

Lesson Plans

**Algebra**

Text: *Prealgebra*, Aufmann, Barker & Lockwood, Houghton Mifflin, 3<sup>rd</sup> Edition  
(Note: Unless otherwise noted, the source is the above textbook.)

Reading assignment: pp. 367-404

**Class Period 1:**

Give the student groups the “**What’s the Score**” problem.

(<http://mathforum.org/algpow/solutions/solution.ehtml?puzzle=117>)

In this problem the students are given some facts about a football game between the Falcons and the Bears. Information is given about how many scores were made, what kicks were missed, and about the final score. Students are asked questions about how many points were scored and what combination of scores would give that final score.

There is a certain degree of testing possible values in this problem. A subsequent discussion on the problem should show that once proper equations are formed, guessing is held to a minimum. This problem will highlight the benefit of algebraic equations.

Give the student groups the “**The Professors’ Ages**” problem.

(<http://mathforum.org/algpow/solutions/solution.ehtml?puzzle=116>)

In this problem the students are given information about the relative ages of three professors. Sums of the professors’ ages are described in terms of square numbers, prime numbers and palindromes. The students are asked to find the ages of the professors.

There is also a certain degree of testing possible values in this problem. As before, a subsequent discussion on the problem should show that once proper equations are formed, guessing is held to a minimum. But in addition, the students will also be working with squares, palindromes, and primes.

**Class Period 2:**

Give the student groups the “**Two Ladders**” problem.

(<http://mathforum.org/algpow/solutions/solution.ehtml?puzzle=124>)

In this problem the students are given graph paper and a problem where they are asked to draw on the graph paper two ladders placed against a wall with given distances from the wall. The distances out from the wall are given in feet and the heights given as fractions of the lengths. The students are asked to find the differences in length of the two ladders.

This problem will expose the students to graphing using distances and also the concept of slope can be introduced.

Give the student groups the “**Marsha’s Triangle**” problem.

(<http://mathforum.org/algpow/solutions/solution.ehtml?puzzle=146>)

In this problem the students are given ordered pairs to graph and are told about a line that passes through a given point and its points of intersection with the x and y axes. The students are asked to draw the line and then asked to find the area of a particular isosceles triangle bordered by the lines they have drawn.

This problem has the students plot ordered pairs and draw a line with given axes’ intercepts. Slope and intercepts can be discussed. Also, this problem deals with finding area of a triangle.

### **Class Period 3:**

Give the student groups the “**Splitting a Square**” problem.

(<http://mathforum.org/algpow/solutions/solution.ehtml?puzzle=144>)

In this problem the students are given four ordered pairs to graph which form a square. The students are then asked to draw a line from the origin that cuts the square into two sections, one larger than the other by a ratio of 2:1. The students are to find the equation of the cutting line.

This problem deals with slope and the students should come up with an equation of the form  $y=ax$ . Slope can be discussed. The problem also is an exercise in finding areas.

Give the student groups the “**My Three Dogs**” problem.

(<http://mathforum.org/algpow/solutions/solution.ehtml?puzzle=205>)

In this problem the students are given weight information about three dogs. The students are asked to convert the information into algebraic sentences and then solve for the weights of the dogs.

This problem is an exercise in translating a sentence into an equation and solving. The students can then be asked to come up with their own sentences and equations share them with the class.

### **Class Period 4:**

Give the student groups the pool problem 2.1 from Connected Mathematics - Algebra – “**Say it with Symbols**”.

In this problem the students are given a picture of a swimming pool with sides “s” and border tile that is  $1 \text{ ft}^2$ . If the sides “s” are 1,2,3,4,6, and 10 feet, what are the number of tiles needed to form the border. The students are asked to draw the different sized pools and then make a table with the values. Then they are asked to write an equation based upon what they are seeing in their tables.

This problem is an exercise in making a table and observing a pattern and writing an equation to model that information. In addition the students could be asked to graph their ordered pairs and discuss the slope of the line.

Give the students the “Building with Toothpicks” problem (p. 46 Navigating Through Algebra 6-8). In this problem they are building 2-dimensional staircases with toothpicks. Every time they add a stair they use additional toothpicks. They are asked to make a table to organize their information, find a pattern, and write a formula that would work with any number of stairs you would.

This problem has the students making a table, observing a pattern, and writing an algebraic equation. Students could try other shapes, such as triangles or a shape of their choosing, and see if they can observe patterns and come up with formulas.

**Class Period 5:**

Give the students the Pledge Plans problem (p. 46 Navigating Through Algebra 6-8). Let them work on it in groups for the remainder of the hour and be prepared to present next class period. This is the “Task” described on the following page.

PERFORMANCE PACKAGE TASK 1

(Title of Package)

Content Standard: Algebra

Level: Technical/  
Community College

***Specific Statement(s) from the Standard:***  
***Algebra (NCTM) Standard***

*Upon completion the student will be able to:*

- *Understand patterns, relations, and functions*
- *Represent and analyze mathematical situations and structures using algebraic symbols*
- *Use mathematical models to represent and understand quantitative relationships*
- *Analyze change in various contexts*

***Product(s):***

*The student can make a table to organize data, make a graph to display the data, recognize the relationship among the table, the graph, the equation and the slope of the line, and identify the y-intercept.*

***Task Description:***

*The students are given three scenarios for sponsors to pledge money for a walkathon. Two of the pledge plans are of the form  $y=ax$  and the third plan is of the form  $y=ax+b$ . The students will make a table showing the amount of money the sponsor would owe under each plan. The students will graph each plan using a scatterplot. The student will use words to describe the relationships between money earned and distances walked and then put them into equation form. The students will describe how changing the pledge changes the table, graphs and equations and also how adding the fixed amount “b” affects the amounts.*

***Special Notes:***

PERFORMANCE PACKAGE TASK 1  
(Title of Package)

**FEEDBACK CHECKLIST FOR TASK 1**

The purpose of the checklist is to provide feedback to the student about his/her work relative to the content standard. Have the standard available for reference.

Y=Yes

N=Needs Improvement

<u>Student</u>		<u>Teacher</u>
_____	The student organized the data in a table.	_____
_____	The student made graphs to display the data and used correct labels and scales.	_____
_____	The student described the plans in words.	_____
_____	The student correctly converted the words into equations.	_____
_____	The student can identify the slopes of the lines from the graphs and equations	_____
_____	The student can identify the y-intercept from the graph and equation and can differentiate between equations with a zero and non-zero y-intercept.	_____

**Overall Comments** (information about student progress, quality of the work, next steps for teacher and student, needed adjustments in the teaching and learning processes, and problems to be addressed):