Summarizing a Set of Data with Iditarod Race Statistics

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Discipline / Subject: Math

Topic: Mean, Median, Mode, Range, Data Analysis, Adding Decimals, Subtracting Decimals, Dividing Decimals

Grade Level: 6, 7, 8

Resources / References / Materials Teacher Needs:

- **Mean, Median, Mode, and Range worksheet/ packet**
- **Iditarod Race Archives**
- **Access to the Iditarod website – www.iditarod.com**

Lesson Summary:
Students will summarize a set of data using a measure of center, such as mean, median, or mode, or a measure of variability, such as range. They will research Iditarod race archives in order to find a set of data to summarize.

Standards:

CCSS.MATH.CONTENT.6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

CCSS.MATH.CONTENT.6.SP.B.5.C Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

CCSS.MATH.CONTENT.6.SP.B.5.D Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

CCSS.MATH.CONTENT.6.NS.B.2 Fluently divide multi-digit numbers using the standard algorithm.

CCSS.MATH.CONTENT.6.NS.B.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

6.SP.A. 2 Understand that a set of data collected to answer a statistical question has a distribution, which can be described by its center (median, mean, and/or mode), spread (range, interquartile range), and overall shape.

6.SP.B.5 Summarize numerical data sets in relation to their context, such as by reporting the number of observations, describing the nature of the attribute under investigation, including how it was measured and its unit of measurement, and giving quantative measures of center (median and/or mean) and variability (range and/or interquartile range) as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data was gathered.

6.NS.B.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Learning Objectives:	Method of assessment for learning
1. Students will be able to summarize a set of data using a measure of center, such as mean, median, or mode, or a measure of variability, such as range.	1. Mean, Median, Mode, and Range have been successfully found for Joar's data and Dallas' data. All work has been shown.
2. Students will be able to add and subtract decimals.	2. Students will research the Iditarod race archives, complete a table and fill in the corresponding data based on speed, and then find the mean, median, mode, and range. Students will share their findings.

Procedural Activities

1. Review the definitions of mean, median, mode, and range.

2. Review the examples of how to find the mean, median, mode, and range of a data set.

3. As a class, look at Joar's 2018 Iditarod Race Statistics and complete 1 (a, b, and c) and 2 (a, b, and c).

4. Put students in groups of 3-4. Have students look at Dallas' 2016 Iditarod Race Statistics. As a group have them complete 1 (a, b, and c) and 2 (a, b, and c). When all groups have finished, check for understanding by reviewing as a class.

5. Make sure all students have access to technology and the Iditarod website.

6. Model how to navigate through the race archives.

7. Have students independently research the archives, select one Iditarod Race finisher, create their own table, and find the mean, median, mode, and range of the data.

8. Share the results with one another and/or display the students' work around the room.

Materials Students Need:

- Mean, Median, Mode, and Range packet
- Technology to access the Iditarod Race Archives
- Optional- chart paper to record their independent data findings/ research

Technology Utilized to Enhance Learning:

- Chromebooks, Ipads, Desktop Computers, etc. to access the Iditarod Website
- Visualizer to review problems as a class

**Other Information:**

N/A

Modifications for Special Learners/ Enrichment Opportunities:

- Provide access to a calculator
- Reduce the number of "checkpoints" / data which the student (s) must record and summarize
- Provide a reference sheet with definitions and examples
- Graph the data on a scatterplot
- As a follow-up lesson, have students use mean deviation in order to compare how consistent a particular musher is
- Have students make predictions for this year's upcoming race based off of their findings
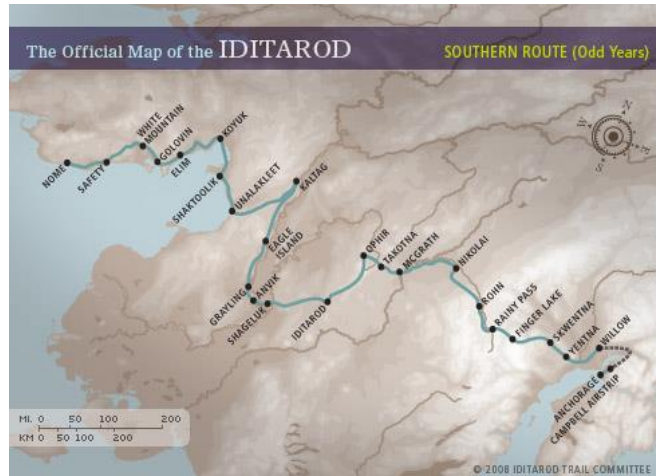
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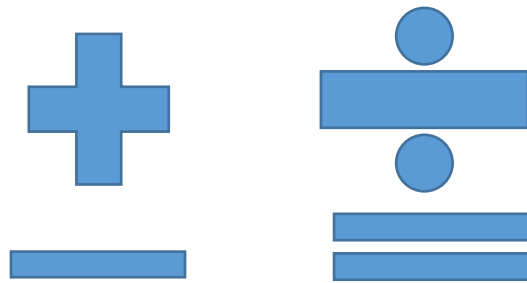
Statistical Measures

