Parallel and Perpendicular Lines

Summary

In this activity, students: Examine the concept of parallel and perpendicular lines Determine by the slope and points,if one line is parallel to another line Graph the lines on a graphing calculator to prove your conclusion Determine by points if two lines are perpendicular Graph the lines on a graphing calculator to prove your conclusion

Time Frame

4 class periods of 45 minutes each

Group Size

Individual

Life Skills

Thinking & Reasoning

Materials

Hardware

- Graphing calculators
- Overhead projector
- 6 Disposable cameras

Background for Teachers

Students are given specific points and of two lines. They are required to solve for the slope and create equations by using the point-slope formula. The students identify if the lines are parallel or perpendicular. The students are required to check their work with the use of a graphing calculator.

Student Prior Knowledge

Students must beable to find the slope of a line from a set of points. With this information students will create an equation by using the point-slope formula. Students need to know how to graph on a graphing calculator

Intended Learning Outcomes

Students will be able to solve for the slope created by points. The students through the slope can distinguish between parallel and perpendicular lines. Students will be able to check answers through the use of a graphing calculator

Instructional Procedures

Teacher presents new concept.If two lines are vertical, they are parallel. How can we tell whether nonvertical lines are parallel? The teacher does not answer the question. The students are allowed about five minutes of brainstorming. This consists of the teacher guiding the discussion as an open classroom discussion.

After this discussion the teacher could tell a story about two students, maybe even use two students from the class, that are roller bladding through the neighborhood. The students come to a hill that is straight up. Both students want to get to the top of the hill first. One student arrives at the top first. The distance that the students traveled is the same. The incline of the hill is the same for both

students. Is this like a slope. The teacher draws the problem on the board. It needs to be brought to the attention of the students that it does not matter who got to the top of the hill first. The question to ask should be, did they travel the same distance and height? Distance represents the rate of change in the x directions. Height represents the rate of change in the y direction. Is the students rate of change in the x and y direction the same? If it is the slope is the same and the students have a parallel relationship in their line of travel.
The teacher than reads through the explanation of parallel lines. Examples are put on overhead with transparency. Students are asked to volunter to do problems on board.
Example:

Determine whether the line passing through the points (1, 7) and (4, -2) is parallel to the line given by f(x) = -3x + 4.2.

Solution: The slope of the line passing through (1, 7) and (4, -2) is given by m = [7 - (-2)]/(1 - 4) = -3. Since the graph of f(x) = -3x + 4.2 also has a slope of -3, the lines are parallel.

If one line is vertical and another is horizontal, they are perpendicular. There are other instances in which two lines are perpendicular.
The teacher shows transparency about the perpendicular lines.
At this point the teacher ask the students to get into groups. Cameras are given to each group. Each group goes outside and takes pictures of perpendicular lines and parallel lines. The students are given 20 minutes outside.
Students hand in cameras to be developed.
Class dismissed
Next class period
Examples are put on the chalkboard by the teacher.
Example:
Consider the line given by the equation 8y = 7x - 24.

a) Find an equation for a parallel line passing through (-1, 2).

b) Find an equation of a perpendicular line passing through (-1, 2).

Request volunteers to work problems on the board.

Solution: find the slope of the line given by 8y = 7x - 24, we solve for y to find slope-intercept form: 8y = 7x -24 y = 7/8x - 3.

a). The slope of any parallel line will be 7/8. The point-slope equation yields
y - 2 = 7/8[x - (-1)] y = 7/8x + 23/8.

b). The slope of a perpendicular line is given by the opposite of the reciprocal of 7/8, or -8/7. The point-slope equation yields y - 2 = -8/7[x - (-1)] y = -8/7x + 6/7.

Technology connection The teacher uses the overhead that has an adapter that connects to a graphing calculator and the overhead. This enables the teacher and students to do the graphing together. If a student has a problem with graphing, the teacher can show the student on the overhead step-by-step how to do the proceedure. Teacher does several examples so students understand how to graph.
Problems are put on the board.
This is a quiz:

1. Create two parallel lines and graph on the calculator.

2. Use a graphing calculator to check that y = 3/4x + 2 and y = -4/3x - 1 are perpendicular. Is this true?

3. Use a graphing calculator to check that y = -2/5x -4 and y = 5/2x + 3 are perpendicular. Is this true?

Homework pre-test to evaluate the student's knowledge for chapter test.

Next class period the pre-test is corrected. Students discuss any problems not understood.

Chapter test given next class period. 4. To see that this type of check is not foolproof, graph y =

33/40x + 2 and y = -40/30x - 1.
Are the lines perpendicular? Why or why not?
Write about what you have learned about parallel and perpendicular lines.

Strategies for Diverse Learners

There are several strategies for diverse learners in this lesson plan.that are part of this lesson plan. Visual aids, story telling, and the use of a graphing calculator, all of these are tools for the teacher to use for diverse learners.

Extensions

This type of activity is used with eight graders who are just beginning elementary algebra. When the students have become proficient at their calculations they can move on to using real- life problems. This could be showing the relationship between excerise and maintaining a health weight. Creating exercise programs, budgets, and the relationship between teenage smoking and advertisements. This kind of activity can be used without mentioning parrallel or perpendicular lines. This is an activity that will show that math can be a part of their real-life.

Assessment Plan

At a minimum, evaluate students on their ability to: Solve correctly for the slope. Correctly create a point-slope equation. Identify parallel and perpendicular lines. Students should be able to graph these lines on a calculator. Correctly graph equation and identify.A quizz is done the last day of the lesson. This assess the students ability to use graphing calculators to identify parallel and perpendicular lines.
After this quiz a pre-test is given to asses students knowledge for Chapter test.
Chapter test is given to asses knowledge of Chapter

Bibliography

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