Improving Teacher Quality Program

Mathematics Within: Algebraic Processes and Its Connections to Geometry

Sally G. Fisher

Broad Topic: Longitude & Latitude **Subtopic**: Graphing & Location

Grade Level: 4 **Time Frame**: 10 to 12 60-minute sessions

Aim: Use math to define the globe and maps.

Specific Objectives:

- Students will be able to distinguish between the lines of longitude & latitude.
- Students will discover that the lines of longitude are 15 degrees apart (the entire sphere is 360 degrees). These sections are divided into 24 sections, one for each hour of the day.
- Students will be able to explain that when giving a location with the lines of longitude, an E or W direction must be added; when a location for latitude is given, a direction of N or S must be added.
- Students will be able to locate a place on a map or globe by using the lines of longitude & latitude.
- Students will use math to define these locations.
- Students will create a story to demonstrate their knowledge of locating places on the globe or map.
- Students will plan a trip to at least 5 destinations and give clues as to the location with longitude, latitude, vegetation, landmarks, description of the people, and miles between places. This project may be done in a video, game, creative story, PowerPoint presentation, triptik map, or other acceptable option suggested by the student.

Materials/Supplies:

- Globes
- map with lines of longitude & latitude
- 5 handouts
- oranges
- permanent markers
- Dice
- calculators

Vocabulary:

- North Pole
- South Pole
- Sphere
- Axis
- Parallel
- Equator
- Prime Meridian
- Hemisphere
- Longitude
- Latitude
- North
- South
- East
- West
- Grid
- Quadrants
- Time Zones
- Degree

Introduction

Students will look and explore globes. A discussion will begin about lines of longitude & latitude and why they are important & what they represent.

Body

