

# Getting to the Point

## Summary

Students will learn about Rene Descartes (the founder of analytic geometry) and the connection between the Cartesian coordinate system and math.

## Materials

### Invitation to Learn

- *The Fly on the Ceiling, a Math Reader*
- [Graph Paper A](#) (pdf)
- (pdf)
- Object that will stick on board

### Getting to the Point

- *The Coordinate Plane*
- X/Y-axis Dry Erase Mats
- Key Graphing Cling
- Marking pens
- Paper strips
- Metal brads
- [Coordinate Cards](#) (pdf)

### Points of Interest -Coordinate Activity Stations

- [Tic Tac Toe](#) (pdf)
- Pencils
- Scratch paper
- [In Search of Buried Treasure](#) (pdf)
- [Space Wars](#) (pdf)
- Computers
- [Points of Interest Guidelines](#) (pdf)
- [Coordinate Plane Assessment](#) (pdf)
- Math journal

### Additional Resources

#### Books

- *The Fly on the Ceiling, a Math Reader*  
, by Julie Glass; ISBN 0-679-98607-3
- *Math Dictionary-The Easy, Simple, Fun Guide to Help Math Phobics Become Math Lovers*  
, by Eula Ewing Monroe; ISBN 978-1-59078-413-6
- *Mathematicians are People Too*  
, (Vol. 2), by Loretta Rimer; ISBN 0-86651-509-7

## Background for Teachers

Coordinate graphs are very important since they are the place where algebra and geometry come together.

In the 1600s, Rene Descartes, the French philosopher, mathematician, and scientist, founded analytic geometry and originated the Cartesian coordinates. He is given credit for coming up with the two-axis system we use today. The story goes that he was lying in bed and watching flies crawl over the tiles on the ceiling. He realized that he could describe a fly's position using the intersecting lines of the tiles. The coordinate plane is often called the Cartesian plane after him.

The coordinate plane is divided into four quadrants, which are labeled with Roman numerals. In the fifth-grade math curriculum, the students need to know how to locate and write points defined by ordered pairs of integers in all four quadrants. The center of the coordinate plane is called the origin and has the coordinates of (0, 0). The ordered pairs are referred to as coordinates. We write a point's coordinates inside parentheses, separated by a comma like this: (5, 6). The first number in an ordered pair is called the x-coordinate. The x-coordinate tells us how far from the origin the point is along the x-axis or the horizontal number line. The second number is called the y-coordinate. The y-coordinate tells us how far from the origin the point is along the y-axis or the vertical number line.

## Instructional Procedures

### Invitation to Learn

This invitation to learn, allows you to assess the level of students' mastery in locating an object on a coordinate plane using ordered pairs.

Have a student throw an object that will stick to the board.

Challenge the students to identify the exact location of the object on the board. Allow time for a short discussion, but try to do as little leading as possible.

Project transparency of the *Graph Paper A* on board.

Have a student throw object on to the projected *Graph Paper A*.

Again challenge the students to identify the specific location of the object.

If the students suggest numbering the *Graph Paper A*, and using ordered pairs, follow through on their ideas. Let them know that they aren't the first to come up with this idea; Rene Descartes discovered this concept over three hundred years ago. Read the book, *The Fly on the Ceiling, a Math Reader*.

If they are unable to figure out what to do, proceed directly to reading *The Fly on the Ceiling, a Math Reader* by introducing Rene Descartes, a man who discovered a solution to this problem over three hundred years ago.

After reading the book, repeat the activity using what they learned from the book.

## Instructional Procedures

### Getting to the Point

Share *The Coordinate Plane* PowerPoint with students introducing them to the coordinate plane with the correct vocabulary. Use the key points to review main ideas.

If you're unable to access the PowerPoint, use the *Key Graphing Cling* and introduce the following key points.

#### Key Points

Plane: a flat surface that goes on forever in every direction

Coordinate plane: made up of an infinite number of points and divided by two number lines

Point of Origin: where the two number lines meet

Axis (plural is "axes"):

x-axis: the horizontal line; east of the origin is positive while west is negative.

y-axis: vertical line; north of the origin is positive while south is negative.

Quadrants: the four sections divided by the x and y axes numbered in order from I-IV starting in the upper right quadrant and going counterclockwise.

Coordinates or ordered pair:

the two numbers used to locate points on the plane; relative to the point of origin

always written in parentheses with the x-value first (x,y).

the ordered pair for the point of origin is (0,0).

Pass out Dry Erase Mats and using the Key Graphing Cling

Give students two different colored strips of paper.

Have them make two individual number lines using their mats as a guide with "0" in the center and include both positive and negative numbers.

Connect the two strips at "0" using a brad.

Rotate the second strip 90 degrees to form the y-axis .

Overlay these on mats.

Begin to label the mats with markers:

x- axis

y- axis

point of origin

4 quadrants (I-IV)

Using *Coordinate Cards*, have students practice locating and plotting coordinates on their mats.

Check for accuracy using Key Graphing Cling.

