

Points & Lines & Slopes (Oh My!)

ID: 8106

Name _____

Class _____

In this activity, you will explore:

- the relationship between coordinates of points and locations on the coordinate plane
- the relationships of lines with their equations, slopes and y intercepts
- the slopes of parallel and perpendicular lines

Open the file *Alg1Act1_PointsLinesSlopes_EN.tns* on your handheld and follow along with this document and your teacher. Record your answers on the worksheet or as directed by your teacher.

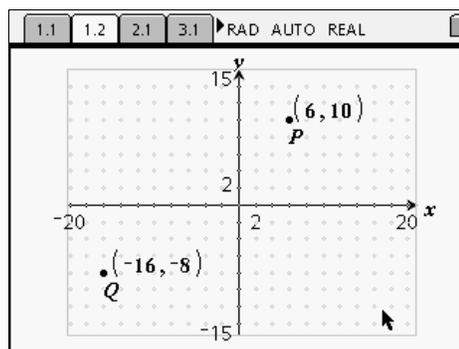
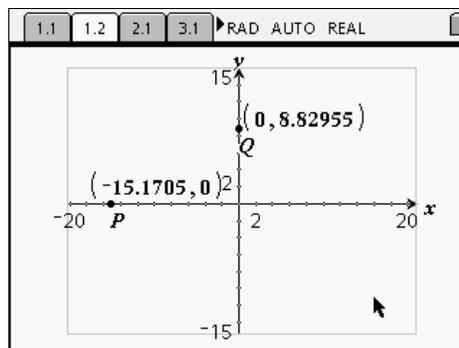
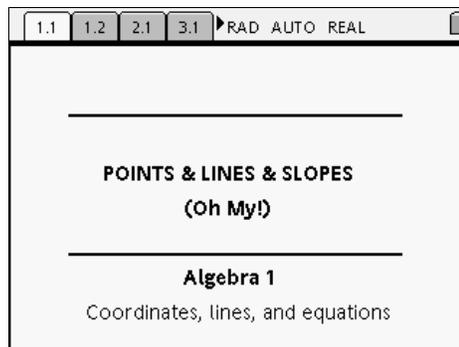
Problem 1 – Investigating the coordinates of points

On page 1.2, place and label points *P* and *Q* anywhere in the coordinate plane as directed by your teacher. Use the **Coordinates & Equations** tool to label each point with its coordinates.

Select **MENU > Tools > Redefine** to place point *P* on the x-axis and point *Q* on the y-axis. Drag the points on their respective axes and answer the following questions.

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

Now show the grid by selecting **MENU > View > Show Grid**. Redefine points *P* and *Q* to grid points to show integer values for the coordinates. As directed by your teacher, drag point *P* around the coordinate system until you can complete the statements on the next page.

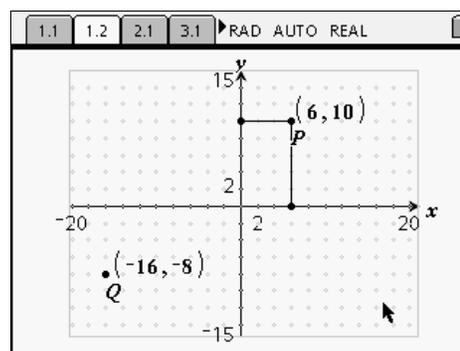


Write *positive* or *negative*.

- A point is in Quadrant 1 (top right) when its x-coordinate is _____ and its y-coordinate is _____.
- A point is in Quadrant 2 (top left) when its x-coordinate is _____ and its y-coordinate is _____.
- A point is in Quadrant 3 (bottom left) when its x-coordinate is _____ and its y-coordinate is _____.
- A point is in Quadrant 4 (bottom right) when its x-coordinate is _____ and its y-coordinate is _____.

Next follow your teacher's directions to construct perpendiculars through point *P* to each axis and measure each distance. Drag point *P* and explore.

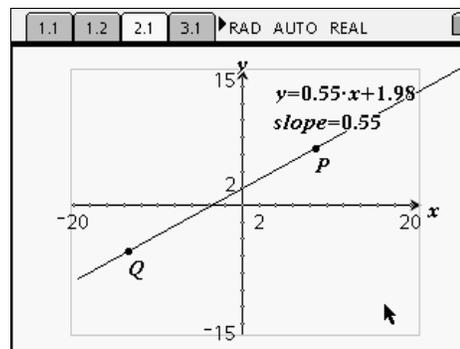
- What is this relationship between the coordinates of point *P* and the distances to each axis?



Problem 2 – Investigating lines, equations, and slopes

Listen as your teacher explains how to draw a line through points *P* and *Q*, and label the line with its equation and slope. Look for relationships between the slope and equation as you change the line by grabbing and dragging point *P*, and then by grabbing and dragging the line itself.

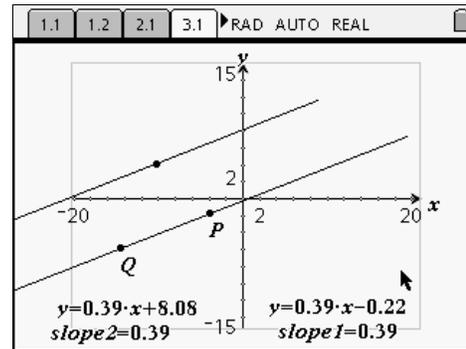
- When dragging the line by point *P*, what is the relationship of the slope and the equation?
- When dragging the line itself, what is changing in the equation?
- Drag point *Q* to the *y*-axis (or redefine it to the *y*-axis). What is the relationship between point *Q* and the equation of the line?



Problem 3 – Investigating the slopes of parallel and perpendicular lines

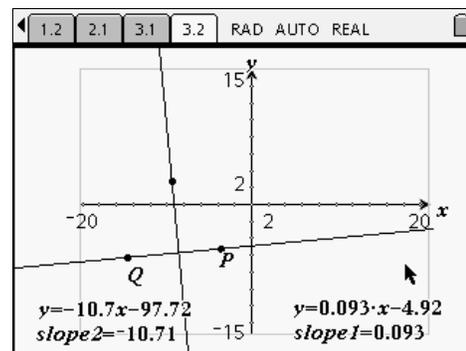
On page 3.1, drag the lines by points *P* and *Q* and examine the slopes.

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



On page 3.2, again drag the lines to investigate the relationship between the slopes.

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



Finally, you will use the **Calculate** tool (**MENU > Tools > Calculate**) to see what happens when the slopes of two perpendicular lines are multiplied together.

Create a text box (**MENU > Tools > Text**) in an empty area on the graph, and type “a*b” (or any other two variables). Next, select the **Calculate** tool and hover the cursor over the text box you just created. Press $\frac{\pi}{\text{enter}}$ and move the cursor a little. You will now be prompted for the values to use for *a* and *b*; simply click on each of the slopes at the bottom of the screen. Move the product near the original expression.

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

- What do you observe about the product of the slopes?