Parallel and Perpendicular Lines – An Investigation

Investigation I

Use the numbered steps below to draw a pair of parallel lines on your graph paper. For the purposes of these two investigations, do not draw any lines that have slopes of 1, -1, 0, or undefined. Also, for both, be sure that your pair of parallel lines is different from those of anyone else in your group.

1. Place your ruler on your graph paper so that the bottom edge of the ruler is on at least two integer ordered pairs on the graph paper. Label these points A and B.

2. Draw a line through the two points. Be sure to hold your ruler steady and to make a very thin, straight line.

3. Find two integer points on the graph paper on the other side of your ruler. Label these points C and D. Draw this line.

4. Be sure you drew your lines so that they are parallel. Close won't work here. One way to be sure is to fold your graph paper so that the lines are on top of each other. If your lines are parallel, the fold line in the middle will be equally distant from each line and will also be parallel to the two lines.

If you are sure that your two lines are parallel, find the slope of lines AB and CD. What do you notice about the slopes? Compare your results with those of your group members. Is there a common result?

On your graph paper, state your conclusion about the slopes of lines which are parallel. Support this conclusion by showing the calculations that you made to determine the slopes of your lines.

Investigation II

Use the numbered steps below to draw a pair of lines which are perpendicular.

1. Take a sheet of paper which has a right-angled corner. Place the corner at an integer point on your graph paper. Label this point Y.

2. Rotate this sheet of paper about your chosen point until **each** edge passes over a point that is also an integer point. Label these points X and Z.

3. Take your ruler and carefully draw angle XYZ.

Find the slope of rays YX and YZ. What do you notice about the slopes? Compare your results with those of your group members. Is there a common result?

On your graph paper, state your conclusion about the slopes of lines which are perpendicular. Support this conclusion by showing the calculations that you made to determine the slopes of your lines. Verify your conclusions with your teacher before going on to the assignment.

Parallel and Perpendicular Lines –
Independent Assignment

Part I

A quadrilateral that has both sets of opposite sides parallel and one right angle is a rectangle. Verify that quadrilateral ABCD below is a rectangle. In order to do this, follow the steps below.

1. Show that both pairs of opposite sides are parallel.

2. Show that at least one pair of adjacent sides is perpendicular.
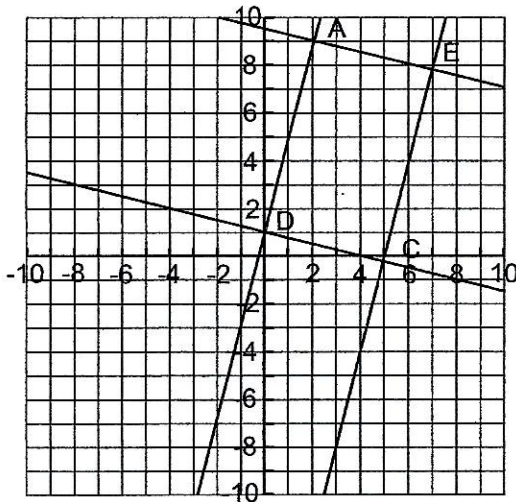
Part II

1. Determine the coordinates for four ordered pairs so that the quadrilateral they make is a parallelogram, but not a rectangle. Be sure to justify your choice of coordinates.

2. Determine the coordinates for four ordered pairs so that the quadrilateral they make is neither a parallelogram, a rectangle, nor a square. Be sure to justify your choice of coordinates.