Mean	The sum of data divided by the number of values in the data set
	$(10.77 + 5.71 + 6.78 + 5.65 + 8.58 + 5.71) \div 6 = \textbf{7.20}$
Median	The middle data value of a set
	5.65 5.71 **5.71** **6.78** 8.58 10.77 $(5.71 + 6.78) \div 2 = \textbf{6.245}$
Mode	The data value that occurs most frequently
	5.65 **5.71** **5.71** 6.78 8.58 10.77 Mode = **5.71**
Range	The difference between the greatest value and the least value
	5.65 5.71 5.71 6.78 8.58 **10.77** $10.77 - 6.65 = \textbf{4.12}$

Key Concept: You can summarize a set of data using a measure of center, such as the mean, median, or mode, or a measure of variability, such as the range.

The Official Map of the IDITAROD — SOUTHERN ROUTE (Odd Years)

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The following table shows musher Joar Leifseth Ulsom's race speeds during his 2018 Iditarod Race. Use the data to answer the questions that follow.

Checkpoints	Speed (mph)
Willow to Yentna Station	10.54
Yentna Station to Skwentna	4.89
Skwentna to Finger Lake	8.30
Finger Lake to Rainy Pass	8.53
Rainy Pass to Rhon	8.75
Rhon to Nikolai	5.67
Nikolai to McGrath	6.97
McGrath to Takotna	6.92
Takotna to Ophir	7.89
Ophir to Iditarod	5.13
Iditarod to Shageluk	7.78
Shageluk to Anvik	7.61
Anvik to Grayling	6.28
Grayling to Eagle Island	N/A Note: Eagle Island was not an official checkpoint this year due to weather
Eagle Island to Kaltag	5.09
Kaltag to Unalakleet	5.51
Unalakleet to Shaktoolik	7.16
Shaktoolik to Koyuk	6.09
Koyuk to Elim	6.78
Elim to Golovin	N/A
Golovin to White Mountain	6.76
White Mountain to Safety	6.93
Safety to Nome	7.06

1. The table shows Joar's race speeds between checkpoints throughout the Iditarod. Find the mean.

a. Find the sum of the speeds.

Sum = _____

b. Next, **DIVIDE** the sum by the number of values in the data set.

_____ ÷ _____ = _____.

c. The mean of Joar's speeds during the 2018 Iditarod Race is _____.

Photo by Jeff Schultz / IditarodPhotos.com

2. The table shows Joar's race speeds between checkpoints throughout the Iditarod.

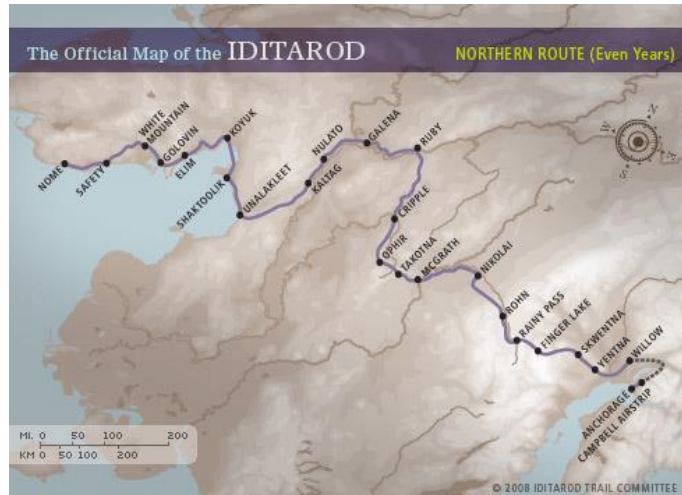**a.** Find the median of the data. List the data in order from least to greatest.

