

## Grade 6 Math

### I. Introduction to Birds

Most birds have many characteristics that allow them to fly such as hollow bones and feathers, both of which are very light. Feathers also provide insulation and protection. Because of these characteristics, birds often appear much heavier than they actually are. (For example, students often guess that our Bald Eagle, Fiona weighs 50 lbs when she actually weighs only about 9 lbs).

Of course there are always exceptions to the rule as can be seen with non-flighted birds such as penguins and ostriches. Penguins do not have hollow bones, and the added weight acts as a “diving belt” that helps them dive to deeper depths. Ostriches have solid, marrow-filled bones as well. The denser bones in their legs give the birds much needed strength for running at great speeds while supporting their large bodies. They are also used in defense through kicking.

#### Grade 6

**Standard 5: Data Analysis and Statistics** – The student will use data analysis and statistics to interpret data in a variety of contexts.

- 5.1: Collect, organize, and interpret data to solve problems (e.g., data from student experiments, tallies, Venn diagrams, tables, circle and bar graphs, spreadsheets).
- 5.3: Find the median and mode for a set of data in a variety of contexts.

#### **Activity: I’m a Wandering Albatross!**

(This activity is also included in the Science lesson plans)

Objective: To review concepts such as proper measurement, range, mean, and the interpretation and creation of simple graphs, as well as to introduce new concepts such as median and mode. This activity will help strengthen students’ abilities to interpret data in different ways.

#### Materials: Balances (triple beam)

- Scale that measures in grams (for larger birds above 1000 g)
- Bird Field Guide and/or
- Access to a reliable bird information website
- Meter sticks and rulers with SI units
- Masking tape
- Pens and pencils
- Graph paper
- Assorted classroom objects (erasers, books, paper clips, etc...)

#### Procedure:

- 1) Allow students to look through a bird field guide or a bird information website.
- 2) Have each student (or group of students) pick a different species of bird. Encourage them to choose birds of all sizes and from different Orders and Families so that the class “flock” is a diverse group.
- 3) Students should then look up the average mass and wingspan of their particular bird.

Note: Females and males of many species of birds can vary substantial amounts in size. If there is a range available for both sexes, students may average the two together.

- 4) Have each student find common objects around the classroom (books, pencils, paper clips, etc...) that they think will equal the mass of the bird that they researched.
- 5) Using a triple beam balance (for birds with a mass under 1000 grams), have the students determine the mass of their objects and compare it to the mass of their bird.

For larger birds over 1000 grams, a larger scale must be used. An option is a cooking scale, either digital or spring, that also measures in SI units.

- 6) After the masses of their objects have been measured, ask students to alter the objects or the amount of objects in the balance pan until the mass is equal to the mass of their bird.

(Example: A student picked a Ruby-Throated Hummingbird with an average mass of 4 grams, but chose objects with a mass of 10 grams. That student could either take some of the objects away or try to find different/smaller objects such as paperclips or buttons.)

- 7) Starting at a common point on the wall or chalkboard, have each student take turns measuring their bird’s wingspan with meter sticks or rulers. Students should mark and label their measurements with chalk or masking tape.
- 8) Once every student has measured and labeled their particular bird on the chalkboard, have students record all of the birds in the “class flock” along with their mass and wingspan measurements.
- 9) Allow each student to go to the chalkboard to determine “which bird they are.”

Facing the board, have students place the tip of their left middle finger on the common starting point and stretch both arms as far as they can.

Determine which bird wingspan the tip of their middle finger on their right hand is closest to in order to decide which bird's wingspan they match.

- 10) Record everyone's name and the bird with which they are associated.
- 11) Create a bar graph for the following sets of data:
  - a) Mass/Bird –Data from step 8
  - b) Length/Bird –Data from step 8
  - c) number of students/bird or wingspan –Data from step 10
- 12) Find the range, mean, median, and mode for all the wingspans and the masses of the “class flock”

*\*\*Ensure that all units are SI units and labeled correctly.\*\**

## II. Training

In order to train our animals, we have to establish a working relationship with them. This is done by providing positive reinforcement for completing the behaviors that we ask of them. Positive reinforcement can include many things, but our primary reinforcement method is food “treats.” To ensure that a working relationship stays functional, all of our animals must be weighed on a daily basis during training. This is done to ensure the animals maintain a healthy weight and diet.

By monitoring an animal daily, we are able to compare how well the animal works with us at different weights. With large sets of data every month, it is important to detect a working range, as well as to be able to maintain an average weight to ensure the animal's health. Our African Grey Parrot, Ellie, is one of our most popular animals. One month's worth of Ellie's weights are used for this activity.

### Grade 6

Standard 5: Data Analysis and Statistics – The student will use data analysis and statistics to interpret data in a variety of contexts.

- 5.1: Collect, organize, and interpret data to solve problems (e.g., data from student experiments, tallies, Venn diagrams, tables, circle and bar graphs, spreadsheets).
- 5.2: Construct and interpret graphs of statistical data (e.g., explain how different representations lead to different interpretations and may distort information).
- 5.3: Find the median and mode for a set of data in a variety of contexts.

**Activity: Ellie’s Working Weight**

Objective: To improve data organization, interpretation, and representation. This activity will also provide additional practice with concepts such as mean, median, mode, range, and basic statistics.

- Materials: Pencils  
Graph Paper  
Notebook Paper  
Rulers or other straight-edge  
Calculators  
Data set- 35 days of Ellie’s weights  
Compass  
Markers (optional)

Procedure:

- 1) Hand out a set of the data provided to each student.
- 2) Have each student (or students may work in small groups) arrange the weights in order from lowest to highest. When there are repeating weights, make sure students include those in the list by just repeating them (Example: 200, 203, 203, 203, 206, 210).
- 3) Once the data are arranged, have each student find the range, median, mode, and mean of the data set.
- 4) Students should then use graph paper to construct a bar graph of the data. To do this, it would also be helpful to list each weight that appears and then mark them with tallies each time they repeat.
- 5) After the bar graph is completed, ask students to look at their graphs and determine a range of weights within which they think Ellie most often falls in order to maintain good health.
- 6) Using the range they determined, have each student calculate the percent of weights during the month that fell within this range, above this range, and below this range.

Ellie’s Weights- 35 days

447	460	493	463	464
443	462	465	458	457
451	454	475	462	460

442	458	462	477	442
440	466	458	483	443
446	460	472	464	436
464	472	453	475	475