

## Where's The Point?

ID: 8816

 Time required  
 45 minutes

## Activity Overview

*This activity can be used to introduce students to the Cartesian plane. They should have some familiarity with how points are located in the plane using two coordinates, but the emphasis in this activity is solidifying students' understanding of just how that is done. As configured, the activity is restricted to the first quadrant (positive  $x$ - and  $y$ -coordinates).*

## Topic: Functions &amp; Relations

- *Graph a set of ordered pairs as a scatter plot.*

## Teacher Preparation and Notes

- *This activity is designed for use in an Algebra 1 or Pre-Algebra classroom. Students should have an understanding of a number line and been introduced to the concept of locating a point in the plane using two numbers for the coordinates of the point.*
- *This activity is designed to have students explore **individually and in pairs**. However, an alternate approach would be to use the activity in a whole-class format. By using the Cabri Jr. application and the questions found on the student worksheet, you can lead an interactive class discussion on the location of points in a plane.*
- *Although it is encouraged to have students work through the activity with a partner or in small groups, it is important that each student have the opportunity to move the points around the plane.*
- *Prior to beginning this activity, students should download the five Cabri Jr. files **POINT1–POINT5** to their calculators.*
- *Information for an optional extension is provided at the end of this activity.*
- ***To download the Cabri Jr files and student worksheet, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter "8816" in the keyword search box.***

## Associated Materials

- *WheresThePoint\_Student.doc*
- *POINT1.8xv, POINT2.8xv, POINT3.8xv, POINT4.8xv, POINT5.8xv*

## Suggested Related Activities

*To download any activity listed, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter the number in the keyword search box.*

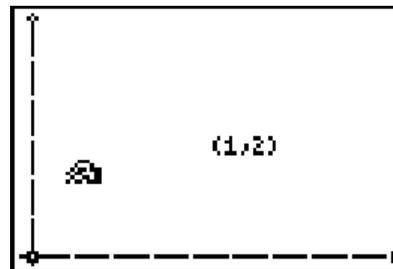
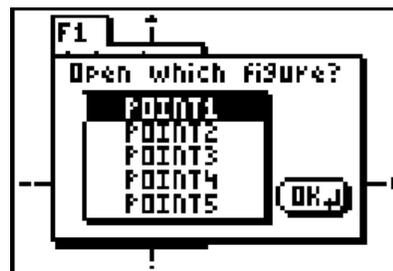
- *Order Pears (TI-84 Plus family) — 11638*
- *Points & Lines & Slopes (Oh My!) (TI-Nspire technology) — 8106*

**Problem 1**

In this problem, students will use the file POINT1 in Cabri Jr to determine which direction the points need to move in order for the first coordinate, or x-coordinate, to stay the same. Then they will determine which direction the point need to move for the second coordinate, or y-coordinate to stay the same.

To drag point  $P$ , student need to hover the cursor over the point and press [ALPHA]. To release the point press [ALPHA] again.

As students move the point, the values of the coordinates will automatically update.



**Problem 2**

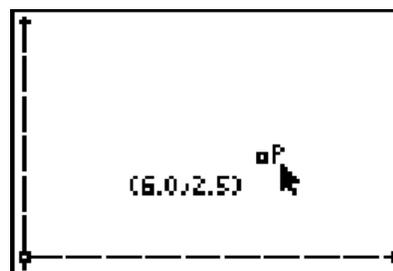
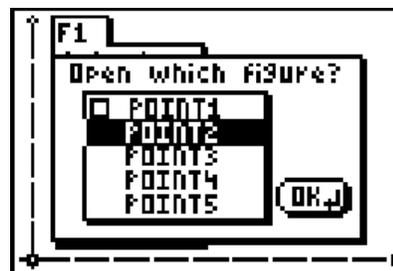
In this problem, students are given a scenario in which the score of two players are the x- and y-coordinates of the point.

When students open the file POINT2, the calculator will ask if the student wants to save the file. Tell the students to select NO. This should be done each time a new file is opened in this activity.

In the game shown, Xavier (x-coordinate) is in the lead, and the score is 6 to 2.5.

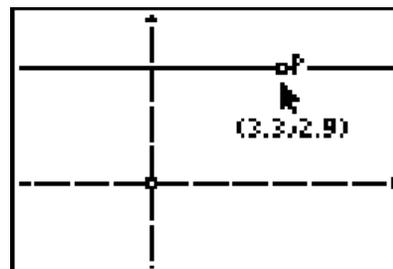
Students are to grab and move point P to answer questions 3 – 7 on the worksheet.

Have a class discussion on students' strategies to determine the answers.



**Problem 3-4**

Students will use the files **POINT3**, **POINT4**, and **POINT5** to investigate different scoring situations for the game described in Problem 2. They should answer questions 8 – 10 on the worksheet as they work through their investigation.



**Solutions**

1. Moving a point vertically (parallel to the  $y$ -axis) causes the first coordinate to stay the same.
2. Moving a point horizontally (parallel to the  $x$ -axis) causes the second coordinate to stay the same.
3. When Xavier has scored no points, point  $P$  is on the  $y$ -axis.
4. When Yvette has scored no points, point  $P$  is on the  $x$ -axis.
5. When Yvette is in the lead by the most points, point  $P$  is above the diagonal line from the bottom left corner to the top right corner.
6. When Xavier is in the lead by the most points, point  $P$  is below the diagonal line from the bottom left corner to the top right corner.
7. When the score is tied, point  $P$  is *on* the diagonal line from the bottom left corner to the top right corner.
8. Yvette's score is "stuck" on 2.9. Xavier's score can be changed.
9. Xavier's score is "stuck" on 3.4. Yvette's score can be changed.
10. The length of  $\overline{PY}$  is equal to Xavier's score.
11. The length of  $\overline{PX}$  is equal to Yvette's score.

### Extension

As an extension, you may wish to change the setting from using the plane as a "scoreboard" to using it as a dual-thermometer. The coordinates  $x$  and  $y$  of a point could represent the temperature in two cities, Xanadu and Yarra. Such a change offers several advantages:

- provides a more natural explanation for a continuous change in the coordinates as a point is dragged
- allows for easier interpretation of points with negative coordinates

To prepare the **CabriJr** files for such a setting, you may drag the coordinate plane so the origin is near the center of the screen.

In such a setting, one could ask questions such as these:

[expected answers appear in brackets]

- Where is the point when the temperature is  $-5^\circ$  in Xanadu and  $10^\circ$  in Yarra?  
[left of the  $y$ -axis and above the  $x$ -axis]
- Where is the point when the temperatures in Xanadu and Yarra are the same?  
[on the diagonal line from the lower left corner to the upper right corner]
- One day, the temperature in Yarra remained a constant  $40^\circ$ , while the high temperature in Xanadu was  $20^\circ$  and the low was  $0^\circ$ . Describe the points that represent the temperatures in the two cities that day.  
[the points lie on a horizontal segment with endpoints  $(0, 40)$  and  $(20, 40)$ ]
- Another day, the temperature in Xanadu remained a constant  $100^\circ$ , while the high temperature in Yarra was  $50^\circ$  and the low was  $-15^\circ$  degrees. Describe the points that represent the temperatures in the two cities that day.  
[the points lie on a vertical line segment with endpoints  $(100, -15)$  and  $(100, 50)$ ]