

Official SAT Practice

Lesson Plans

for Teachers by Teachers

LESSON 13 (3 OF 4 FOR PASSPORT TO ADVANCED MATH)

Systems of Equations; Relationships Between Algebraic and Graphical Representations of Functions; Function Notation

Subscore: [Passport to Advanced Math](#)

Focus: Solving systems of equations, relating properties of the function to properties of its graph, and using function notations

Objectives:

Students will:

- solve systems of equations in two variables in which one equation is linear and the other equation is quadratic or another nonlinear equation.
- relate properties of the function f to properties of its graph and vice versa.
- use function notation; students will need to evaluate a function given the rule that defines it.
- interpret the value of a function given a contextual description.

Before the Lesson:

- Review the Teacher Notes for this lesson.
- Make sure students have access to Official SAT[®] Practice during class if completing the main activity.
- Make sure you have a way to share example problems with students if completing the alternative activity.

Partner Work | 40 minutes

- Have students complete the Basic and Harder Examples for “Linear and quadratic systems,” “Polynomial factors and graphs,” “Nonlinear equation graphs,” and “Function notation,” in Official SAT Practice on Khan Academy®.
 - ◆ Remind students to pause the video as soon as they can see the problem. Once students have worked through the problem, have them watch the video to check their work.

Teacher Notes

- The videos from these four sections add up to about 15 minutes. Encourage students to discuss their solutions and questions for each problem prior to watching the video.

Alternative Activity—Classwork and Discussion (as time allows)

- Have students complete the Example Problems below and then discuss them in small groups or as a class. Review terms and definitions as needed (see Teacher Notes below).

1. $3x + y = -3$

$$(x + 1)^2 - 4(x + 1) - 6 = y$$

If (x, y) is a solution of the system of equations above and $y > 0$, what is the value of y ?

2. The graph of which of the following functions in the xy -plane has x -intercepts at -4 and 5 ?

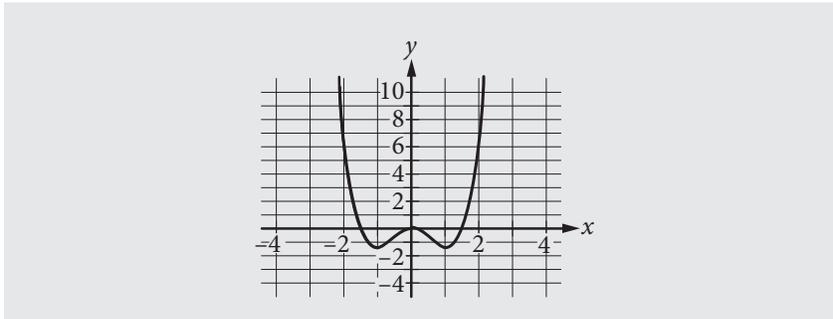
A. $f(x) = (x + 4)(x - 5)$

B. $g(x) = (x - 4)(x + 5)$

C. $h(x) = (x - 4)^2 + 5$

D. $k(x) = (x + 5)^2 - 4$

3.



The function $f(x) = x^4 - 2.4x^2$ is graphed in the xy -plane as shown above. If k is a constant such that the equation $f(x) = k$ has 4 solutions, which of the following could be the value of k ?

A. 1

B. 0

C. -1

D. -2

4. If $g(x) = 2x + 1$ and $f(x) = g(x) + 4$, what is $f(2)$?

Teacher Notes

- See Examples 12–15 on pages 234–237 in [Chapter 18 of the SAT Study Guide for Students](#) for answers and explanations.
- Note that the first step to solving Example Problem 1 is substitution, an approach students may use on Heart of Algebra questions. The other key was noticing that $(x + 1)$ can be treated as a variable.
- The domain of a function is the set of all values for which the function is defined. The range of a function is the set of all values that are the output, or result, of applying the function.
- Remind students not to assume the size of the units on the two axes are equal unless the question states they are equal or unless they can conclude they are equal from the information given.
- Remind students that what may seem at first to be a complex question can boil down to straightforward substitution.

Wrap-Up: For your term book | 5 minutes

- Domain
- Range
- Intercepts
- Maximum and minimum values
- End behavior
- Asymptotes
- Symmetry
- Transformations

Teacher Notes

- These terms are defined on pages 235–236 in [Chapter 18 of the SAT Study Guide for Students](#).

Homework | 20 minutes

- This set of practice problems may take students more than 20 minutes. Complete practice problems in Official SAT Practice on Khan Academy in these skill areas as time allows:
 - ◆ Linear and quadratic systems
 - ◆ Polynomial factors and graphs
 - ◆ Nonlinear equation graphs
 - ◆ Function notation
- Encourage students to move on to the higher skill level once they successfully complete the problems in their current skill level and can “level up.”