

# Iditarod Nutrition Plan

## Fuel for the Fire

**Developed by:** Sid Lucas

**Discipline / Subject:** Life Science/STEM

**Topic:**

Energy/Nutrition/Metabolism/Cellular Respiration

**Grade Level:**

9-12

**Resources / References / Materials Teacher Needs:**

- 1) Trent Herbst's Email correspondence.
- 2) Printed maps of the Iditarod Trail (Note that race route varies with even and odd number of years). See link:  
[http://d3r6t1k4mqz5i.cloudfront.net/wp-content/uploads/2011/12/route\\_download.jpg?cecb8a](http://d3r6t1k4mqz5i.cloudfront.net/wp-content/uploads/2011/12/route_download.jpg?cecb8a)
- 3) Guide to calculating Calories (Kcals) per pound in dog food (provided by Lloyd Gilbertson and Caribou Creek Dog Food) Use along with the web site:  
<http://www.cariboucreekgold.com/>
- 4) Website to determine Calories per pound of raw beef, raw lamb, and chicken fat. Suggested site: <http://www.nutrientfacts.com/>
- 5) Students should have prior knowledge and understanding of Calories as a unit of energy. Students should also recognize Carbohydrates, Proteins, and Fats as the major biomolecules required for providing organisms with Calories. Use the following rule to determine the energy provided by one gram of each major biomolecule: Carbohydrates - 4 Kcals/gram; Protein - 4 Kcals/gram; Fats - 9 Kcals/gram. This lesson also requires students to apply their understanding of several mathematical concepts, including fractions, proportions, and solving basic algebraic equations. I have found it helpful to model the skills necessary to solve basic nutrition problems using food labels of common foods. Students can then practice and master the skills with their own chosen food labels along with your guidance.  
Example:  
The average human requires 2,000 Kcals per day. One pound of pepperoni pizza provides 1,160 Kcals. How many pounds of pizza does it take to provide your daily requirement of 2,000 Kcals?
- 6) Internet can be used by students to acquire Iditarod Trail data by using the following link: <http://iditarod.com/about/the-iditarod-trail/>  
Teachers can also print this data ahead of time and provide students with paper copies if computers are not readily available.
- 7) Trail Schedule Guidelines.

**Lesson Summary:**

Students use problem-based learning strategies to calculate dog food quantities necessary to supply the calories required for each food drop along the Iditarod Trail according to a race plan and run/rest schedule determined by an Iditarod musher.

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

- 1) Use a model to explain cellular respiration as a chemical process whereby the bonds of food molecules and oxygen molecules are broken and bonds in new compounds are formed that result in a net transfer of energy.
- 2) Show how the ideas and themes of science can be used to make real-life decisions about use of resources.
- 3) Use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information.
- 4) Create equations that describe numbers or relationships.

**Learning Objectives:**

- 1) Students can collaborate to brainstorm and develop questions to answer for the sake of creating an Iditarod nutrition plan (goal is to develop a standard list of questions for all students to use).
- 2) Students can obtain and use nutrition data to calculate the amount of Calories/lb. for various foods used by Iditarod sled dogs. This data can further be used to calculate the amount of each food necessary to re-fuel the daily Calorie expenditure of an average Alaskan Husky sled dog.
- 3) Students can use project guidelines and obtained data (average travel speed, run/rest schedule) to calculate and record resting points on the Iditarod trail.
- 4) Students can provide a final plan for the amount and location of rests and food drops along the Iditarod trail, along with the total amount of each food item necessary in each food drop. The total amount of each food item required for completion of the race as well as the total time required to run the race can also be calculated.

**Assessment:**

Method of assessment for learning

- 1) Teachers can allow collaborative groups to share their questions to the whole group in order to formatively assess developed questions and offer feedback.
- 2) Teachers can check student data and calculations for accuracy before moving on to succeeding steps.
- 3) Teacher can check student maps to assess for accurate placement of rest positions along the trail.
- 4) Teacher can require students to organize and prepare a final nutrition report along with a labeled Iditarod trail map complete with symbols and key.

### **Procedural Activities**

- 1) Establish collaborative groups of 3-4 students. Each group will seek to answer the question, “How much food needs to be dropped at each food-drop along the Iditarod Trail to meet the Calorie expenditure of Trent Herbst’s dog team?” Groups will work together to brainstorm questions that will need to be answered to solve the problem.
- 2) Groups will share developed questions with the whole-group to obtain feedback and support each of the other groups.
- 3) Class will decide on the essential questions necessary to solve the question (see Essential Questions and their answers in the Other Information section.
- 4) Use [www.nutrientfacts.com](http://www.nutrientfacts.com) to find the Kcals/lb. provided by regular raw ground beef, raw lamb, and chicken fat.
- 5) Use the Caribou Creek Dog Food website <http://www.cariboucreekgold.com/>, and the guide to calculating Kcals in dog food, to calculate how many Kcals in each pound of Caribou Creek kibble.
- 6) Use nutrition data to calculate how many pounds of each food item are necessary to meet the Calorie expenditure of each dog and entire team per feeding (number of feedings will later be determined for each food drop).
- 7) Follow the Trail Schedule Guidelines to calculate the musher’s resting locations along the Iditarod Trail. Use estimation to mark the locations of rest stops between checkpoints. Rest stop locations can be marked with a vertical slash (/). If rest stops fall on checkpoints, include a circle around the slash. If the checkpoint is selected as a mandatory rest, record the time of rest next to the checkpoint name.
- 8) Use your map with rest locations and rest times to determine how many feedings need to be sent to each food drop. Highlight these numbers next to the name of each corresponding checkpoint on the map.
- 9) Calculate total elapsed time to complete the Iditarod race.
- 10) Create a spread sheet of your final nutrition plan, including food-drop checkpoints, number of feedings at each food-drop, Food type and pounds needed for both individual dog/feeding and team/feeding, total pounds of each food type needed for entire race, and total elapsed time to complete the Iditarod race.

**Materials Students Need:**

- 1) White boards/large construction paper and markers for recording questions during collaboration.
- 2) Trail Schedule Guidelines.
- 3) Two copies of Iditarod Trail map (One for sloppy copy, one for final product).
- 4) Iditarod Trail data.
- 5) Trent Herbst Email correspondence.
- 6) Internet access to obtain nutrition information.
- 7) Guidelines for calculating dog food Calorie content.
- 8) Calculator
- 9) Student Journal for organizing and recording information.
- 10) Microsoft Excel, or similar program for creating final plan.

**Technology Utilized to Enhance Learning:**

- 1) Internet for data research and Iditarod Trail information (if not provided by teacher).
- 2) Microsoft Excel, or similar program.

**Other Information:**

I have provided a copy of a sample key for both the completed trail map and nutrition information. However, it may be beneficial to work through the steps of the project prior to introducing it to students to identify potential stumbling blocks your students may face.

**Essential Questions:**

- 1) How many Calories does an average Alaskan Husky require per day?  
**11,000**
- 2) How many times do Alaskan Huskies get fed per day?  
**2x**
- 3) What do Alaskan Huskies eat?  
**Kibble (Commercial Dog Food) - 50% of Kcals**  
**Raw Beef (ground regular) – 25% of Kcals**  
**Raw Lamb – 12.5% of Kcals**  
**Chicken Fat – 12.5% of Kcals**
- 4) How many dogs are on an Iditarod team?  
**16**
- 5) How fast does an Iditarod team travel?  
**Average 8 mph**
- 6) How many Iditarod checkpoints are there?  
**23 checkpoints after the start in Willow, including Nome.**
- 7) How far is it to each Iditarod checkpoint?  
**See trail mileage at <http://iditarod.com/about/the-iditarod-trail/>**
- 8) Can food be dropped at each Iditarod checkpoint?  
**No food drops at Yentna, Finger Lake, Golovin, or Safety. Also, no need to drop food at Anchorage or Willow, as dogs get fed before starting the race.**
- 9) Do teams ever take extended rests?  
**Every team takes a mandatory 24 hour rest at some checkpoint along the trail. There is also a mandatory 8 hour rest at any checkpoint along the Yukon River, and an 8 hour rest at White Mountain (See trail guidelines for feeding rules at these checkpoints).**

**Modifications for Special Learners/ Enrichment Opportunities**

There are many opportunities to change variables in this project, such as brand of dog food, average speed of dogs, run and rest times, alternate food choices, etc. This provides opportunities for students to create unique nutrition plans that can be critiqued and compared. This will, however, require additional time to communicate with students in order to assess the accuracy of their work. Motivated students can apply what they have learned by independently producing a personal nutrition plan designed to optimally provide the necessary energy for an activity that interests them. Past students have created plans for mushing the Iditarod Sled Dog Race, competing in Iron Man competitions, running marathons, and many other physical endeavors. Students can formally present their methods and results to an audience.

Research requirements can be reduced by providing information for students to work with. Pre-calculated nutrition data can be supplied, mapping guidelines can be simplified, and overall project goals can be tailored to meet student needs.