



***Mathematics**

Area, Fractions, Decimals, Percentages

Peter has visited Farmer McGregor's garden so many times that he knew it like the back of his hand, or paw. Peter made a map of the garden to share with his sisters. His having first studied its measurements, learned it's area, figured its divisions and calculated what percentage was planted with carrots.

Kentucky Mathematics Arts

Fractions & Decimals (2.7, 2.8, 2.12) Grades 4-6

Academic Expectations:

2.8 Students understand various mathematical procedures and use them appropriately and accurately.

2.7 Students understand number concepts and use numbers appropriately and accurately.

2.12 Students understand mathematical structure concepts including the properties and logic of various mathematical systems.

Ohio Mathematics Standards: Number, Number Sense and Operations

Benchmark(s) Grade 4

J. Estimate the results of whole number computations using a variety of strategies and judge the reasonableness. (Estimate results of computations involving whole numbers, fractions and decimals, using a variety of strategies.

Grades 5-6

I. Use a variety of strategies, including proportional reasoning, to estimate, compute, solve and explain solutions to problems involving integers, fractions, decimals and percents.

Ohio Mathematics Standards: Measurement

Benchmark(s) Grade 4

D. Identify appropriate tools and apply counting techniques for measuring side lengths, perimeter and areas of squares, rectangles, and simple irregular two-dimensional shapes...

Grades 5-6

E. Use problem solving techniques and technology as needed to solve problems involving length, weight, perimeter, area, volume, time and temperature.

Objective

Students will:

- Use a map of Farmer McGregor's garden to calculate area, fractions, decimals, and percentages.

Assessment

Student will be able to:

- Calculate area using the formula "length x width = area."

- Identify fractional parts, decimals and percentages; proportional units of a whole.
- Compare portions of a diagram and discuss which fractions, decimals and percentages are less than, equal to, or greater than a whole.

Sample selected response items to gauge student understanding:

1. Define the term, "perimeter."
Answer: Sum of the sides of a plane figure.
2. What information is provided from calculation of area?
Answer: The size of a flat space within limited boundaries.
3. What role do fractions serve?
Answer: A way/method to examine parts of a whole; small portions.

Vocabulary

- Square meters
- Fraction
- Percent
- Decimal

Materials

- Chart/map of Farmer McGregor's Garden (see handout)
- Pencil
- Colored pencils

Activity

Farmer McGregor's Garden

Teacher will:

1. Engage students through recall of their attendance at The Children's Theatre of Cincinnati's production of *The Rockin' Adventures of Peter Rabbit*. Re-emphasize the importance of Farmer McGregor's garden as a main setting in the play where multiple events occurred.
2. Prepare copies of the Handout, "Farmer McGregor's Garden," one for each student.
3. Introduce/review with students the terms area, fractions, decimals, and percents.
4. Explain to students that Farmer McGregor has neighbors who are farmers as well. Farmer McGregor has difficulties when communicating with his neighbors as they do not speak the same language. One refers to his garden in square units, while another speaks of his garden in terms of tenths and hundredths, and the last refers to his garden in terms of percentages.
5. Instruct students of their task to assist Farmer McGregor in his desire to calculate and compare his garden to that of his neighbors.
6. Distribute the Handout, "Farmer McGregor's Garden" to each student. Emphasize the problem-solving required as that of observation, calculation and unit conversions.

7. Model problem-solving for one or two handout question, and have students complete the activity. (Use of spreadsheets to create a data table with formulas may be beneficial for checking answers.)
8. Debrief and check student answers as a whole class.
9. Challenge students to create additional authentic problems for classmates to solve regarding Farmer McGregor's garden.



***Mathematics**
Handout: Farmer McGregor's Garden

Name _____

Farmer McGregor's Garden

Directions: The garden is divided into 25 equal sections. Each section is labeled below. To easily identify each group of vegetables, color each square using the following labels:

corn = yellow
beans = green
tomatoes = red
cucumbers = blue

pumpkins = orange
peas = gray
onions = white
wheat = brown

Now answer the questions about the garden.

40 meters	40 meters	Corn	Corn	Beans	Pumpkins	Wheat
		Corn	Corn	Beans	Pumpkins	Wheat
		Corn	Corn	Tomatoes	Peas	Wheat
		Corn	Corn	Tomatoes	Peas	Wheat
		Corn	Corn	Cucumbers	Onions	Wheat



***Mathematics cont.**

Handout: Farmer McGregor's Garden, Part 2

Name _____

Directions: Calculate the following, and identify the relationships between fractions, decimals and percentages.

Calculate the measurement and area					
Length of garden					
Width of garden					
One section of garden					
Entire garden					
Find the value of ...	How many meters?	How many square meters?			
Corn					
Tomatoes					
Beans					
Pumpkins					
Wheat					
Onions					
Peas					
Cucumbers					
Find the value of			Fractional Value	Decimal Value	Percentage
Corn					
Tomatoes					
Beans					
Pumpkins					
Wheat					
Onions					
Peas					
Cucumbers					

Hints:

- Measurement and Area: Area = Length x Width
- Denominator is the total number of sections in the garden
- Reduce fractions to their lowest terms
- Decimals: divide the numerator by the denominator
- Percentage: Move the decimal point



***Mathematics cont.**
Handout: Farmer McGregor's Garden, Part 2

Answer Key

Directions: Calculate the following, and identify the relationships between fractions, decimals and percentages.

Calculate the measurement and area					
Length of garden	200 m				
Width of garden	200m				
One section of garden	1600 sq. meters				
Entire garden	40,000 sq. meters				
Find the value of ...	How many meters?	How many square meters?			
Corn		16,000 sq. m.			
Tomatoes		3,200 sq. m.			
Beans		3,200 sq. m.			
Pumpkins		3,200 sq. m.			
Wheat		8,000 sq. m.			
Onions		1,600 sq. m.			
Peas		3,200 sq. m.			
Cucumbers		1,600 sq. m.			
Find the value of			Fractional Value	Decimal Value	Percentage
Corn			2/25	0.4	40%
Tomatoes			2/25	0.8	8%
Beans			2/25	0.8	8%
Pumpkins			2/25	0.8	8%
Wheat			1/5	0.4	20%
Onions			1/25	0.04	4%
Peas			2/25	0.08	8%
Cucumbers			1/25	0.04	4%