ⓘ Overview

Groups of students will calculate the probable number of Golden-cheeked Warblers in a specified area of Kerr County, Texas. Each group's final product will include a marked map, a map legend, and explanation paragraphs from each group member.

Grade Levels: 4–6

◎ Concepts

- Multiplication
- Division
- Measurement
- Problem solving

☆ Materials

- ▦ TI-15 Explorer™ calculators
- Paper, pencils
- Rulers
- Map pencils
- Student activity sheet

✔ Assessment

Throughout the activities, questions are included for formative assessment. Student work samples should be used as a check for understanding. Have the students use the TI-15 Explorer™ to show their calculations.

Modified from Silenced Songbirds, from A World of Mathematics: Acitvities for Grades 4,5, and 6 using the TI-15

Background Information

In order to make this problem work mathematically, some adjustments were made in the introduction presented. All of the basic information is correct: the Golden-cheeked Warbler is a songbird on the endangered species list, the bird nests in the Hill Country of Texas, and each pair requires about 5 acres of nesting area. The section of Kerr County was chosen for the ease of calculation: the fractional area suitable for the birds was selected for mathematical reasons.

Introduction

Have the students calculate the area of the classroom. Have them calculate how much area per person the classroom contains. Have them estimate the area per person in their home or apartment. For example, if there are 600 square feet in your classroom and 20 students, there are 30 square feet per person. If the house is 1,000 square feet and there are 5 people in the house, there are 200 square feet per person.

Presenting the Problem

1. Discuss the concept "endangered species" with the students. What makes a species "endangered?"

2. Discuss a definition of songbird with the students: "a bird, especially of the suborder Oscines of passerines, with a melodious song or call." (From *The American Heritage High School Dictionary*, 1993.) The Golden-cheeked Warbler is a songbird on the endangered species list.

3. Have the students read the *Silenced Songbird* Problem page. Have them discuss how much area a pair of Golden-cheeked Warblers needs. Discuss with the students the various reasons a pair of birds would need so much space.

4. Have each group make a plan to solve the problem. The plan should include ways of finding the numbers they need to solve the problem, drawing a conclusion from that information, and creating the required map.

5. If groups have difficulty with the problem, use the *Things to Consider* page. This page provides guiding questions to help the students solve the problem.

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Evaluating the Results

1. After the maps are completed have groups share what they did.

Questions for Students:

- ❖ *How are the maps similar?*
- ❖ *How are they different?*

2. Ask them to compare the maps.

Questions for Students:

- ❖ *How can we be certain all of the maps show the needed information?*
- ❖ *Are all of the legends the same?*
- ❖ *Did all groups mark the same area of the map?*
- ❖ *Why do you suppose this is so?*

3. Discuss with the students the numerical answers each group found. Ask them to determine the reasonableness of the results.

Questions for Students:

- ❖ *How are the numerical answers alike?*
- ❖ *How are they different?*
- ❖ *Is it reasonable for different groups to have different answers?*
- ❖ *Why do you think so?*

4. Discuss how the calculator was used to solve the problem.

Questions for Students:

- ❖ *Did all groups use the calculator in the same way?*
- ❖ *Why do you think that happened?*

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SOLUTIONS

Student Activity

Name _____

Date _____

Silenced Songbirds

The Problem: How many Golden-cheeked Warblers can live in the part of Kerr County shown on the map?

In the first part of the activity students will answer the question by marking a map and creating a map legend. They will then write a paragraph describing the map.

Using the Calculator

Solving problems involving area

Use the TI-15 calculator to solve the problems:

1 Henry is covering a table top with ceramic tiles. The table is $2\frac{1}{2}$ feet long and $1\frac{1}{4}$ feet wide. What is the area of the table top?

Press	The display shows:
2 Unit 1 n 2 d × 1 Unit 1 n 4 d Enter	Answer: $3\frac{1}{8}$

Does the answer make sense?

Answer: Yes.

Draw the table top on 1-inch grid paper. Let 1 inch = 1 foot.

Answer: Check students' drawings.

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❷   Henry has another problem. The tiles he wants to use are 2 inches square. How many tiles does Henry need to cover the same tabletop? Calculate the number of tiles in 1 square foot.

Press	The display shows:
12 ÷ 2 Enter	Answer: 6

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This gives the number of tiles on one side of the square foot since 12 inches = 1 foot. Now multiply the answer by itself to get the number of tiles in one square foot.

Press	The display shows:
6 ⊠ 6 [Enter]	Answer: 36

This answer is the number of 2-inch square tiles in one square foot.

Multiply this answer by the number of square feet in the tabletop (the answer to the first problem).

Press	The display shows:
36 ⊠ 3 [Unit] 1 [n] 8 [d] [Enter]	$112\frac{4}{8}$

Is the answer in mixed number form?

Answer: Yes.

Note: The [U⅟d↔⅟d] key changes the display between mixed number form and improper fraction form.

Is the answer in simplest terms?

Note the [Simp] key simplifies the fraction. You may need to simplify more than once. If the display shows $\frac{N}{D} \rightarrow \frac{n}{d}$, you can further simplify the fraction.

Henry can only buy whole tiles. How many tiles does Henry need to buy to complete the tabletop?

Answer: 113 tiles

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