Median = _____

b. Find the mode of the data.

Mode = _____

c. Find the range of the data.

_____ $-$ _____ = _____

The following table shows musher Dallas Seavey's race speeds during his 2016 Iditarod Race. Use the data to answer the questions that follow.

Checkpoints	Speed (mph)
Willow to Yentna Station	10.20
Yentna Station to Skwentna	8.87
Skwentna to Finger Lake	7.64
Finger Lake to Rainy Pass	8.96
Rainy Pass to Rhon	8.30
Rhon to Nikolai	5.67
Nikolai to McGrath	8.83
McGrath to Takotna	8.18
Takotna to Ophir	9.14
Ophir to Cripple	5.54
Cripple to Ruby	7.25
Ruby to Galena	8.72
Galena to Nulato	5.66
Nulato to Kaltag	11.75
Kaltag to Unalakleet	6.53
Unalakleet to Shaktoolik	8.11
Shaktoolik to Koyuk	5.51
Koyuk to Elim	5.68
Elim to Golovin	N/A
Golovin to White Mountain	8.19
White Mountain to Safety	9.48
Safety to Nome	8.25

1. The table shows Dallas' race speeds between checkpoints throughout the Iditarod. Find the mean.

a. Find the sum of the speeds.

Sum = _____

b. Next, **DIVIDE** the sum by the number of values in the data set.

_____ ÷ _____ = _____.

c. The mean of Dallas' speeds during the 2018 Iditarod Race is _____.

Photo by Jeff Schultz / IditarodPhotos.com

2. The table shows Dallas' race speeds between checkpoints throughout the Iditarod.

a. Find the median of the data. List the data in order from least to greatest.


Median = _____

b. Find the mode of the data.

Mode = _____

c. Find the range of the data.

_____ − _____ = _____

Research the race archives on the Iditarod website. Select one musher who has finished the race, from any year, and record his or her race speeds between the various checkpoints on an appropriate table (i.e. northern route, southern route, or Fairbanks route). Then, find the **mean, median, mode**, and **range** for your data set.

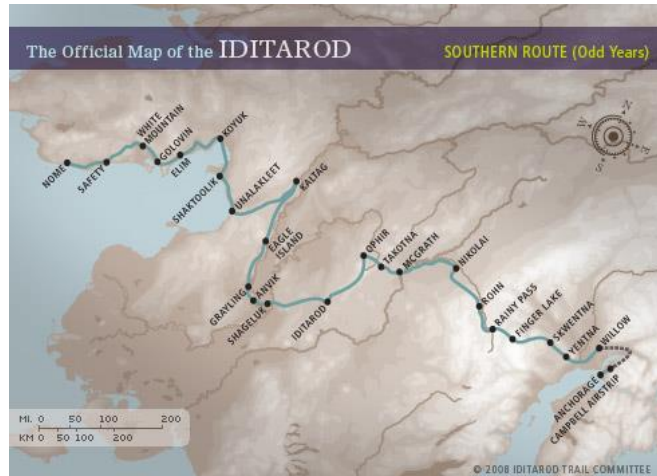*You can use one of the tables below or you can make your own.
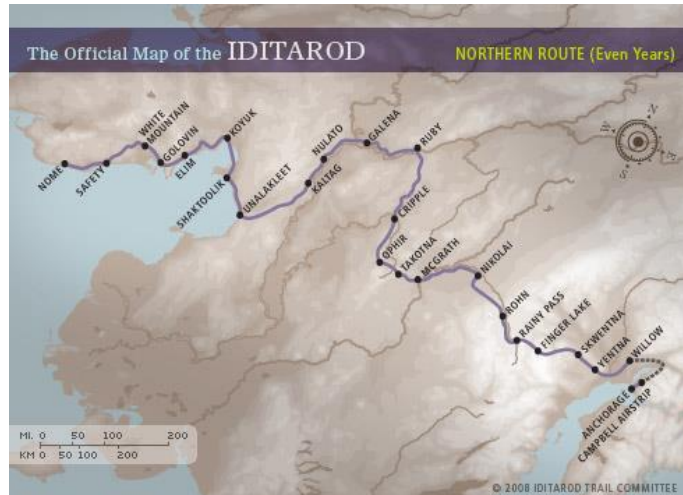
NORTHERN ROUTE