Have the students group into pairs. Give each pair an orange and work with them to plot out the Equator, Prime Meridian, and International dateline. Have them calculate & draw 4-hour time zones on the oranges. Students will then try to peel orange in one piece and flatten the skin to demonstrate how cartographers tried to draw the world.

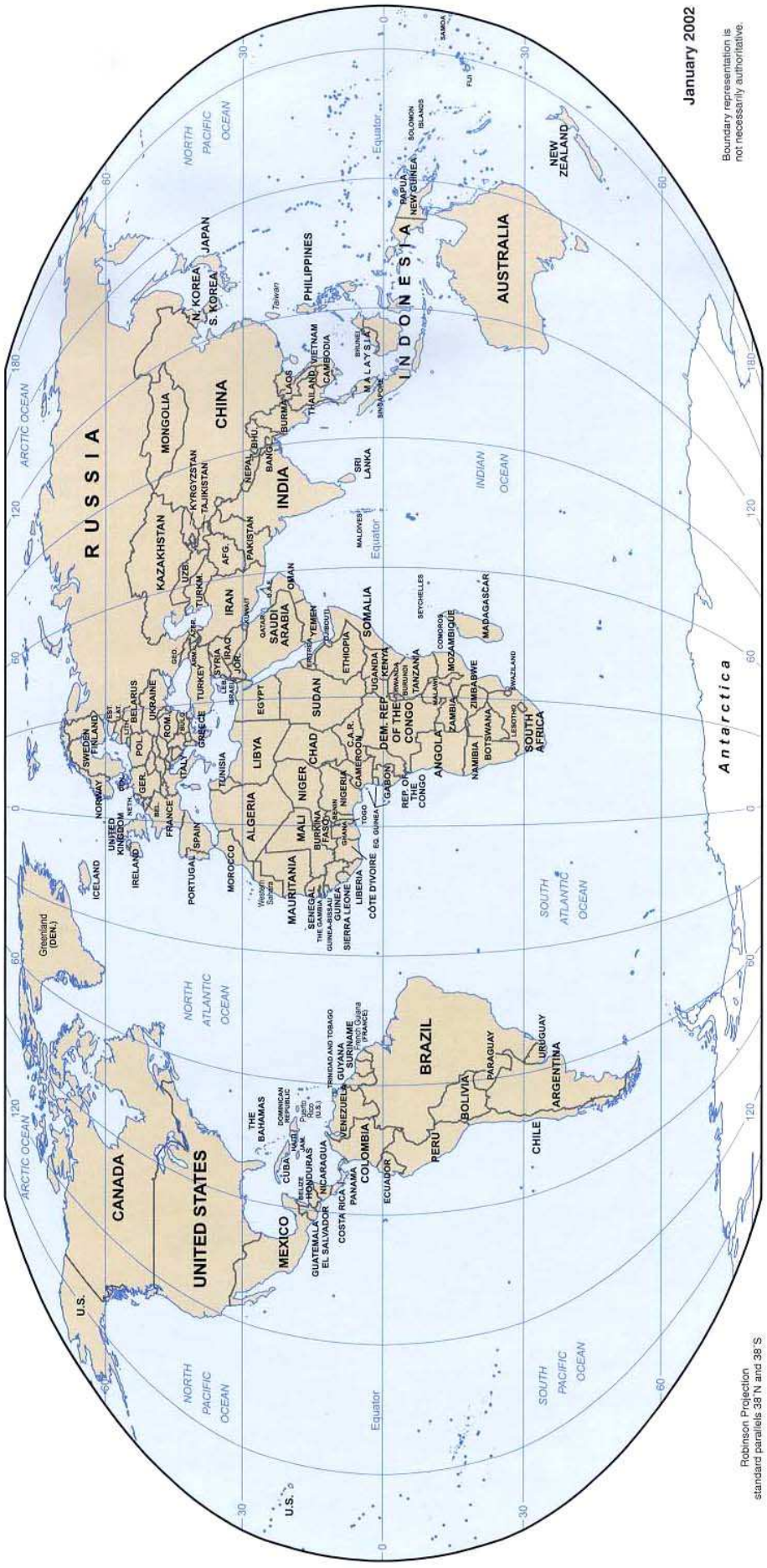
Students will demonstrate their knowledge of longitude and latitude by playing a game that allows them to visit continents, oceans, and/or regions of the world. This game can be called "Vector Travel" or any name that seems appropriate. Students will receive a paper map of the world (Handout 1) and a transparency (Handout 2) with grid lines that coordinate with the lines of longitude and latitude that will be placed over the map. Students can work in ability groups and individually or in teams. Each player/team has two roles of a dice (one for N or S direction-latitude and one for E or W direction-longitude). The number on the dice are multiplied by 10 to increase the distance of travel (or you can multiply by 5, 15, 7, whatever multiplication facts you'd like to stress at the time; or use a larger sided die with more options and no multiplication is needed.) Students move the number of degrees that they have rolled in two directions, making a vector. The object is to land on every continent (ocean, oceans and continents, or more specific countries can be used for more advanced groups). Students record each move on supplied chart (Handout 3). The student or pair that reaches the goal of landing on the targets first is the winner. Students can use game pieces or actually draw on the transparency with Vis-a-Vis markers. Another dimension would be to let student decide on their mode of travel (helicopter, boat, Hummer, by foot, etc.) and incur the obstacles that happen along their travels.

