

Altitudes and Temperatures

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Discipline / Subject: Math

Topic: Integers

Grade Level: 5th-8th

Resources / References / Materials Teacher Needs:

- Attached handouts and map of Iditarod Trail
- Access to www.iditarod.com & www.weather.com , helpful but not necessary
- Access to Google Earth, helpful but not necessary

Lesson Summary:

Students use the altitudes of the checkpoints on the Iditarod Trail to calculate the differences (positive and negative) in altitude while running the race. Students use some average temperatures (highs and lows) of the checkpoints during March to calculate the differences in temperature, and draw some conclusions about how the geography of the trail affects temperature.

Standard's Addressed: (Local, State, or National)

1. NY Math (2005) 5th & 6th Grade Problem Solving;
 - *PS.3 Interpreting information correctly, identify the problem, and generate possible solutions.
 - *PS.5 Formulate problems and solutions from everyday life situations.
 - *PS.11 Translate from diagram to a number or symbolic expression
2. NY Math (2005) 7th Grade, Number Sense and Operations
 - *N.12 Add, subtract, multiply, and divide integers
 - *N.13 Add and subtract two integers (with and without the use of a number line)
3. NY Math, Science, and Technology, NY: Elementary Core Curr: Standard Analysis, Inquiry, and Design
 - *Major understanding M1.1c Apply mathematical skills to describe the natural world
 - *Major Understanding M2.1b Explain verbally, graphically, or in writing patterns and relationships observed in the physical and living environment

<p>Learning Objectives:</p> <ol style="list-style-type: none"> 1. Students will calculate the differences in altitude between the checkpoints on the Iditarod Trail. 2. Students will calculate the differences between the high and low temperatures at various checkpoints along the Iditarod Trail during the month of March. 3. Students will draw conclusions about the geography of Alaska and temperatures. 4. Students will look for patterns between altitudes and temperatures. 	<p>Method of assessment for learning</p> <ol style="list-style-type: none"> 1. Altitudes Activity handout 2. Temperature Activity handout
<p>Procedural Activities</p> <p>Hook: Show video clips from an Iditarod video or the Iditarod Insider showing the descent down a mountain &/or the wind blowing across the Bering Strait.</p> <ol style="list-style-type: none"> 1. Show students a map of the Iditarod Trail. If access to www.iditarod.com, show the interactive site with elevations. If access to the Insider, show a virtual fly by. 2. Ask students how they would describe the trail. 3. Explain that there are many different challenges along the trail, including ascents and descents. 4. Show them how to find the difference in two altitudes using a + for higher change of elevation and – for lower change of elevation. 5. Start a chart from Willow to Yentna. 6. Using the map and chart provided, students complete the change in elevation chart and answer the questions that follow. (This may be done individually or in partners depending on the age and ability of the students) 7. Discuss the results. 8. Show students a temperature chart with highs and lows. Explain how to calculate the difference between a high and low temperature using negative numbers. 9. Have students complete the chart, including the altitudes. 10. In partners, students discuss any relationships or patterns they see between the geography and temperatures & the altitude and temperatures. 11. Share observations with the whole class. 	
<p>Materials Students Need:</p> <ul style="list-style-type: none"> • Map of Iditarod Trail and Chart of Altitudes • Activity Handout (attached) • Access to Internet for www.iditarod.com & www.weather.com (optional) • Access to Google Earth (optional) 	
<p>Technology Utilized to Enhance Learning:</p> <ul style="list-style-type: none"> • Above websites 	

Other Information:

Bloom's Taxonomy: Knowledge, Comprehension, Application, Analysis. (for extensions, Synthesis and Evaluation)

Multiple Intelligences: Mathematical, Verbal-Linguistic, Interpersonal, Naturalist

Modifications for Special Learners/ Enrichment Opportunities:

- This activity can also be given as an assessment after a unit on integers (grades 6-8)
- If during the Iditarod, students can chart the temperatures of more checkpoints using www.weather.com
- For struggling students, number lines which include negative numbers can be used to help calculate the differences in temperature.
- Advanced students can use the temperatures (if access to more checkpoints) to determine a mean temperature for the race. (This can be done at the end of the race)
- Students can write a letter to a rookie musher describing the challenges in altitude and temperatures in various spots of the trail according to their findings.
- For an extension of more length, students can use the geography of Alaska (or another state or country) to create a shorter qualifying race that would have the challenges of ascents and descents. They should give the altitudes of the various checkpoints on their trail and determine what month the race should be run.

Grade 5 Horizons Math
Integers Project: The Iditarod

Name _____

Date _____

Part I: The Highs and Lows of the Trail

Using the attached trail map, calculate the altitude change between each checkpoint of the Iditarod trail for an even year. Record your findings on the chart below.