MUSHER: _____   **Year:** _____

Checkpoints	Speed (mph)
Willow to Yentna Station	
Yentna Station to Skwentna	
Skwentna to Finger Lake	
Finger Lake to Rainy Pass	
Rainy Pass to Rhon	
Rhon to Nikolai	
Nikolai to McGrath	
McGrath to Takotna	
Takotna to Ophir	
Ophir to Cripple	
Cripple to Ruby	
Ruby to Galena	
Galena to Nulato	
Nulato to Kaltag	
Kaltag to Unalakleet	
Unalakleet to Shaktoolik	
Shaktoolik to Koyuk	
Koyuk to Elim	
Elim to Golovin	
Golovin to White Mountain	
White Mountain to Safety	
Safety to Nome	

The Official Map of the IDITAROD   SOUTHERN ROUTE (Odd Years)

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SOUTHERN ROUTE

MUSHER: _____   Year: _____

Checkpoints	Speed (mph)
Willow to Yentna Station	
Yentna Station to Skwentna	
Skwentna to Finger Lake	
Finger Lake to Rainy Pass	
Rainy Pass to Rhon	
Rhon to Nikolai	
Nikolai to McGrath	
McGrath to Takotna	
Takotna to Ophir	
Ophir to Iditarod	
Iditarod to Shageluk	
Shageluk to Anvik	
Anvik to Grayling	
Grayling to Eagle Island	
Eagle Island to Kaltag	
Kaltag to Unalakleet	
Unalakleet to Shaktoolik	
Shaktoolik to Koyuk	
Koyuk to Elim	
Elim to Golovin	
Golovin to White Mountain	
White Mountain to Safety	
Safety to Nome	
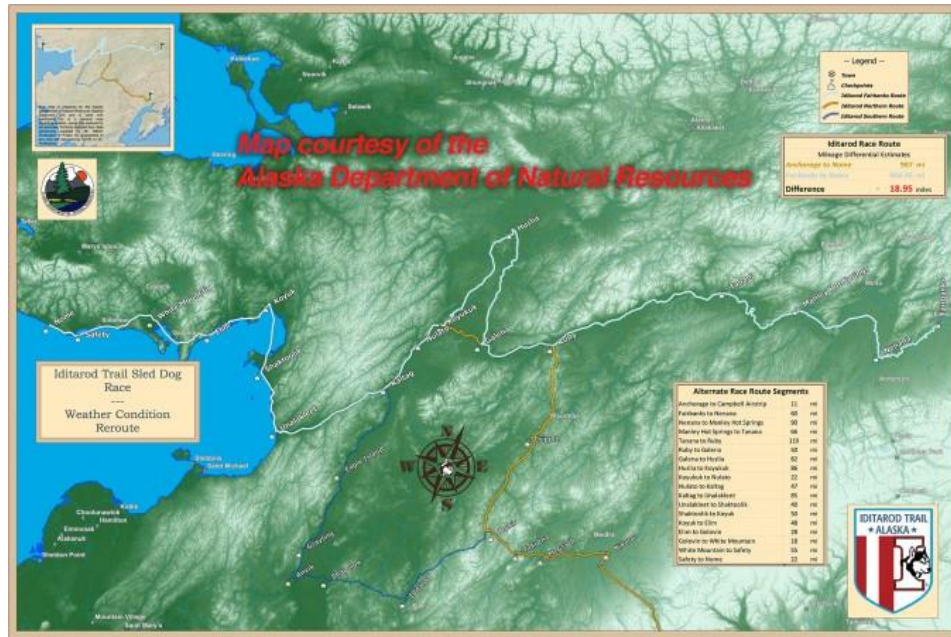
FAIRBANKS ROUTE

MUSHER: _____   **Year: _____**

Checkpoints	Speed (mph)
Fairbanks to Nenana	
Nenana to Manley	
Manley to Tanana	
Tanana to Ruby	
Ruby to Galena	
Galena to Huslia	
Huslia to Koyukuk	
Koyukuk to Nulato	
Nulato to Kaltag	
Kaltag to Unalakleet	
Unalakleet to Shaktoolik	
Shaktoolik to Koyuk	
Koyuk to Elim	
Elim to Golovin	
Golovin to White Mountain	
White Mountain to Safety	
Safety to Nome	