

Build-A-Function: Algebra Edition II

or

“Find an expression for a transformed function given its base graph and new graph.”

Engagement Activity for Section 1.7 of Precalculus, Third Edition, Stitz and Zeager

Primary Section: 1.7

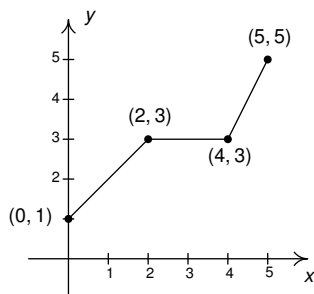
Secondary Sections: 1.6

Key Concepts: Transformations, graphs of functions

This activity is designed to help you more fully understand the concepts presented in Section 1.7 of the textbook. It is not a replacement for the regular homework, but rather, is a deeper investigation into the material presented in the section and how it is connected to other material presented in other sections. Your professor will have specific instructions as to how he/she wants the activity to fit into the class so please pay attention in class when this activity is assigned.

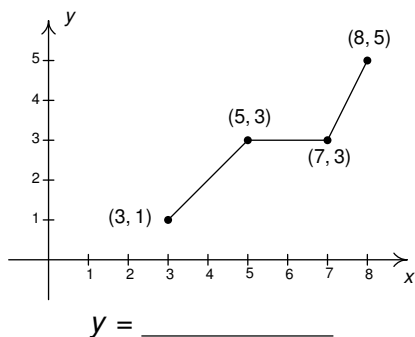
In the Exercises in Section 1.7, we asked you to graph a function which was essentially a “base” function that had been modified via one or more transformations. In Part One of this Activity we go the other way – we give you the graphs of both the base function and the new function after the transformations have been applied and ask you to find an expression for the new function. There may be different correct answers for a given set of transformations so don’t worry if your answers don’t match those of your classmates. In fact, we encourage you to be creative! In Part Two, we ask some open-response questions which require written answers and perhaps some computation or graphs.

Part One: In questions 1 through 10, the “base” graph of $y = f(x)$ has been modified by one or more transformations. Find an algebraic expression for the “transformed” function g .

