

Weekly Focus: graphing
Weekly Skill: application

LESSON 36: Using Slope to Solve Geometric Problems and Application of Linear Equations

Lesson Summary: For the warm-up, students will solve a problem about earning interest. In Activity 1, they will identify parallel and perpendicular lines and their slopes. In Activity 2, they will use slope to identify lines. In Activity 3, they will do problems with geometric application. Activity 4 is a summary activity for graphing linear equations. Estimated time for the lesson is 2 hours.

Materials Needed for Lesson 36:

- Video (length 5:00) on the slope of parallel and perpendicular lines. The video is required for teachers and optional for students.
- *Mathematical Reasoning Test Preparation for the 2014 GED Test Student Book (pages 76 – 77)*
- *Mathematical Reasoning Test Preparation for the 2014 GED Test Workbook (pages 110 – 113)*
- Application Activity (Link embedded in the lesson plan below.)

Note: Please ask your coordinator (or you can do it yourself) to create a free account on teacherspayteachers.com. Then download the activity for your class only.

Objectives: Students will be able to:

- Use the interest formula to solve the warm-up problem
- Use slope to identify parallel and perpendicular lines
- Use slope to identify basic geometric problems
- Use algebra and graphing skills to solve the review problems

ACES Skills Addressed: N, CT, LS, ALS

CCRS Mathematical Practices Addressed: Building Solution Pathways, Make Sense of Problems and Persevere in Solving Them, Construct Viable Arguments and Critique the Reasoning of Others

Levels of Knowing Math Addressed: Intuitive, Pictorial, Abstract, Application, and Communication

Notes:

You can add more examples if you feel students need them before they work. Any ideas that concretely relate to their lives make good examples.

For more practice as a class, feel free to choose some of the easier problems from the worksheets to do together. The “easier” problems are not necessarily at the beginning of each worksheet. Also, you may decide to have students complete only part of the worksheets in class and assign the rest as homework or extra practice.

The GED Math test is 115 minutes long and includes approximately 46 questions. The questions have a focus on quantitative problem solving (45%) and algebraic problem solving (55%).

Students must be able to understand math concepts and apply them to new situations, use logical reasoning to explain their answers, evaluate and further the reasoning of others, represent real world problems algebraically and visually, and manipulate and solve algebraic expressions.

This computer-based test includes questions that may be multiple-choice, fill-in-the-blank, choose from a drop-down menu, or drag-and-drop the response from one place to another.

The purpose of the GED test is to provide students with the skills necessary to either further their education or be ready for the demands of today's careers.

Lesson 36 Warm-up: Solve the interest problem

Time: 10 Minutes

Write on the board: Nora wants to earn interest on her savings. She has \$300 she can leave in her savings account for 2 years. The current interest paid is 2% annually.

Basic Question:

- How much interest will she earn in two years? ($i = 300 \times \frac{5}{100} \times 2 = \30)
- Teacher Notes:
- See if the students can remember or figure out the interest formula of $i = prt$ (interest = principal x rate x time) on their own before you tell them.
- Ask students to solve both with decimals and fractions
- Students will need to rearrange the formula to be $p = \frac{i}{rt}$ for the extension question or they may notice that 5% for two years equals 10% of the principal so it's easy to determine that it is \$30 for \$300 saved and \$50 in interest for \$500 saved.

Extension Question:

- How much money does Nora need in her savings account if she wants to earn \$50 in interest?
 - She will need \$500 in her savings account for 2 years

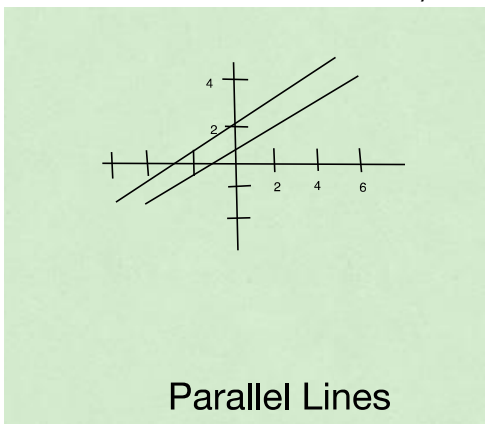
Lesson 36 Activity 1: Parallel and Perpendicular Lines

Time: 10-15 Minutes

1. Draw a line with the equation of $y = \frac{1}{2}x + 1$. It will look like the lower line on the graph below.

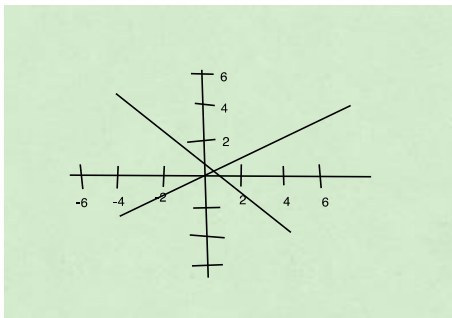
Ask students to identify some points on the line.

- a. Possible answers include (-2, 0), (0,1), (2,2), and (4,3).
- b. Ask students to find the slope. (The slope is $\frac{1}{2}$).
- c. Ask students what the y-intercept is (it is 1).



2.

3. Now draw a second line that is parallel to the first one. Draw it with a y-intercept of 2. The equation of this line is $y = \frac{1}{2}x + 2$.
4. Ask students what they can tell you about this line.
 - a. Students may say the lines are parallel and they may identify some points $(-2,1)$, $(0,2)$, $(2,3)$.
 - b. Ask what the y-intercept is. **(It is 2).**
 - c. This example shows that **two lines that are parallel to each other have the same slope.**
5. Draw the first line again. Now draw a line with the equation $y = -2x + 1$ that is perpendicular to the first line.
6. Ask students what they can tell you about this line.
 - a. They may tell you it is perpendicular and they may give you some points on the line such as $(-2,5)$, $(0,1)$, and $(2,-3)$.
 - b. This example shows how **a line that is perpendicular to another has a slope that is the opposite (or negative) inverse of the first line.** The slope of the original line is $\frac{1}{2}$ and the slope of the perpendicular line is -2 .
 - c. The example should look similar to the graph below.



7.

Lesson 36 Activity 2: Use slope to Solve Geometric Problems | Time: 15 Minutes

- 1) Do **pages 76-77 in the student book** together.
- 2) Explain question 1, and make sure students understand how the slopes of parallel lines are the same and those of perpendicular lines are the opposite inverse.

Lesson 36 Activity 3: Independent Practice

Time: 25 Minutes

Have students work independently in the **workbook pages 110-113**. Circulate to help. Review any questions that students found challenging. Choose a few problems to have volunteer students do on the board and explain if they want.

Lesson 36 Activity 4 Application: Linear Equations Review

Time: 45 Minutes

1. [This activity](#) serves as a comprehensive review of linear equations and graphing.
2. Students use critical thinking skills to solve the two problems.
3. The problems are multi-step and include in/out tables, inequalities, and graphing.
4. The first problem is about the growth of a plant.
5. The second problem is about comparing the rental rates of cars.