



Montana
Office of Public Instruction
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Mathematics

Model Teaching Unit

Graphing Old Man's Journey

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Grade 5 – Approximate Duration: 60 minutes

Stage 1 Desired Results

Established Goals:

Number Sense and Operation Mathematics Content Standard 1: A student, applying reasoning and problem solving, will use number sense and operations to represent numbers in multiple ways, understand relationships among numbers and number systems, make reasonable estimates, and compute fluently within a variety of relevant cultural contexts, including those of Montana American Indians.

- **1.6 Proportional Reasoning:** Understand and apply proportional relationships to model real world situations and to solve problems involving rates, ratios, proportions, percents, and direct variation.

Algebraic and Functional Reasoning Mathematics Content Standard 4: A student, applying reasoning and problem solving, will use algebraic concepts and procedures to understand processes involving number, operation, and variables and will use procedures and function concepts to model the quantitative and functional relationships that describe change within a variety of relevant cultural contexts, including those of Montana American Indians.

- **4.1 Representing and Generalizing Patterns:** Create and use tables, graphs or diagrams, symbolic expressions, and verbal descriptions to represent, analyze, and generalize a variety of patterns involving numbers and operations.
- **4.5 Linear Modeling:** Identify and compute rate of change/slope and intercepts from equations, graphs, and tables; model and solve contextual problems involving linear proportions or direct variation using cultural contexts, including those of Montana American Indians.

IEFA: Essential Understanding 3: The ideologies of Native traditional beliefs and spirituality persist into modern day life as tribal cultures, traditions, and languages are still practiced by many American Indian people and are incorporated into how tribes govern and manage their affairs.

Additionally, each tribe has its own oral histories, which are as valid as written histories. These histories pre-date the “discovery” of North America.

Understandings:

Students will understand...

- that oral histories exist that may differ from the histories they are familiar with.
- how to represent rate with line graphs.

Essential Questions:

- To what extent does a graph tell a story? How does it differ from oral or written stories?
- How can you use a graph to interpret the events of a story?



Mathematics Grade 5 – Graphing Old Man’s Journey (continued)

Students will be able to...

- represent portions of the Blackfeet creation myth with a line graph.
- use a line graph to represent change over time.
- explain the connection between rate and steepness of a line.
- construct and interpret a line graph.

Students will know...

- the features of line graphs.
- a graph can be a visual representation of a story.
- that in a line graph using time versus distance, a steeper line represents a faster rate while a flatter line represents a slower rate.

Stage 2 Assessment Evidence

Performance Tasks: Line Graphs Worksheet

Other Evidence: Participation in class discussion, oral justifications, individual questioning of students

Stage 3 Learning Plan

Learning Activities: Students listen to a Blackfeet creation story. Using portions of the story, students learn how to represent rates and frequencies with line graphs and histograms.

BACKGROUND (Essential Understanding 3)

Tribal languages, cultures, and traditions are alive and well throughout Indian country. Indigenous languages are still spoken, sacred songs are still sung, and rituals are still performed. It is not important for educators to understand all of the complexities of modern day contemporary American Indian cultures, however, educators should be aware of their existence. They should also understand the ways cultures might influence much of the thinking and practice of American Indians today.

These histories and traditions may be private, to be used and understood only by members of that particular tribe. Educators should be aware of this issue when asking students about their histories, ceremonies, and stories.

Educators should also be consistent with policies surrounding “religious/spiritual activities” and ensure that Native traditions and spirituality are treated with the same respect as other religious traditions and spirituality. Each tribe has a history, as valid as any other belief, which can be traced to the beginning of time. Many tribal histories place their people in their current traditional lands in Montana. For example, educators should respect these beliefs when teaching about “the history of mankind,” particularly regarding the Bering Strait Theory. Many tribal histories will be told only orally as they have been told and passed down through generations.

Some tribes may only tell certain stories during certain times of the year, and this knowledge should be respected in classrooms.

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1. Warm-Up Activity

Arrange students in a circle or line to play “telephone”. The first person whispers a phrase into the ear of the second person, with each repeating what he or she heard. The last person to receive the message states the message out loud to the group. A comparison of the original message is made to the final message which has usually been altered through the oral process. Start with the phrase, “The old woman wandered down a dusty road that wound around a bend and crossed a rippling stream before heading up the hill to her home among the cliffs.”

After the activity, compare the original message to the final one. Were all the details still intact? Was the main message still communicated?

Ask students what they think would have happened if you wrote the message on a piece of paper and then passed it to each person, having them read it or copy it. (It would most likely remain close to the original.)