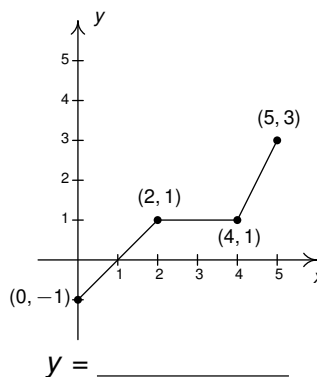


“Base” graph of $y = f(x)$

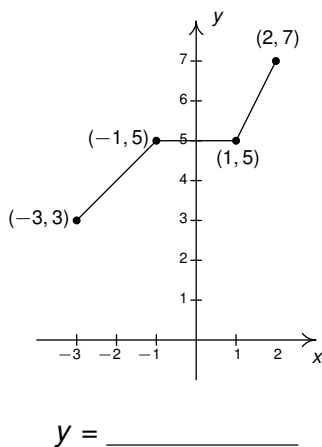
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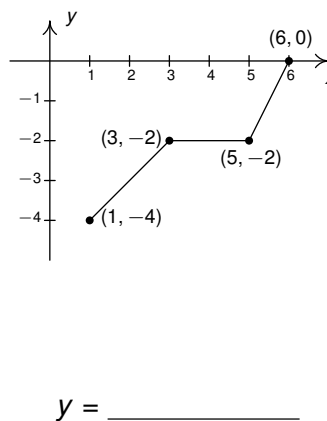
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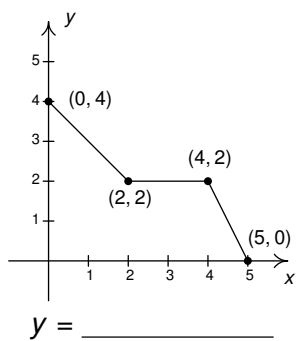
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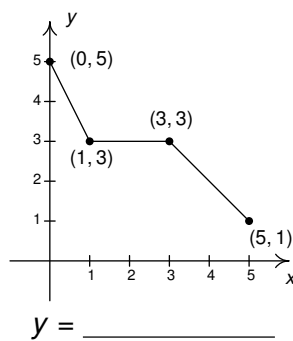
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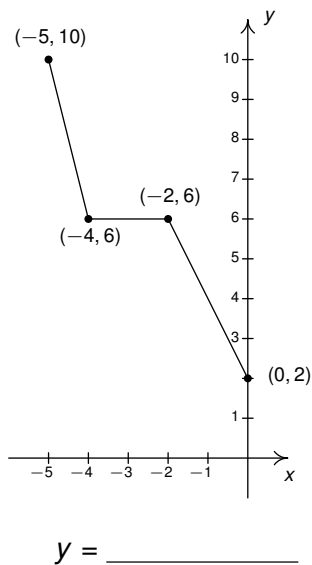
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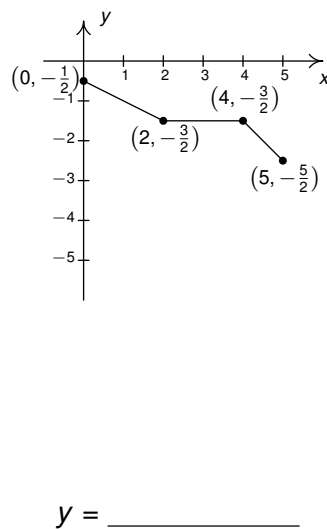
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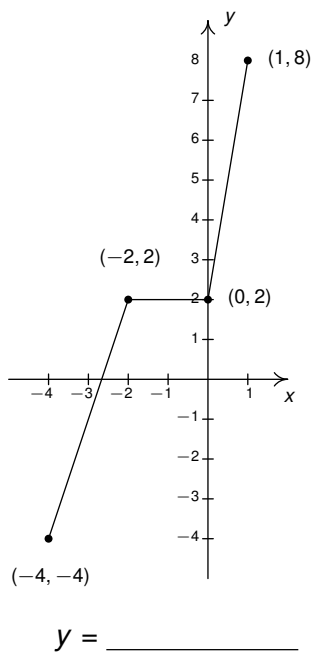
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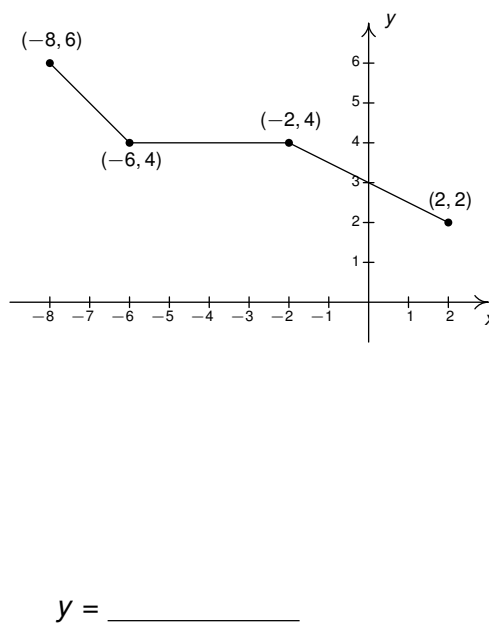
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9.



10.



Part Two: These open-response questions tie together concepts from several different sections so you may need to refer to your textbook as you think about your answers.

11. For many common functions, the properties of Algebra make a horizontal scaling the same as a vertical scaling by (possibly) a different factor. For example, we state in the textbook that $\sqrt{9x} = 3\sqrt{x}$. With the help of your classmates, find the equivalent vertical scaling produced by the horizontal scalings for these functions.

(a) $y = (2x)^3$

(b) $y = |5x|$

(c) $y = \sqrt[3]{27x}$

(d) $y = \left(\frac{1}{2}x\right)^2$

(e) $y = (-2x)^3$

(f) $y = |-5x|$

(g) $y = \sqrt[3]{-27x}$

(h) $y = \left(-\frac{1}{2}x\right)^2$

12. What happens if you reflect an even function across the y -axis?

13. What happens if you reflect an odd function across the y -axis?

14. What happens if you reflect an even function across the x -axis?

15. What happens if you reflect an odd function across the x -axis?
16. How would you describe symmetry about the origin in terms of reflections?
17. We mention in the textbook that, in general, the order in which transformations are applied matters, yet in our first example with two transformations the order did not matter. (You could perform the shift to the left followed by the shift down or you could shift down and then left to achieve the same result.) With the help of your classmates, determine the situations in which order does matter and those in which it does not.

Student Questionnaire for Build-A-Function: Algebra Edition II

This Engagement Activity was created with one purpose in mind - to help you the student better understand the concepts presented in College Algebra. Whereas we think the activity does its job, the truth is that we need to know from you if it actually helped you learn. Please take a few minutes to complete this questionnaire anonymously and return it to your instructor. Your feedback will be used to improve the activity for next semester.

1. For Questions 1a through 1e below, please place an X in the box which most closely matches your opinion.

- (a) Before I began the activity, my understanding of the material was best described as

Clueless	Not so good	Meh	Pretty good	I pwned it!

- (b) After completing the activity, my understanding of the material is best described as

Clueless	Not so good	Meh	Pretty good	I pwn it!

- (c) The connection between the activity and the course material was clear

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

- (d) The activity's instructions were clear

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

- (e) The activity was a good use of class time

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. What did you like about the activity?

Continued on back →

3. How can we improve the activity?

4. Other comments: