

STRAND 2: LINEAR FUNCTIONS

TOPIC 4: APPLICATIONS OF LINEAR PROGRAMMING

Topic Notes

Mathematical focus

The mathematical focus of this strand is linear programming.

Topic overview

Participants investigate systems of inequalities by exploring linear programming problems. They develop the components of linear programming problems then apply them in groups to various situations.

There are 2 tasks in this topic:

Task 2.4.1: Cotton vs. Corn

Task 2.4.2: Linear Program Applications

TEExES standards focus

TEExES Standard II.006 Patterns and algebra. The teacher understands linear and quadratic functions, analyzes their algebraic and graphical properties, and uses them to model and solve problems.

The beginning teacher:

(C) Applies techniques of linear and matrix algebra to represent and solve problems involving linear systems.

(G) Models and solves problems involving linear and quadratic equations and inequalities using a variety of methods, including technology.

TEExES Standard V.019 Mathematical processes and perspectives. The teacher understands mathematical connections both within and outside of mathematics and how to communicate mathematical ideas and concepts.

(B) Understands how mathematics is used to model and solve problems in other disciplines (e.g., art, music, science, social science, business).

(C) Translates mathematical ideas between verbal and symbolic forms.

(D) Communicates mathematical ideas using a variety of representations (e.g., numeric, verbal, graphical, pictorial, symbolic, concrete).

(E) Understands the use of visual media, such as graphs, tables, diagrams, and animations, to communicate mathematical information.

(F) Uses appropriate mathematical terminology to express mathematical ideas.

TEKS/TAKS focus

TEKS 2A.3 Foundations for functions. The student formulates systems of equations and inequalities from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situations. The student is expected to:

- (A) analyze situations and formulate systems of equations in two or more unknowns or inequalities in two unknowns to solve problems;
- (B) use algebraic methods, graphs, tables, or matrices to solve systems of equations or inequalities; and
- (C) interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts.

High School TAKS Objective 4: The student will formulate and use linear equations and inequalities.

Materials

	Task 1	Task 2
Graphing calculator	*	*
Inequal APP for calculator (opt.)	optional	optional
Geometer's Sketchpad (opt.)	optional	optional
Chart paper		*
Markers		*
Rulers		*

Procedure

Linear programming is a method widely used by industry and the military to find optimal solutions to situations with constraints. Typical linear programming problems involve many variables and constraints and are usually solved using technology (computers). In these tasks, we will look at simple 2-variable problems and analyze the solutions through tables and graphs.

Summary

In these tasks, participants model real life situations with a system of inequalities that define the solution to a problem. Then, they look for a specific solution that maximizes or minimizes an objective function. Linear programming is an example of applied mathematics in industry. Although the examples here are simple in terms of the number of constraints, industry and military use very complex systems to solve problems

Assessment

Reflect and Apply, Teacher Journal for Task 1
Student Journal for Task 2

	Teacher use only	Modify for students	Ready for students
Task 1		*	
Task 2			*