ELL CONNECT® - Content Area Lesson Plans for English Language Learners

Subject: Algebra 2  
Grade: 9-12  
Author: Irving, Texas  
Approximate Time: 120 Minutes (3 class periods)  
Date: Fall 2008

Topic/Theme: Linear Programming

Note: Previously, students learned how to solve systems of equations and systems of linear inequalities.

Objectives:

**Content**
The students will solve linear programming problems.

**Language**
The students will read and analyze situations and formulate (write) systems of equations and inequalities in two or more unknowns to solve the problem.

Vocabulary:

**Content Specific**
- Linear Programming
- Constraint
- Feasible Region
- Objective Function

**Related**
- System of Linear Inequalities
- Boundary Line

Note: These vocabulary words are needed for Chapter 3 Section 4 – Linear Programming. The words are introduced as they appear in the chapter section. Once a term is introduced it is used in context each day when appropriate. By the end of this lesson, students will be expected to be familiar with the bold/highlighted words from the text.

Materials:

- Algebra 2 textbook and/or laptop, pencil, paper, ruler, map pencils, Lesson 3-4 Know-It-Notes, Algebra 2 Homework packet, A&M Linear Programming Notes, calculator, Linear Programming Problem Strips (One per group)

Activities:

Day 1 (40 minutes)

- SW read the content and language objectives.
- To engage the students, TW project the following comic strip:
- SW read the comic.

- TW ask the students to formulate (set up) the system of equations that would represent the situation described in the comic strip using the formula distance = rate x time.

- SW share, compare, and solve their system of equations with a partner.

- TW circulate around the classroom to monitor students.

- SW post their problems up around the classroom.

- SW walk around the classroom to view all of the postings.

- SW write a journal entry (on the blackboard discussion board) discussing the similarities and differences between all of the postings.

- TW ask the students how the system could be changed into a linear programming problem.

Day 2 (40 minutes)

- SW read the content and language objectives.

- SW read section 3-4 (pp. 205 - 208), and complete the 3-4 Know-It-Notes (1 - 5).

- TW demonstrate solving linear programming problems with the following example:
  - Superbats Inc. manufactures two different quality wood baseball bats, the Wallbanger and the Dingbat.

  The Wallbanger takes 8 hours to trim and turn on the lathe and the Dingbat takes 5 hours to trim and turn of the lathe. The total time for trimming and lathing is 80 hours.
The Wallbanger takes 2 hours to finish and the Dingbat takes 5 hours to finish. The total time for finishing is 50 hours.

- TW with the students assistance, write the inequalities that represent each constraint.
- TW with the students assistance, graph the system of inequalities and identify the feasible region.
- TW with the students assistance, identify and/or find the vertices of the quadrilateral that makes up the feasible region.

• SW work the second example on the notes page on their own.
• SW compare their solution to the second example with a partner or with a small group (no more than 3 students)
• TW monitor and assist students as needed.
• One student from three of the groups will present one part of the example to the entire class.
• TW review objectives and clarify any questions.

Day 3 (40 minutes)

• SW read the content and language objectives.
• SW be divided in to small groups of 3 (no more than 4).
• TW give each group a linear programming problem strip.
• SW with their group read the problem situation and formulate (write) the linear inequalities that represent the constraints then pass the problem strip to the next group.
• SW with their group read the problem, verify the linear inequalities given to them and graph the linear inequalities and identify the feasible region, and pass the problem strip to the next group.
• SW with their group read the problem, verify the linear inequalities, verify the graph of the system of inequalities (the feasible region), and identify and find the vertices of the polygon that borders the feasible region, then they will pass the problem strip back to the original group.
• SW with their group review, discuss, and check the complete solution of the linear programming problem they started with.
• TW review objectives and clarify any questions.
**Closing Discussion:**

**Thinking out-of-the-box**

Describe how to recognize when you have found the maximum or minimum value of an objective function for a given set of constraints.

After discussion, have the students post their comments on the blackboard discussion board.

**Review & Assessment:**

**Vocabulary**

SW complete 3-4 Know-It-Notes (6) with a partner. Together they will review examples 1 and 2 and complete the Linear Programming Frayer Model.

**Content**

Independent practice assignment from Algebra 2 Homework packet WS A 3-4 Linear Programming (1-5) all

**Extension / Take-home Activity:**

- Write new terms on index cards with definitions and or examples on the back.