									
4									
5									
6									
7									
8									
9									

Image Source: OC

Another interesting fact is that an advanced digital camera can have a resolution of upto 40 Megapixels but the resolution of the human eye is 576 Megapixels. Image resolution defines the number of pixels displayed per inch of an image

Time to teach	Asset type	Theme	Sub Theme
4 minutes	Interesting Asides	Co-ordinate Geometry	Abscissa and Ordinate Cartesian system(origin, axes, quadrants and cartesian plane)

SA_Art with Coordinates

Objective: Students will be able to create a design by plotting points of the given ordered pairs.

Teaching Aids: PPT, Report Templates

Notes to the teacher: Two activities are given below. These are art-integrated Maths activities where children can create designs by plotting the coordinates. The teacher may use either one of these two activities to be given as project work for the students. The students can submit their design and project report after completing it.

Report templates for both activities are given as attachments. The students can be advised to submit their design with a written report for the activity in the format provided.

Aim: To create designs by plotting points on a coordinate plane using

1. Cross Stitch
2. *Bindis* (stickers)

Resources Required:

Activity 1: Matte or jute cloth, black, red, green, yellow coloured thread or wool (or according to availability), big eyed needle

Activity 2: Sheet of paper/Chart paper, pencil, ruler, bindis

Setting for the Activity: Indoors (both the activities)

Type of Activity: Project activity by students

Preparation for the Activity: The teacher may go through the PPT in advance to be able to guide the students to complete the project. She may choose either one of the two activities or leave the choice to the students.

Role of the Teacher: Facilitator

Activity 1

Procedure:

To make a design using cross stitches on a matte cloth - Individual activity

Step 1: Take a piece of matte cloth. Fold it in two halves.

Step 2: Take a black coloured thread and using a running stitch, etch out the axes intersecting at origin (0,0).

Step 3: The two axes divide the cloth into four quadrants I, II, III, IV. After drawing the axes, marking of points on X and Y axes should be done.

Step 4: Count 5 squares towards the right, starting from the origin (0, 0). Then move up by counting 4 squares and stitch one cross, using red thread. The coordinates of this point are (5, 4).

Step 5: Count 5 squares towards the left, starting from origin (0,0). Then move up by counting 4 squares and stitch one cross, using red coloured thread. The coordinates of this point are (-5,4).

Step 6: Count 5 squares towards the right, starting from (0,0). Now move down by counting 4 squares and stitch one cross, using red coloured thread. The coordinates of this point are (5,-4).

Step 7: Count 5 squares towards the left, starting from (0,0). Then move down by counting 4 squares and stitch one cross, using red coloured thread. The coordinates of this point are (-5,-4).

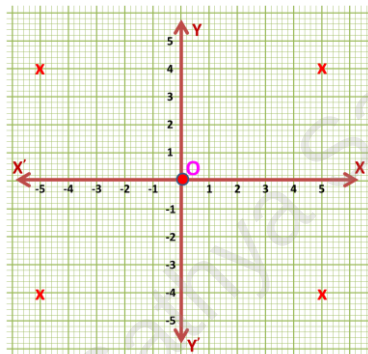


Image Source: OC

Step 8: Join the red crosses with crosses, using green coloured thread. Thus the outline of a shape is formed.

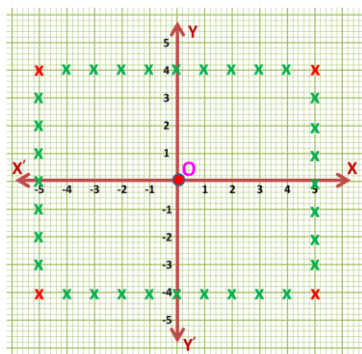


Image Source: OC

Step 9: On completion, the design appears as shown below.

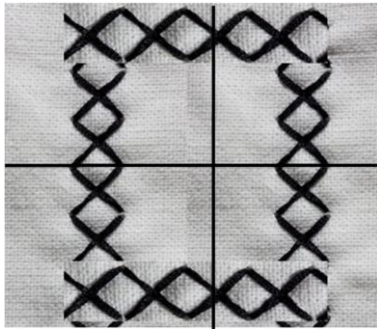


Image Source: Design: pxhere.com/en/photo/932366

Attribution: pxhere

Observation:

What is the design obtained?