2. Introduce the concept of storytelling.

- Ask students about their experiences with storytelling. Ask if any of them listen to stories passed on through generations in their families, or listen to special stories during holidays. Some may relate to family gatherings where the recalling of events that occurred in the past are retold year after year, like remember the time when the bridge washed out...or when Dad surprised us with... Is the story always told exactly the same and with the same detail? (Some details may be enhanced or deleted depending on the story teller, thus altering the versions. Some persons may use effects such as their voice tone, volume, pausing to emphasize certain parts of the story.)
- Explain to students that oral storytelling is an important tradition in Native American cultures. Even though the details may vary among Story Tellers, these oral stories communicate what some people feel are the highest truths from their tribal histories. Tell students you will be reading an oral story from the Blackfeet Indians that was eventually recorded and published in a book in 1953. Explain that a myth (preferably called a creation story) is “a traditional story accepted as history that serves to explain the world view of a people” (wordnet.princeton.edu)
- Ask that while you read, students to try to visualize the story, especially the activities that take place during the story.

3. Read aloud to students the Blackfeet story, “The Creation” (found at www.opi.mt.gov/pdf/IndianEd/Resources/MTIndiansHistoryLocation.pdf)

4. Handout Line Graphs Worksheet.

5. Direct students to look at the graph in Question 1.

- Discuss the axes. Ask what the horizontal axis represents. (time) Discuss how to read the horizontal axis since there are no intervals given. (Read from left to right, further right, more time has passed) Ask what the vertical axis represents (distance traveled). Again ask how to read the distance since no units are given. (As you move up the vertical Old Man has traveled more total distance). For students having difficulty with these concepts you may want to label the horizontal axis with increments in hours and the vertical with miles.
- Contrast the first two segments of the line graph. Read aloud or have students read to themselves parts *a* and *b* of the story. Then ask why the graph changes and what the changes represent. Guide students to understand that Old Man starts walking at a constant speed. If students misinterpret segment *a* as increasing speed since the line is directed upward, have them make stair steps on the graph by repeatedly following the horizontal grid lines of the graph paper by going right 1 segment and then up vertically as much as needed

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to reach the line. This way they can see that for each equal segment of time, he is traveling the same distance since the vertical segments in this section are all equal in length. Then contrast this to the steepness of segment *b* where Old Man is crossing the river. Ask students why the line segment is not as steep. (Crossing a river takes longer and he must walk slower through the water.)

- Continue comparing the remainder of the segments and aligning them with Old Man’s actions, speed, and distance. Allow students to share observations and conclusions about the graph. Be sure to point out the relationship between the times Old Man is stopped and the flat horizontal segments *c* and *e*. In both these, time continues to pass, but his total distance remains unchanged while he is stopped, so it does not increase or decrease.
- Ask students to brainstorm the advantages/disadvantages of using a graph to represent Old Man’s journey. (Advantages include: It is a quick visual reference that shows his pace without having to read through the story. Disadvantages include: It is one person’s interpretation of the Old Man’s distance and time. There is no set number of miles or time that he traveled related in the story. Many of the details of the story such as what he was creating or saying during that time are not communicated.)

6. Direct students to look at the graph in Question 2.

- Ask students to choose one of the graphs that best represents the Old Man’s speed as he takes a Big Horn sheep up the mountain and an antelope down the mountain. Re-read the corresponding paragraphs of the story aloud if desired.
- Discuss students’ choices and allow students to share justifications for their choice or their elimination of the other two graphs. (Graph A is the best choice) Most students will be able to eliminate Graph C since the distance decreases as time passes. Some may choose Graph B because its shape “looks” like a steep mountain. Use this opportunity to talk about your walking rate as you climb a mountain (it is slower) than when you descend a mountain (faster, thus Old Man descends the same distance in less time with Graph A)

7. Assign Question 3 to be completed individually.

- Graphs to Question 3 will vary since no specific units are designated for time or distance. The idea is for students to understand the overall shape of the graph without being focused entirely on the units of measure.

8. Turn in Line Graphs Worksheet.

- Check for key characteristics in students’ graphs: walking should show a line going up, high hill walking should be less steep of a line going up, resting should show a flat line, and sliding down should be a line going down. Since sliding indicates a faster pace than climbing, it should be steeper than the uphill climb.

9. Share information about other tribes’ stories.

- Discuss that Old Man’s Journey is one of many stories told by Native Americans. Salish and Pend d’Oreille tribes’ oral histories tell of their placement in the Montana region through a story of the coyote. Many of the Coyote stories contain what may be considered fairly precise descriptions of the geological events of the last ice age (*Montana Indians, Their History and Location* p. 24)

Materials/Resources Needed:

Copy of “The Creation” (www.opi.mt.gov/pdf/IndianEd/Resources/MTIndiansHistoryLocation.pdf Blackfeet Reservation, document pages 8-10)

Copies of Line Graphs Worksheet (one for each student)

