Where's the Point?
ID: 8247

<div style="float:right">

Time required
45 minutes

</div>

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 & Relations

- *Introduction to ordered pairs and the Cartesian plane.*

Teacher Preparation and Notes

- *This activity is appropriate in a PreAlgebra or Algebra 1 setting. 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 computer software and the questions found in the student .tns file, 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.*
- *Notes for using the TI-Nspire™ Navigator™ System are included throughout the activity. The use of the Navigator System is not necessary for completion of this activity.*
- *Information for an optional extension is provided at the end of this activity.*
- ***To download the student TI-Nspire document (.tns file) and student worksheet, go to education.ti.com/exchange and enter "8247" in the keyword search box.***

Associated Materials

- *WheresThePoint_Student.doc*
- *WheresThePoint.tns*

Suggested Related Activities

To download any activity listed, go to education.ti.com/exchange and enter the number in the keyword search box.

- *Any 2 Points Make A Line (TI-Nspire technology) — 9002*
- *What Is My Rule? (TI-Nspire technology) — 8256*
- *Order Pears (TI-Nspire technology) — 11639*
- *Algebra Town (TI-Nspire technology) — 10501*

Problem 1

Problem 1 introduces students to the graph of a point in the Cartesian plane. They may drag point *P* around the plane, seeing how each movement affects the point's coordinates. As constructed, the points will "snap" to the grid points, restricting coordinates to "friendly" numbers.
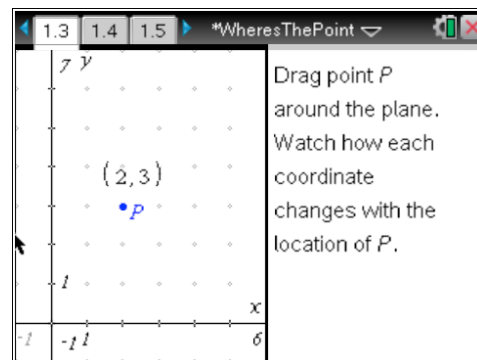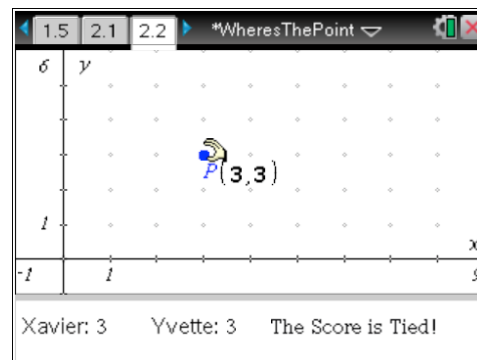
Student .tns File Solutions

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.

TI-Nspire Navigator Opportunity: *Screen Capture*

See Note 1 at the end of this lesson.

Problem 2

In Problem 2, students should be able to conclude that:

- points on the *x*-axis have a *y*-coordinate of 0
- points on the *y*-axis have an *x*-coordinate of 0
- points that are farther to the right have greater *x*-coordinates than those to the left
- points that are higher up have greater *y*-coordinates than those that are lower

Student .tns File Solutions

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 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.

6. 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.

7. When the score is tied, point *P* is *on* the diagonal line from the bottom left corner to the top right corner.
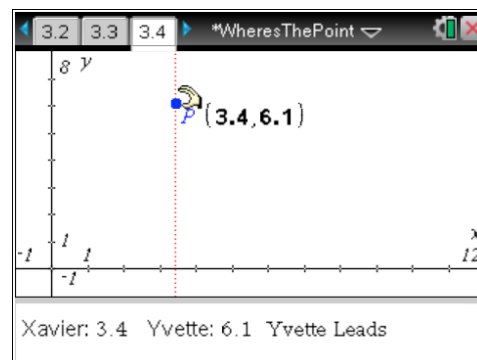

TI-Nspire Navigator Opportunity: *Quick Poll*

See Note 2 at the end of this lesson.

Problem 3

In Problem 3, students will find that points on a specific vertical line have the same *x*-coordinate (page 3.2), and that points on a specific horizontal line have the same *y*-coordinate (page 3.4).

Student .tns File Solutions

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.

> **TI-Nspire Navigator Opportunity:** *Quick Poll*
> **See Note 2 at the end of this lesson.**

Problem 4

Problem 4 should enable students to really see what it means to graph a point in the plane by connecting the *x*- and *y*-coordinates to lengths of horizontal and vertical line segments. Note that when points with negative coordinates are studied later on, the idea of "directed distance" or will need to be introduced.

Student .tns File Solutions

10. The length of $\overline{PY}$ is equal to Xavier's score.
11. The length of $\overline{PX}$ is equal to Yvette's score.
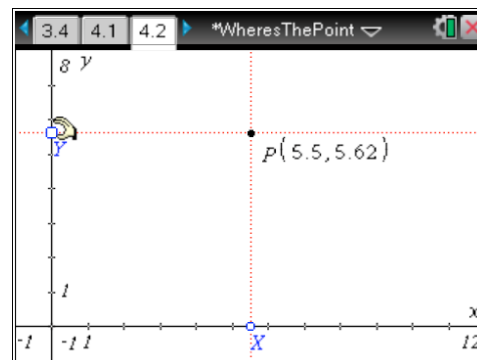
> **TI-Nspire Navigator Opportunity:** *Quick Poll*
> **See Note 2 at the end of this lesson.**

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 .tns file for such a setting, you may drag the coordinate plane so the origin is near the center of the screen, or simply select **MENU > Window/Zoom > Standard**.

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° in Xanadu and 10° 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°, while the high temperature in Xanadu was 20° and the low was 0°. 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°, while the high temperature in Yarra was 50°and the low was –15° 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)]

TI-Nspire Navigator Opportunities

Note 1
Problem 1, *Screen Capture*
This would be a good place to do a screen capture to verify students are able to move the point *P* on pages 1.3-1.5.

Note 2
Problems 2-4, *Quick Poll*
You may choose to use Quick Poll to assess student understanding. The worksheet questions can be used as a guide for possible questions to ask.