

Weekly Focus: functions Weekly Skill: evaluation

LESSON 38: Evaluation of Functions

Lesson Summary: For the warm-up, students will solve a problem about study time. In Activity 1, they will see examples of graph transformations and graph a few equations. In Activities 2 and 3, they will do practice problems in the student book and the workbook. Activity 4 is an application activity related to the NFL draft. Estimated time for the lesson is 2 hours.

Materials Needed for Lesson 38:

- Video (length 23:00) on graphs of basic functions and their transformations. The video is required for teachers and optional for students.
- 1 Worksheet (38.1) with answers (attached)
- Application Activity (link embedded in lesson plan)
- Mathematical Reasoning Test Preparation for the 2014 GED Test Student Book (pages 80 81)
- Mathematical Reasoning Test Preparation for the 2014 GED Test Workbook (pages 118 121)
- <u>Note:</u>
 - This lesson is challenging. The idea is for students to get a basic understanding of evaluating functions. They are not expected to master this topic in one lesson.

Objectives: Students will be able to:

- Answer the questions about a chart
- Graph parabolas
- Evaluate functions with relative minima and maxima and periodicity
- Analyze an application function about the NFL (National Football League) draft

ACES Skills Addressed: N, CT, LS

CCRS Mathematical Practices Addressed: Building Solution Pathways, Make Sense of Problems and Persevere in Solving Them

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

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 38 Warm-up: Solve the Study Time Questions Time: 5-10 Minutes

Project the following table and sentences on the board:

X Hours Student Studies for Test	Y Correct Number of Questions on Test
2	18
3	27
4	36
5	45

A. Which of the following statements is false per the information in the table?

- 1. The student has to study at least 7 hours to get 63 questions correct on the test.
- 2. If he studies one hour, he will get 10 questions correct.
- 3. If he doesn't study, he will get all the questions incorrect.
- B. What is the pattern you see in the table?
- C. Write an equation to represent the information in the table.

Answers:

- A. Number 2 is false.
- B. Pattern is 9 questions correct for every hour studied.
- C. Equation is 9x = y

Lesson 38 Activity 1: Graphing Quadratic Equations and	Time: 25 Minutes
Their Transformations	

- 1. Students need to practice more basic graphs of functions before they can evaluate them. Graph each of the following on the board. Explain and have students give input as you draw each one.
- 2. Example A: Graph $f(x) = x^2 1$. Make a table first. Examples of input and output may be (-



3.

5.

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3,8), (-2,3), (0, -1), (2,3), (3,8). The graph should look similar to the one below. This shows that adding or subtracting a constant to the basic quadratic equations moves the parabola up or down on the y-axis.



4. Example B: Graph $f(x) = x^3$. Some inputs and outputs may be (-2,-8), (-1,-1), (0,0), (1,1), (2,8). The graph should look similar to the one below:



6. Example C: Graph f(x) = 1/x. The inputs and outputs will show that f(x) approaches the x-axis but never touches it. The input/output table and graph should look similar to the one below:



D. Legault, Minnesota Literacy Council, 2014



- 8. Students can practice by graphing the four problems on **Worksheet 38.1**. Do the first one together if needed.
- 9. After the first problem is done, point out to students how the +1 in the equation $(x + 1)^2 2$ makes the graph move left one space and how the constant -2 makes it move down two on the y-axis.
- 10. Note: There are more practice problems available like these on math-aids.com.

Lesson 38 Activity 2: Evalu	ation of Functions
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Time: 20 Minutes

- 1. Do the problems in the student book pages 80 and 81.
- 2. Look at the first graph on page 80. Explain the **relative minimum** and **relative maximum** in the graph. This means these points are the lowest and highest points for a portion of the graph. They are the "hills and valleys" in the graph.
- 3. Sometimes graphs have periodicity and they are called **periodic functions**. An example is the second graph on page 80, which has a period of 2. This means that it repeats at every 2 intervals on the x-axis.
- 4. Do questions 1 9 together.

	Lesson 38 Activity 3: Independent Practice	Time: 25 Minutes
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- 1. Do the problems in the workbook pages 118 121.
- 2. Explain the graph of where **functions are undefined** like the example graph on page 118.
- 3. The questions are challenging. Do the best you can in the time given.

Lesson 38 Application: NFL Draft Picks	Time: 25 Minutes
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- 1. Start with a discussion about the salaries of football players and what the draft is about. Some students may know a lot about this topic and they may be able to explain what the different rounds of the draft are and how they affect players' salaries.
- 2. Give the students a copy of <u>the activity graph and questions</u>. The solution can be accessed if you are a member.
- 3. Ask questions about what information is on the y-axis and the x-axis.
- 4. Discuss the questions in small groups.
- 5. There may not be time to finish and that is okay. The idea is to expose the students to a reallife application of the types of graphs they have seen in the book activities.



Worksheet 38A.1

Graph the given equation.







Worksheet 38.1 Answers