Graph paper for each student

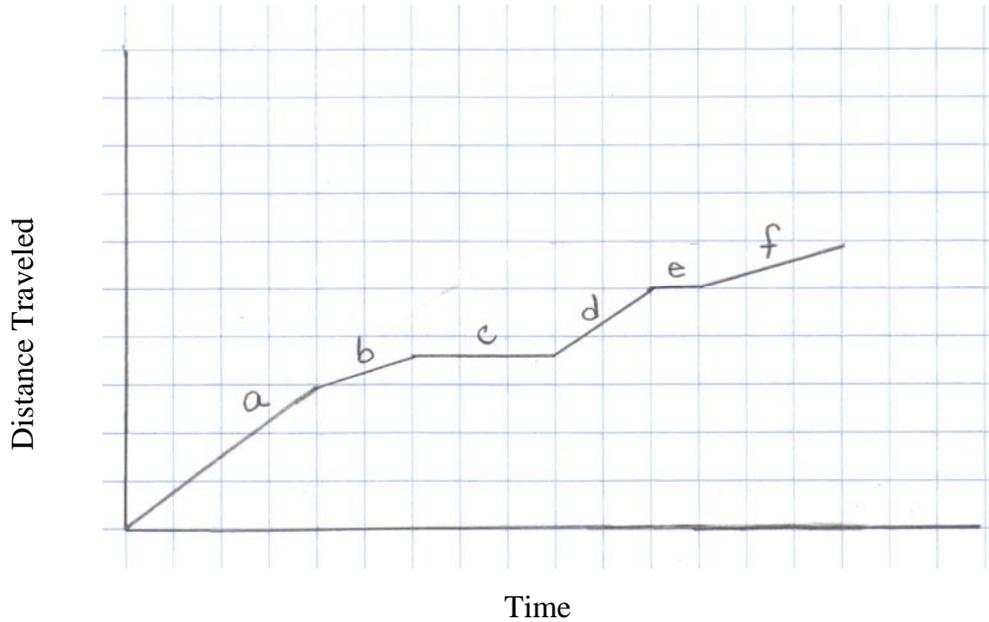
Ruler or straight edge for each student

Line Graphs Worksheet

Name: _____

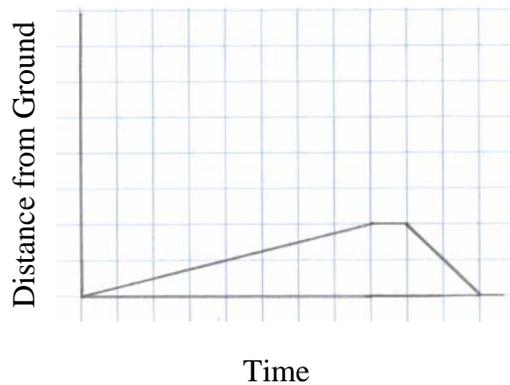
1. Study the line graph below. Discuss as a class the relationship between the story and the labeled segments of the graph.

Old Man's Travels

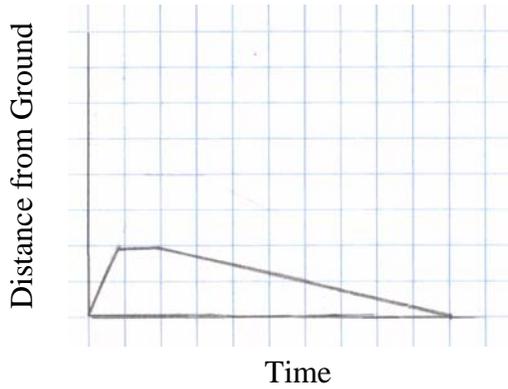


2. As the story progresses, Old Man leads a Bighorn sheep up a mountain and then later leads an antelope down from the mountain to the prairie. Study the three graphs below to determine which graph best represents his trip on the mountain.

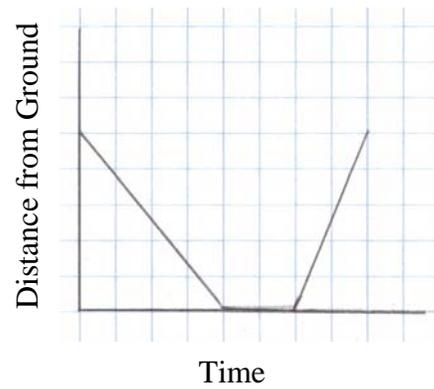
Graph A: Mountain Trip



Graph B: Mountain Trip



Graph C: Mountain Trip



Which graph did you choose? _____

Why? Justify your choice. _____

3. On graph paper, create a line graph to represent Old Man's distance above the ground during the following portion of the story. Be sure to include a title and labels on the horizontal and vertical axes.

When he awoke from his sleep, he traveled farther north until he came to a high hill. He climbed to the top of it and there he sat down to rest. As he gazed over the country, he was greatly pleased by it. Looking at the steep hill below him, he said to himself, "This is a fine place for sliding. I will have some fun." And he began to slide down the hill. The marks where he slid are to be seen yet, and the place is known to all the Blackfeet tribes as "Old Man's Sliding Ground".