# The Mystery of the AGOUTI and the OCELOT
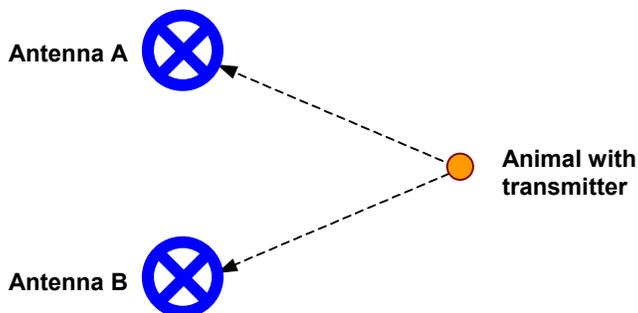
## T E A C H E R

**TI-73 Explorer™**

## Activity Overview

The agouti is a large rainforest rodent and a favorite prey of the ocelot. The agouti can run fast, swim and hide from its enemies. It has powerful rear legs that allow it to bounce through the underbrush. Agoutis are always alert to possible predators and ready to run away at the first sign of danger.

The Barro Colorado Island (BCI) provides researchers with the opportunity to study mammals like the agouti and the ocelot in their natural setting. Using tools, such as radio telemetry, researchers have been able to gain a great deal of knowledge about these and other mammals. Radio telemetry involves the use of transmitters and receivers to track the movement of the animals. The researchers, using a method called triangulation, then change the information received into map coordinates. The researchers use the map coordinates to determine the location of the animal they are tracking at different times of the day by plotting the coordinates on a map of the area the animals traveled.



Antenna A

Animal with transmitter

Antenna B

In this activity, students will use the TI-73 Explorer™ and a set of XY coordinates to map the locations of an agouti and an ocelot at one-hour intervals from 12:00 pm until 5:00 pm. After determining the locations of the animals, they will use the information to draw conclusions about each animal's movements and actions during certain time intervals.

* This activity has been written for the TI-73 Explorer™ but you can easily substitute the TI-83 or TI-83 Plus.

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# AGOUTI and the OCELOT

## Concept Background

- The biodiversity of Barro Colorado Island (BCI) is astounding. The island occupies only 15 square kilometers, yet it is home to roughly 110 mammal species. As a protected habitat, BCI is a living laboratory where scientists can study the interactions of animals and plants in their natural habitats.

- In Central America, 3,300 square kilometers of rainforest are lost each year to logging, hunting, and other human activities. Thousands of species are driven to extinction worldwide. Studying tropical mammals in their habitats helps scientists make wise conservation decisions for the world's remaining rainforests.

- Scientists study mammals in their natural habitats to observe how they compete with other species for food and space. They are using innovative techniques such as trip cameras and radio telemetry to monitor their activity without frightening them away.

- To locate an animal through triangulation, the automated system must receive directional readings from at least two antennas. The locations of the antennas are marked down on a map. Then two directional lines are drawn on the map, corresponding to the readings from the two antennas. If the directional readings are accurate, the animal should be found at the point where these two lines cross (see Activity Overview).

— **National Education Standards**

*Science Standard C: Life Science*
Students should develop an understanding about the structure and function of living systems, reproduction and heredity, regulation and behavior, populations and ecosystems, and the diversity and adaptations of organisms.

*Science Standard E: Science and Technology*
Students should learn about science and technology and develop the abilities necessary for technological design.

*Math Standard: Numbers and Operations*
Students should develop an understanding of numbers: ways to represent and manipulate them, the relationships among different numbers, and the relationships between number systems.

*Math Standard: Geometry*
Students should develop an understanding of the properties of two- and three-dimensional shapes, transformations, symmetry, and develop their use of visual and spatial reasoning to solve problems.

*Geography Standard 1: The World in Spatial Terms*
Students should learn to view the world in spatial terms and organize information about people, places, and environments in a spatial context.

*Geography Standards 4–6: Places and Regions*
Students should learn about the physical and human characteristics of places and regions.

*English Language Arts Standard 3*
Students apply strategies to comprehend, interpret, evaluate, and appreciate texts.


JASON

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## Preparation and Classroom Management Tips

- This activity is divided into two parts. In Part A students plot the path of an agouti on a line graph using X and Y coordinates from Table 1. In part B they plot the path of an ocelot on the same line graph using X and Y coordinates from Table 2.

- Encourage students to record their answers from Data Analysis into their *Journal*.

- Create your own student questions for use on your students' TI graphing devices using the Texas Instruments StudyCard applications.

## TEACHER

**Vocabulary**

**Arboreal**  Living and foraging in trees.

**Biodiversity**  A measure of the number and variety of species within a region.

**Crepuscular**  Active at dusk and dawn.

**Echolocation**  A method some bats use to navigate in the dark. The bats make high-pitched calls and interpret their echoes to determine the locations of objects.

**Habitat**  The environment in which an organism normally lives or occurs.

**Home range**  The area used by an animal in the course of its typical daily activities.

**Mammal**  A warm-blooded animal that gives birth to live young and produces milk to feed them.

**Map coordinates**  Two numbers, (latitude and longitude), which give the location of a point on a map.

**Nocturnal**  Active at night.

**Ordered pairs** A pair of numbers (X coordinate, Y coordinate) that indicate the position of a point in the Cartesian Plane.