We have obtained a design on the matte cloth which appears as follows:

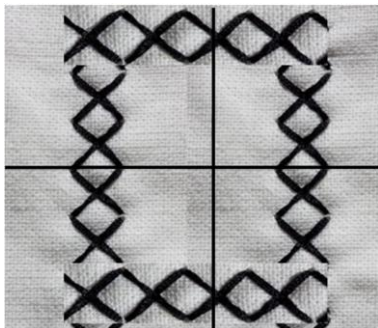


Image Source: Design: pxhere.com/en/photo/932366

Attribution: pxhere

Identify the figure formed.

Clue: Rectangle

Give the coordinates of the four vertices.

Coordinates of the four vertices are $(5, 4)$, $(-5, 4)$, $(-5, -4)$, $(5, -4)$

Conclusion:

Every point in the design corresponds to a point in the Cartesian plane.

Based on the size and type of design we require, we can mark the points and create beautiful patterns.

[**Notes to the teacher:** In the above activity, the teacher or students may choose to plot different vertices to obtain different designs.]

Activity 2

Procedure:

To make a design using *bindis* on grid

Step 1: Take a sheet of white paper. Draw a grid using pencil and ruler. Divide the square grid paper into four quadrants using the X and Y axes.

[Notes to the teacher : The students may also use a graph sheet]

Step 2: Stick the *bindis* on the coordinates $(2, 0)$, $(-2, 0)$, $(0, 2)$, $(0, -2)$

Starting from the origin,

1. Move 2 units towards the right on the x axis and place a *bindi*. This point is read as $(2, 0)$.
2. Move 2 units towards the left on the x axis and put a *bindi* on the point which is read as $(-2, 0)$.
3. Move 2 units up on y axis and put a *bindi* on the point which is read as $(0, 2)$.
4. Move 2 units down on y axis and put a *bindi* on the point which is read as $(0, -2)$.

Step 3: Join all the above mentioned points using scale and pencil. Observe and record the shape obtained.

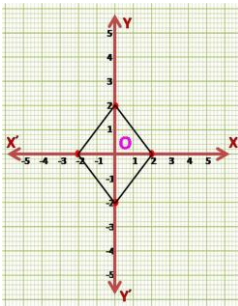


Image Source: OC

Step 4: Repeat the process done in step 2 and place the bindis on points $(4, 0)$, $(-4, 0)$, $(0, 4)$, $(0, -4)$.

Join these points using a ruler and pencil.

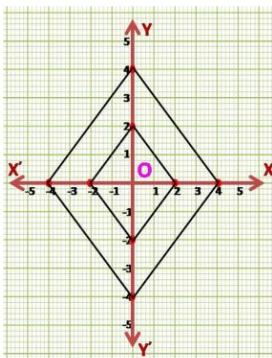


Image Source: OC

Step 5: Locate the following points on the grid and place the bindis on these points also.

$(1, 1)$, $(-1, 1)$, $(1, -1)$, $(-1, -1)$, $(2, 2)$, $(-2, 2)$, $(2, -2)$, $(-2, -2)$

Observation:

[Notes to the teacher: The student can be asked to answer the following questions based on their observation.]

What is the design obtained?

Answer: A design of 2 concentric rhombuses.

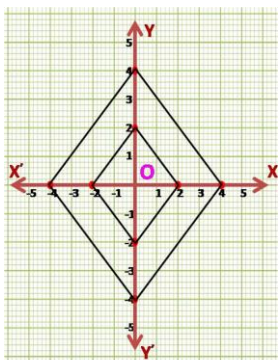


Image Source: OC

Name the vertices of the innermost figure.

Answer: $(0, 2)$, $(2, 0)$, $(0, -2)$, $(-2, 0)$

Conclusion: Every point in the design corresponds to a point in the Cartesian plane. Based on the size and type of design we require, we can mark the points and create beautiful patterns.

[Notes to the teacher: In the above activity, the teacher may choose different vertices to obtain different designs.]

Precautions: Students should be made cautious of not hurting themselves while using the needle.

Troubleshooting: If the cross stitches are not put on the correct squares, the shapes obtained would be different.