Working in pairs, students take turns giving and plotting ordered pairs on their Dry Erase Mats.

### Points of Interest -Coordinate Activity Stations

These activities are designed for two players each. Pass out *Points of Interest Guidelines* for each team. Have enough materials at each point for at least three to four groups depending on the size of your class. Groups may rotate through each point independently or as directed by teacher. After visiting all *Points of Interest*, have students reflect in journals what they have learned about the coordinate plane and locating points in all four quadrants

#### Point 1: "Tic Tac Toe"

##### 1. *Tic Tac Toe*

game board.

Scratch paper and pencil for each player to record their coordinates.

Play rock, paper, and scissors to determine who starts. The winner begins the games, while the other picks X or O symbol.

The object of the game is to get four X's or four O's in a row vertically, horizontally, or diagonally.

Player one writes down the ordered pairs on scratch paper, then points to that location. It is up to the other player to check for accuracy before a symbol can be placed. If the point is mislabeled, no symbol is made on the game board.

Players take turns writing and locating the ordered pairs until one player has four in a row.

Students continue playing until they have played a game in all four quadrants.

#### Point 2: "In Search of Buried Treasure"

The object of this game is to practice naming coordinates on a four-quadrant grid.

Each player gets one game board, *In Search of Buried Treasure*.

Play rock, paper, and scissors to determine who buries the "treasure" first.

Player one: Hides the "treasure" in one quadrant by marking it on their coordinate plane (keeps it hidden-a book works well for hiding it).

Player two: Guesses the location by writing an ordered pair in the "guess" box on their page while telling Player 1. They then mark it on their coordinate plane.

Player one: Marks the same coordinates and then uses the compass to tell Player two in which direction they must go to find the treasure. Caution the students that if Player 1 does not mark their partners point, they may give out the wrong direction.

Player two: Writes the direction in their "clue" box.

The game continues until the treasure is found.

Players switch roles and play again using the second coordinate plane.

#### Point 3: "Space Wars"

Object of the game is to find and destroy each others' hidden spaceships.

Players each mark (vertically or horizontally only) their "Fleet" of five ships on their "Air Space" on the coordinate plane. There must be at least one ship in each quadrant. The ships should remain hidden from the opponent's view. A book works well. Taking turns, players call out their "shots" attempting to get "hits" on the opponent's spaceships and destroy them. "Hits" or "misses" should be marked on the other coordinate plane. Use an X for a hit and an O for a miss. A spaceship is destroyed when all points on the craft are hit. A player wins when all five opponent's ships are destroyed.

Fleet:

Length	Name
5 points	Death Star
4 points	Warbirds
3 points	Starship
3 points	Fighters
2 points	Starbase

#### Point 4: Internet Games (optional)

There are many sites on the internet that have interactive games to reinforce the coordinate plane. Here are just a couple.

Mole Game - <http://funbasedlearning.com/algebra/graphing/default.htm>

The students try to catch a mole located within the four quadrants. There are three levels in this game.

Easy version of Graph Mole - If you are learning how to plot points for the first time, try this fun and easy tutorial and game.

Medium version of Graph Mole - If you are reviewing how to plot points, play this game.

Hard version of Graph Mole - Once you have mastered plotting points, try this random question arcade style game.

Maze game <http://www.shodor.org/interactivate/activities/MazeGame/>

This game lets students practice using coordinates by having them move a robot through a mine field to a given target. The students must specify the coordinates of the new location. In order to win, the path must not cross a mine. Challenge the students to place more than five mines. Use the "Help" tab on this site for instructions.

#### Extensions

Art: Have students create simple drawings using coordinates for other students to recreate.

Place *Points of Interest -Coordinate Activities* in centers for students to continue working with coordinates.

Family Connections

If students have access to the internet have them play the games found on the internet.

Play any of the activities from *Points of Interest* with family.

#### Assessment Plan

In their math journals, have students write what they have learned about the coordinate plane and locating points in all four quadrants.

- *The Coordinate Plane Assessment* worksheet

#### Bibliography

Irwin, K.C., (2001). Using everyday knowledge of decimals to enhance understanding. *Journal for*

*research and mathematics education*. 32(4). 399-420.

This study investigated the role of students' everyday knowledge of decimals in supporting the development of their knowledge of decimals. One group worked with problems presented in familiar context, the others were given no contextual connections. The students' ability to make connections between the known and unknown greatly enhanced their understanding of mathematical concepts. Presenting students with real life applications is important when being challenged with new concepts. Furner, J. M., Yahya, N., and Duffy, M. L., (2005). Teach mathematics: Strategies to reach all students. *Interventions in school and clinic*. 41(1),16-23.

In this article, the authors list 20 different strategies that can help teachers reach all students. These strategies are based on the belief that all students have the right to learn math and feel confident in their ability to do math. It is the responsibility of all teachers to see that mathematics can be learned by every student. The strategies introduced in this article can enable teachers to accomplish this goal.

### Authors

[Utah LessonPlans](#)