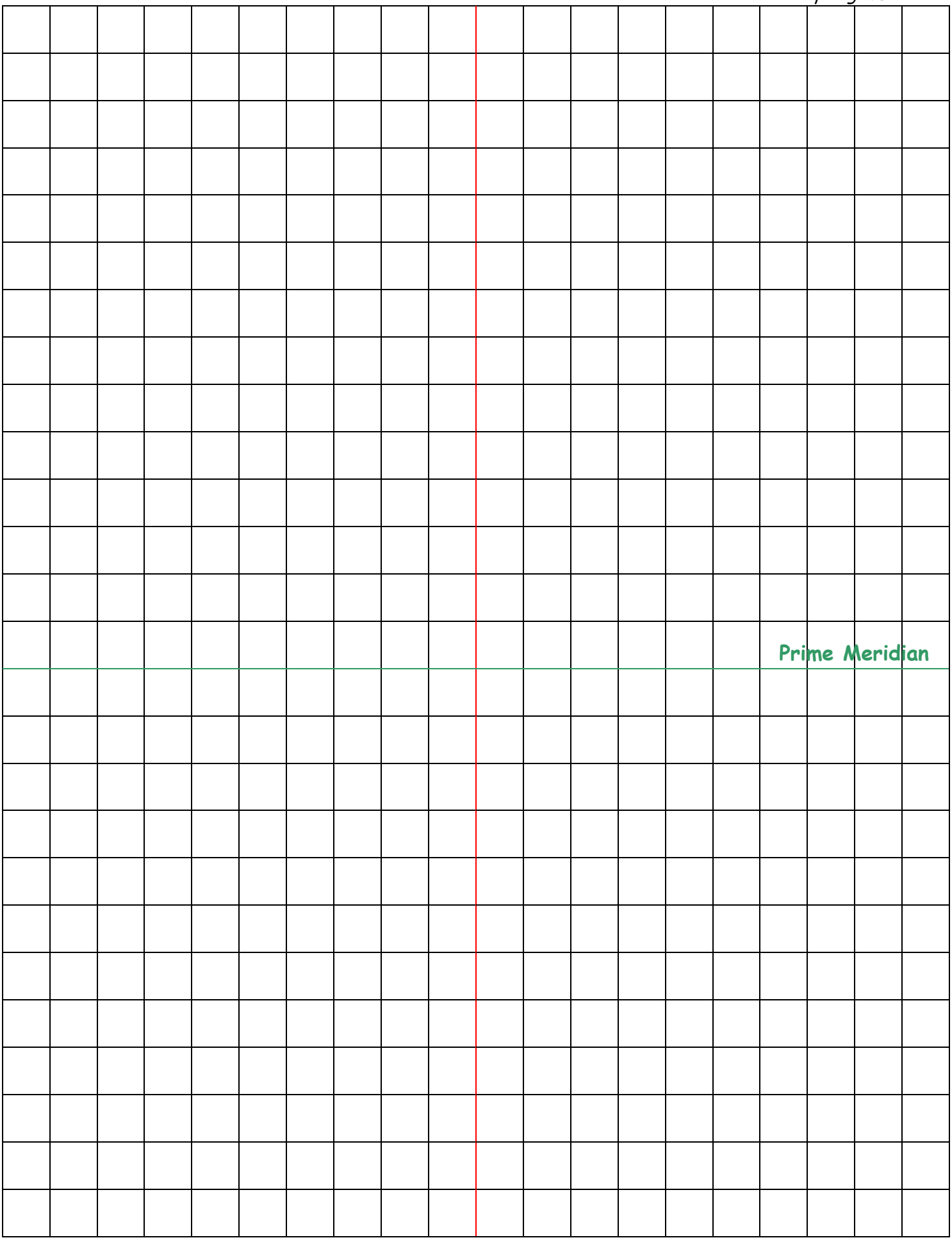
Application

Students will demonstrate their knowledge by creating a story (see Handout 4). Students will plan a trip to at least 5 destinations and give clues as to the location with longitude, latitude, vegetation, landmarks, description of the people, miles between places, etc. This project may be done in a video, game, creative story, or triptik map, or other acceptable options suggested by the student.

Assessment

Students will fill out Evaluation Rubric (see Handout 5) and then teacher will fill out the same evaluation for each student.


January 2002
Boundary representation is not necessarily authoritative.
Robinson Projection
standard parallels 38°N and 38°S
RUSSIA
CANADA
UNITED STATES
CHINA
INDIA
INDONESIA
AUSTRALIA
BRAZIL
ARGENTINA
CHILE
PERU
MEXICO
Antarctica
ARCTIC OCEAN
NORTH PACIFIC OCEAN
NORTH ATLANTIC OCEAN
SOUTH PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
Equator


Prime Meridian
Equator

Scorecard

Location	Direction	Score	Total

Student Activity for Longitude & Latitude

Your job is to create a story to demonstrate your knowledge of locating places on the globe or map. You will plan a trip to at least 5 destinations and give clues as to the location with longitude, latitude, vegetation, landmarks, description of the people, plane flight numbers, miles between places, etc. This project may be done in a video, game, creative story, PowerPoint, triptik map, or other acceptable options suggested by you, the student.

List your cities below. Be sure to keep it a secret from your classmates as they will have to figure out what 5 cities you visited. Make sure you have the correct latitude (N or S) and longitude (E or W) locations correctly recorded. If you need help, see me.

City #1 _____Latitude _____Longitude

City #2 _____Latitude _____Longitude

City #3 _____Latitude _____Longitude

City #4 _____Latitude _____Longitude

City #5 _____Latitude _____Longitude

This is due by _____, 20___. You may turn it in prior to this date.

Please have your parent sign _____ to indicate they have seen this.

Evaluation

Name _____ Date _____

Evaluator ☐ *Teacher* ☐ *Student* ☐ *Resource Teacher*

Subject/Topic _____

CRITERIA	4	3	2	1	0
Evaluate your story. Rate how it demonstrated your knowledge of Longitude and Latitude?					
Evaluate the clues for your 5 cities in terms of interest and sufficiency.					
Evaluate the efficient use of your time. Rate if you were well planned so all the work was done before the due date?					
Evaluate the logical sequence between your story and the clues that you gave to help the viewer find the location?					
Evaluate your enjoyment of the way you chose to share your cities?					
Rate your favorite part of this story or project. Tell us what part you liked.					
Comments:					

4 = The project **exceeds** the criteria. The project shows a heightened level of thinking and creativity.

3 = The project **meets expectation**. The project fulfills the criteria and clearly represents understanding.

2 = The project shows **some achievement** in understanding the criteria. It demonstrates a moderate amount of comprehension of what is expected

1 = The project shows **limited achievement** in understanding the criteria. It demonstrates little or no comprehension of what is expected.

0 = The project was **not attempted** or the criteria is **not present** in any way in this project