



## Water as Habitat Episode 1 Male or Female? Sea Turtles

### Module 4: The Normal Distribution

#### Module 4 Overview:

In this module, students will be asked to analyze data that is approximately normally distributed and use the properties of the normal distribution to estimate probabilities.

Focus: Use the mean and standard deviation of a data set to fit to a normal distribution and estimate population percentages.

Mathematical Standards: MAFS.912.S-ID.1.1 - 1.4 and MAFS.912.S-IC.1.1

Provided Materials: Foldable Concept Summary & Answer Key, Student handouts & Answer Key, Z-scores table, 3 Loggerhead (*Caretta caretta*) nesting videos

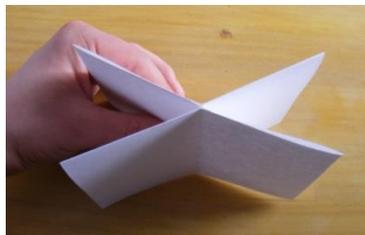
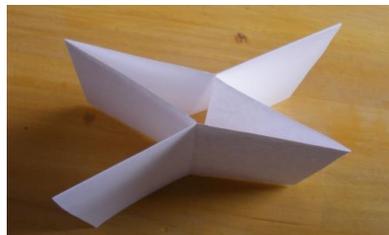
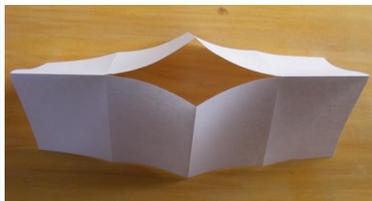
Optional Materials: Calculator capable of calculating standard deviation and probability distributions.

#### Module 4 Lesson Notes:

1. The first provided resource is a foldable that students can fill in as a note-taking guide in class or it can also be used at the end of the unit to summarize the information and material.

Directions for folding the booklet, from <http://www.deviantart.com/art/Single-Paper-Book-296608805>

- Begin holding the paper lengthwise or landscape
- Fold the paper in half, length wise, top down
- Open the paper and fold in half the other direction, left to right
- Open the paper and fold the right side edge to the middle fold line, repeat with left side
- Open the paper, you should see 8 rectangles
- Cut the paper along the black line in the middle of the paper
- Fold the paper as shown below, to create a single paper book



2. The second provided resource is a practice handout that determines whether the nesting dates for Loggerhead (*Caretta caretta*) sea turtles are normalized. It then continues to use the normal distribution of dates to calculate probabilities. The activity can be done independently, in small groups, or as whole group instruction.
3. The final resources provided are 3 short video clips of Loggerhead sea turtles depositing eggs, hatching, and crawling to the water. The egg depositing video is a good “hook” into the normally distributed data given on the student handouts. The second and third videos would be a good way to conclude the lesson at the end of the period.
  - Teachers may also have students “Tweet” about their reactions to these videos to add to the Twitter posts from Module 3.

#### Module 4 Glossary:

1. **Cumulative Frequency** – The sum of all of the frequencies up to and including the new value.
2. **Cumulative Frequency Diagram (Ogive)** – A graph with the upper class boundary on the  $x$  -axis and the cumulative frequency on the  $y$  -axis.
3. **Empirical Rule** – Rule for the Normal distribution that states 68% of the data lies within one standard deviation of the mean, 95% lies within two, and 99.7% lies within three.
4. **Frequency** – number of observed items
5. **Frequency Histogram** – A visual representation of continuous data using the class boundaries and the frequencies.
6. **Mean** – Arithmetic Average; the sum of all data points divided by the total number in the set.
7. **Mid-Interval Values** – The middle value of an interval. Used to estimate mean from grouped frequency data.
8. **Normal Distribution** – A commonly occurring distribution that is symmetric with a single peak at the center and described as bell-shaped.
9. **Population** – An entire group of people or objects of interest.
10. **Random Sample** – a sample in which each element has the same chances of being included.
11. **Sample** – A subset of the population.
12. **Standard Deviation** – A measure of the spread of a data set. It is the square root of the variance.
13. **Variance** – The average squared distance from the mean for a data set.
14. **Z-Score** – The number  $Z$  of standard deviations that a data value lies above or below the mean.

Definitions adapted from:

Buchanan, L., Fensom, J, Kemp, E., LaRondie P., Stevens, & Stevens, J. (2012). *Mathematics Standard Level*. Oxford, NY: Oxford Press.