Problem 1 – Coordinates of Points

Open the *Cabri™ Jr* application by pressing APPS. Open a new file (Y= for F1) and make sure the axes are displayed (press GRAPH for F5 and select **Hide/Show > Axes**). Note, to undo press **F1 > Undo**.

Place a point, *R*, on the *x*-axis and a point, *S*, on the *y*-axis. Use **F2 > Point > Point On**. Press **F5 > Alpha-Num** and ENTER to label the points. When finished with a tool press CLEAR.

Display the coordinates of the points. **Use F5 > Coord & Eq** and move the cursor to a point until the point is flashing. Press ENTER to select that point, then move the cursor to where you want the coordinate to remain and press ENTER again.

To grab a point that is flashing, press ALPHA. To let go of a point press CLEAR. This works as Escape.

1. Explain what is common to all points on the *x*-axis.

2. Explain what is common to all points on the *y*-axis.

Delete points *R* and *S* by moving the cursor to that location and pressing DEL. Place two points, *P* and *Q*, in the top right quadrant. Drag the points around into different quadrants.

Complete the sentences by writing *positive* or *negative*.

3. A point is in Quadrant 1 (top right) when its *x*-coordinate is _____ and its *y*-coordinate is _____.

4. A point is in Quadrant 2 (top left) when its *x*-coordinate is _____ and its *y*-coordinate is _____.

5. A point is in Quadrant 3 (bottom left) when its *x*-coordinate is _____ and its *y*-coordinate is _____.

6. A point is in Quadrant 4 (bottom right) when its *x*-coordinate is _____ and its *y*-coordinate is _____.

Draw two lines through point *P*, one perpendicular to the *x*-axis and the other perpendicular to the *y*-axis. Construct segments from point *P* to the axes, and then hide the lines. Measure the length of each segment. Drag point *P* and explore.

7. What is this relationship between the coordinates of point *P* and the distances to each axis?

Problem 2 – Lines, Equations, and Slopes

Delete or hide the segments and measurements. Use F2 to draw a line connecting *P* and *Q*. Using tools from the F5 find the equation and slope of the line. Press ⊞ as you hover over a value to display more digits.

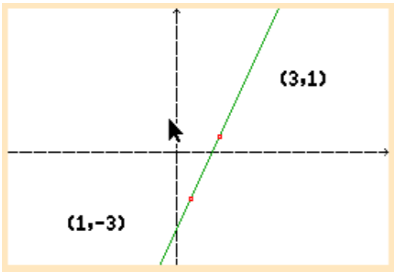
Look for relationships between the points, slope, and equation as you change the line by grabbing and dragging point *P*, and then by grabbing and dragging the line itself.

8. Place a point on the line. Drag the point along the line and record several coordinates of points. How do the coordinates relate to the equation of the line?

9. When dragging the line by point *P*, what is the relationship between the points and the slope?

10. When dragging the line by a point, what is the relationship of the slope and the equation?

11. To the right is a graph with two points labeled. Consider the line through these points. Then, consider the graph of the equation $y = \frac{1}{2}x + 2$. Show you work and explain how the two lines compare. Especially consider the slope and *y*-intercepts.



Problem 3 – Slopes of Parallel and Perpendicular Lines

Open the Cabri™ Jr. file **PARALLEL**. Drag the lines by points *P* and *Q* and examine the slopes.

12. What can you say about the slopes of two parallel lines?

Open the Cabri™ Jr. file **PERPENDI**. Drag the lines to investigate the relationship between the slopes.

13. What can you say about the slopes of two perpendicular lines?

Use the **Calculate** tool to see what happens when the slopes of two perpendicular lines are multiplied together. Select one slope measurement, press ⊠, and select the other slope measurement. Move the product and press ENTER to release it.

Now, change the lines by grabbing and dragging point *P.*

14. What do you observe about the product of the slopes?