FROM	TO	ALTITUDE CHANGE (include + or -)
Willow	Yetna	
Yetna	Skwentna	
Skwentna	Finger Lake	
Finger Lake	Rainy Pass	
Rainy Pass	Rohn	
Rohn	Nikolai	
Nikolai	McGrath	
McGrath	Takotna	
Takotna	Ophir	
Ophir	Cripple	
Cripple	Ruby	
Ruby	Galena	
Galena	Nulato	
Nulato	Kaltag	
Kaltag	Unalakleet	
Unalakleet	Shaktoolik	
Shaktoolik	Koyuk	
Koyuk	Elim	
Elim	Golovin	
Golovin	White Mountain	
White Mountain	Safety	
Safety	Nome	

- 1) What is the change in altitude from the start of the race in Willow to the end of the race in Nome?

- 2) Is the Iditarod race more uphill or downhill? Show your work. Explain your answer.

Part II: Put on your Parka Folks! It's COLD out there.

**Temperatures in Alaska in March
(according to www.weather.com)**

Complete the altitude column from the map.

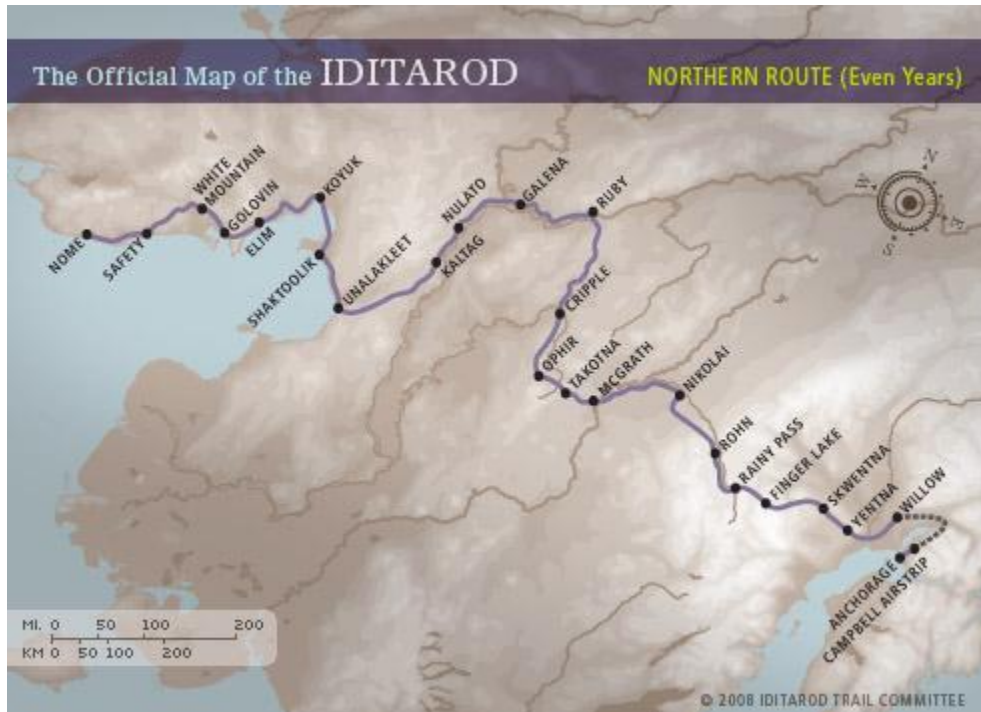
Calculate the difference between the high and low average temperatures from each location.

Answer the questions that follow.

Checkpoint	Altitude	High Temp.	Low Temp.	Difference
Willow		35 deg.F	6 deg.F	
Skwentna		35 deg. F	9 deg. F	
McGrath		25 deg. F	-2 deg. F	
Takotna		25 deg. F	-2 deg. F	
Galena		17 deg. F	-5 deg. F	
Unalakleet		20 deg. F	2 deg. F	
Nome		18 deg. F	1 deg. F	

- 1) From this data, what part of the route appears the most cold?
- 2) What factor(s) may affect how cold it feels in these locations?
- 3) Is there any relationship between the altitude and the temperature? Explain.
- 4) Using the chart above, write a question of your own that can be answered using this data.

Iditarod Trail Map (Even Years)



Checkpoint	Altitude
Willow	236 ft./72 m.
Yentna	77 ft./23 m.
Skwentna	189 ft./58 m.
Finger Lake	979 ft./298 m.
Rainy Pass	3771 ft./1149 m.
Rohn	1440 ft./439 m.
Nilolai	413 ft./126 m.
McGrath	328 ft./100 m.
Takotna	575 ft./ 175 m.
Ophir	696 ft./212 m.
Cripple	430 ft./ 131 m.
Ruby	411 ft./ 125 m.
Galena	131 ft./30 m.
Nulato	149 ft./46 m.
Kaltag	125 ft./38 m.
Unalakleet	24 ft./7 m.
Shaktoolik	3 ft./9 m.
Koyuk	38 ft./12 m.
Elim	14 ft./4.2 m.
Golovin	3 ft./9 m.
White Mountain	132 ft./40 m.
Safety	3 ft./9 m.
Nome	45 ft./14 m.