AIR QUALITY IN THE AMERICAS: MATH & MAPS

by
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Level: high school
Course: first and second year algebra

Lesson Overview

Note: The Algebra assignments are taken from D.C. Heath Algebra I and Algebra II.

Days and Topics

1. Cartesian coordinates, basic linear functions, slope as (change in x)/(change in y), Longitude and Latitude worksheet

2. Longitude and Latitude as analogous to Cartesian coordinate system. Location of cities of the world (special emphasis on the Americas) [See below for procedures for this day.]

3. Map reading for longitude and latitude. Review/intro: linear equations and inequalities (Heath II: 115-116: 1-52)

4. Use of minutes and seconds for greater accuracy. NM Cities

5. Students in pairs select a country of the Americas, use print and internet sources to research capital cities, population, elevation, topography, climate, air quality, land use patterns, principal products, imports and exports. [Due on Day 14]

6. Introduction to topography via 3-D model; reading slopes, watersheds, elevations of points; drawing reasonable trails across a relief map. (I: Order of operations, p 23: 1-31. II: Linear Systems, p 125: 1-18.)

7. Practice with topographic map reading, Relief Map of Upper Rio Grande, Sangre de Cristo Mountains, Colorado. (I: Equations & Inequalities, p 30: 1-33. II: continue work on linear systems)

8. Field trip to land donated for agricultural learning center. Discussion of wise land use relating to rainfall, drainage, slope, and use of grazing animals to improve water absorption by soil.

9. Hands-on use of clay and thread to simulate contours

10. Elevations of section corners (I: Verbal Models, p 36: 1-24; p 37: 25-30. II: Algebraic Solutions to Linear Systems, p 134: 7-29)

11. Township, Range and Section as a coordinate system T,R & Sec worksheet (I: p 37: 31-42; p 38: 43-48. II: p 136: 33-53 —left column)

12. I: Linear Functions on Graphing Calculator. Worksheet pp 4-5. II: Review, p 137: 1-20.

13. I: More equations on the Calculator; using the STORE function. II: QUIZ from p 137. Word Problems, pp 142-43: 8-25 (left column)

14. Review of mapping concepts of latitude and longitude, elevation, topography, Township, Range & Section. Whose Time? —worksheet on time zones. Information due on selected countries.

15. Students in pairs select Algebra/Mapping projects, several of which (including Population Density, Population Growth, Food Production and Distribution, and Environmental Effects of Population Growth) were selected from Investigating Mathematics: An Interactive Approach. Other projects were graphs of population and elevations of capitals in the Americas, graphs of air pollution, locations of capital cities of the Americas, and a topographic map of New Mexico.

16. & 17. Work on projects.

18. Projects presented.

Time needed

four-and-one-half week two-hour blocks (approximately 36 class periods)

Materials

Algebra I and Algebra II, published by D.C. Heath; relief map of Upper Rio Grande, Sangre de Cristo Mountains, Colorado; clay; thread; calculator; Investigating Mathematics: An Interactive Approach

Procedures

2nd Assignment: Longitude and Latitude

Estimate latitude and longitude (to the nearest 5 degrees) for these Capital Cities of the Americas:

Santiago, Chile
Lima, Peru
Caracas, Venezuela
Bogota, Colombia
Montevideo, Uruguay
Buenos Aires, Argentina
Brasilia, Brazil
Tegucigalpa, Honduras
Managua, Nicaragua
Mexico City, Mexico

Estimate latitude and longitude (to the nearest 10 seconds) for these New Mexico cities and towns:

Albuquerque
Portales
(El Paso, TX)
Gallup
Roswell
Shiprock
Clayton
Taos
Santa Fe
Socorro