**Population**  All of the individuals of a single species that make up a specific group or occur in a specific habitat.

**Predator**  An animal that consumes other animals.

**Prey**  An animal hunted or caught for food. Also, to hunt, catch, or eat prey.

**Radio telemetry**  The use of radio transmitters and receivers to track the movements of animals.

**XY coordinates** Two numbers, (X,Y), which give the position of a point. X is the distance measured parallel to the X-axis. Y is the distance measured parallel to the Y-axis.
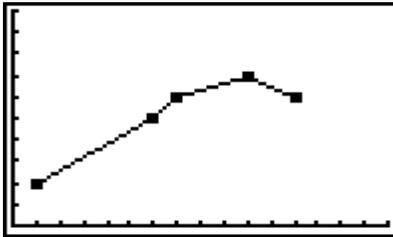
# The Mystery of the AGOUTI and the OCELOT

## Part A — Tracking the Agouti

### Data Analysis

**Table 1**

| Time | X | Y |
|---|---|---|
| 12:00 PM | 1 | 2 |
| 1:00 PM | 6 | 5 |
| 2:00 PM | 7 | 6 |
| 3:00 PM | 10 | 7 |
| 4:00 PM | 12 | 6 |
| 5:00 PM | 12 | 6 |



1. **Q.** During which time interval was the distance between the starting and ending locations the greatest? Explain your thinking.

   **A.** *The distance between the starting and ending locations was the greatest between 12:00 PM and 1:00 PM. This is because the line on the graph connecting the points at those times is the longest.*

2. **Q.** During which time interval was the distance between the starting and ending locations the least? Explain your thinking.

   **A.** *The distance between the starting and ending locations was the least between 1:00 PM and 2:00 PM. This is because the line on the graph connecting the points at those times is the shortest.*

3. **Q.** Does the data suggest that the agouti was moving faster during the 12:00 pm to 1:00 pm time interval or the 2:00 pm to 3:00 pm time interval?

   **A.** *The agouti was moving faster during the 12:00 PM to 1:00 PM interval. The line on the graph between 12:00 PM and 1:00 PM is longer than the line between 2:00 PM and 3:00 PM. This means that the agouti traveled more distance in 1 hour from 12:00 PM to 1:00 PM than from 2:00 PM to 3:00 PM.*

4. **Q.** Using the radio telemetry data collected, the researchers were able to determine that the agouti was actually moving at the same speed during the interval between 1:00 pm to 2:00 pm as it was during the interval 12:00 pm to 1:00 pm. What reason might explain why the distance between the 1:00 pm and 2:00 pm locations was smaller than the distance between the 12:00 pm and 1:00 pm locations?

   **A.** *Since the agouti was moving at the same speed between these time intervals it is likely that it was not moving on a straight path from 1:00 PM to 2:00 PM. It is also possible that during the same time interval it had to travel on a hilly terrain.*

5. **Q.** Using the information provided about agoutis in the research article and the locations of the agouti, write a brief story describing what may have happened while the agouti traveled along its path during the five-hour time interval.

   **A.** *Answers will vary. Students should observe that the agouti was at the same position at 4:00 PM and at 5:00 PM.*
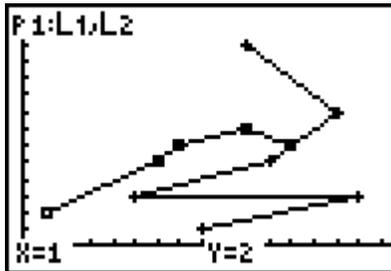
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## Part B — Tracking the Ocelot

### Data Analysis

**Table 2**

| Time | X | Y |
|---|---|---|
| 12:00 PM | 8 | 2 |
| 1:00 PM | 14 | 3 |
| 2:00 PM | 7 | 4 |
| 3:00 PM | 11 | 5 |
| 4:00 PM | 15 | 9 |
| 5:00 PM | 12 | 10 |



6  **Q.** During which time interval was the distance between the starting and ending locations of the ocelot the greatest? Explain your thinking.

   **A.** *The distance between the starting and ending locations was the greatest between 1:00 pm and 2:00 pm. This is because the line on the graph connecting the points at those times is the longest.*

7  **Q.** During which time interval was the distance between the starting and ending locations of the ocelot the least? Explain your thinking.

   **A.** *The distance between the starting and ending locations was the least between 3:00 pm and 4:00 pm. This is because the line on the graph connecting the points at those times is the shortest.*

8  **Q.** Does it appear that the agouti and the ocelot were ever in the same location during any of the recorded times?

   **A.** *The agouti and the ocelot were at the same location because the line that shows the agouti's path between 3:00 pm and 4:00 pm intersects the line that shows the ocelot's path between 3:00 pm and 4:00 pm. This does not necessarily mean that the two animals were at the same location at the same time.*

9  **Q.** Do the data tables provide evidence that the ocelot and the agouti may have met?

   **A.** *By looking at the data in the tables it is difficult to decide if the animals have met unless the data is represented on a graph.*

10  **Q.** Does the graph provide evidence that the agouti and the ocelot may have met?

   **A.** *The graph shows that the paths of the two animals crossed sometime between 3:00 pm and 4:00 pm. Therefore, it is possible that the two animals met.*

11  **Q.** Based on the information provided in the research article and the activity, what do you think happened to the agouti at the end of its path? At what time did it happen?

   **A.** *The data shows that at 4:00 pm the agouti was not moving. This means that it stopped moving and eventually died sometime after 3:00 pm or exactly at 4:00 pm.*

12 **Q.** Does the story you wrote in Part A agree with the information provided in Part B? If the answer is no, rewrite your story.

**A.** *Answers will vary.*

13 **Q.** What other evidence do you need to get an acceptable answer to the question, "Did the agouti and the ocelot meet?"

**A.** *By knowing the exact time that the agouti stopped and the location of the ocelot at that time, one can see if both animals were at the same place at the same time. If both animals had the same X and Y coordinates at the same time (sometime after 3:00 pm and 4:00 pm) it means that they have met. These coordinates will be represented by a single point on the graph.*