Time to teach	Asset type	Theme	Sub Theme
20 minutes	Suggested Activity	Co-ordinate Geometry	Abcissa and Ordinate Basic idea about Coordinate Geometry Cartesian system(origin, axes,



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Annexure to Master Lesson Plan

What is the purpose of this Master lesson Plan?	This Master Lesson Plan (MLP) prepared by Sri Sathya Sai Vidya Vahini (SSSVV), covers the entire chapter for the given board. The MLP for the chapter given in the textbook is broken down into smaller modules known as assets. Any chapter can be taught using the 7 asset types in SSSVV methodology. Several different assets together complete the entire chapter. Depending on the requirement, each asset is supported by teaching aids such as animated presentation, audio, video, and learning aids such as worksheets. The MLP is for the teacher's preparation and the teaching aids are for use in the classroom.
How to use it?	You can prepare for your class with this MLP by following 3 simple steps: 1. Read your textbook; 2. Go through the information given in the assets (document & multimedia); 3. Prepare your teaching notes. Great! Now you are ready to transact the chapter.
Duration	Kindly note the duration given for each asset. Due care has been taken in planning the assets, to ensure the chapter is completed within the time specified by the Board. Note: Preparation time is not included in the asset duration. The teaching time depends on the duration of the teaching aids and is not impacted by the length of the MLP.
What is a 'Main Script' (MS) Asset?	The Main Script asset is there for explaining the main concepts of the chapter clearly. The information given in the textbook is simplified, organised and structured to give more clarity. Additionally, you may find a video or mnemonics or a graphic organiser to deepen the understanding of the concept.
How to teach using the MS asset?	Please use the blackboard, slides and interaction to develop the concept.
What is an 'Inquisitive Questions' (IQ) asset?	The Inquisitive Questions asset uses questions to promote higher order thinking like the n th why, what-if, new perspectives, cause-effect, and others, creating curiosity.
How to teach using the IQ asset?	You may use the questions to connect with the students, encourage exploration to engage them in the learning process. You may allow multiple responses and instead of rejecting any of the responses, ask why, before revealing the suggested answer or hints.
What is a 'Day to day Relevance' (DD) Asset?	The Day to Day Relevance asset helps students understand the practical relevance of every topic, making them eager participants in the classroom. If students connect the concepts to their environment, they would learn meaningfully without dislike or simply memorizing for exams.
How to teach using the DD	You may use the asset by asking questions about their experience and use it to establish why they are learning the topic. If necessary you may substitute with a

asset?	recent or local example.
What is an 'Interesting Aside' (IA) asset?	The Interesting Aside asset uses attention grabbing tidbits or anecdotes to bring joy and satisfy the child's hunger to know more. This is a quick/short asset intended to bring attention back to the main concept being taught.
How to teach using the IA asset?	You may use this asset to give a piece of interesting information relevant to the topic, without prolonged explanation/discussion. You may suggest appropriate books for further reading.
What is a 'Suggested Activity' (SA) Asset?	The Suggested Activity asset provides a detailed step by step procedure for the teacher to conduct a hands-on activity. This promotes Activity Based Learning.
How to teach using the SA asset?	You may use this asset to energise your students to learn by doing simple, fun-filled activities based on the topic. The asset includes - preparation, activity, and follow-up. You may engage the students in the preparation and follow-up stages to develop collaboration and responsibility. You could try it once, yourself, before the actual delivery to be more comfortable with it. Note: The duration mentioned in the asset is usually for the activity part only.
What is a 'Value Content' (VC) Asset?	The Value Content asset integrates Universal Human Values (such as empathy, inclusivity, respect for nature that translates into responsible behaviour) seamlessly into the curriculum, as the "End of education is character".
How to teach using the VC asset?	You may use this asset to engage with the students to bring out their innate values and connect with the intrinsic values in the topic/concept. The asset includes pointers on the specific pedagogical technique followed.
What is a 'Questions to Assess' (QA) asset?	The Questions to Assess asset uses an interactive approach to check learning of different types of learners, and provides feedback to the teacher for appropriate action. The questions cater to all the levels of Bloom's Taxonomy. Questions from 'Apply' level and above enable students to reflect on their learning.
How to teach using the QA asset?	You may go through the slides to understand its flow and know when to click for the answer (slides include suggested answers). While presenting in the class, you may display the question and encourage multiple responses, before revealing the answer. In some cases, this asset may include extra questions/worksheet that can be given as homework.