



# Official SAT Practice

Lesson Plans

# for Students

**LESSON 5 (5 OF 5 FOR HEART OF ALGEBRA)**

**The Relationships Among Linear Equations, Lines in the Coordinate Plane, and the Contexts They Describe**

**Subscore: Heart of Algebra**

**Focus:** The connection between the algebraic, graphical, and contextual representations of linear equations

## Objectives:

Students will

* solve systems of linear equations using graphing and algebraic methods to show how solutions are the same regardless of method used for solving.
* solve systems of linear equations that have infinitely many solutions or no solutions and describe what these solution sets mean graphically and algebraically.
* make connections between the equation of a line and its graph and use the relationships between the slopes of parallel and perpendicular lines to answer questions.
* use understanding of slope and *y-*intercept to interpret equations and graphs that represent contextual situations.

**Do Now**

* Solve this example problem:

2*y* + 6*x* = 3

*y* + 3*x* = 2

Also, determine how many solutions (*x*, *y*) are there to the system of equations above?

* 1. Zero
  2. One
  3. Two
  4. More than two
* Review with students the concepts they needed to know in order to be able to solve the example problem:
* The point of intersection gives the solution to the system.
* If the equations in a system of two linear equations in two variables are graphed, each graph will be a line. There are three possibilities:
  + The lines intersect in one point. In this case, the system has a unique solution.
  + The lines are parallel. In this case, the system has no solution.
  + The lines are identical. In this case, every point on the line is a solution, and so the system has infinitely many solutions.
* What method did you use to solve the example problem?

**\*Various approaches to solving this system: graphing, substitution, and elimination so they can see that the solution is the same regardless of the approach used to solve**.

* Define and give example of each term (**Use a graph and equation**):

“slope”, “*y*-intercept”, “parallel”, “perpendicular.”

**Class Work**

* Have students work through these example problems. Discuss the solutions and any questions students have (Through zoom or phone call on google voice). Also, explain how you answered the question and why the other answers are incorrect?

**1.** 3*s* − 2*t* = *a*

–15*s* + *bt* = −7

In the system of equations above, *a* and *b* are constants. If the system has infinitely many solutions, what is the value of *a*?

**2.**

C) *y* = \_1*x* + 3

2

D) *y* = 2*x* + 4

2

B) *y* = − \_1*x* + 2

The graph of line *k* is shown in the *xy*-plane above. Which of the following is an equation of a line that is perpendicular to line *k*?

A) *y* = −2*x* + 1

*x*

1

1

*O*

*y*

1. A voter registration drive was held in Town Y. The number of voters, *V,* registered *T* days after the drive began can be estimated by the equation *V* = 3,450 + 65*T.* What is the best interpretation of the number 65 in this equation?
   1. The number of registered voters at the beginning of the registration drive
   2. The number of registered voters at the end of the registration drive
   3. The total number of voters registered during the drive
   4. The number of voters registered each day during the drive

**4.** 9*x* – 14*y* = –3;

2*x* – *ay* = –6

What value of *a* will result in a system with no solutions?

Define:

* Parallel
* Perpendicular
* Infinitely many solutions
* No solution
* Slope
* *y-*intercept

**Homework**

Complete practice problems in Official SAT Practice on Khan Academy® in these skill areas:

* Solving linear equations and inequalities
* Solving systems of linear equations
* Graphing linear equations