

Title: A Fraction of the Rain Forest

Brief Overview:

In this unit students will be able to compute basic fractions, complete equivalent fractions, and find parts of a whole. Aspects of the rain forest that will be explored are the animals, plants, people, and products of the rain forest. The students will be expected to produce a bar graph, an accurate indigenous plant, and a rain forest quilt.

Links to NCTM 2000 Standards:

- **Standard 1: Number and Operation**

Mathematics instructional programs should foster the development of number and operation sense so that all students demonstrate their ability to describe and apply number relationships using concrete and abstract materials to understand fractions; and understand the meaning of operations and how they relate to each other as it relates to fractions.

- **Standard 2: Patterns, Functions, and Algebra**

Mathematics instructional programs should include attention to patterns, functions, symbols, and models so that all students understand various types of patterns and functional relationships to construct a quilt; use symbolic forms to represent and analyze mathematical situations when describing the three layers of the rain forest; and use mathematical models and analyze equivalent fractions and parts of a whole.

- **Standard 3: Geometry and Spatial Sense**

Mathematics instructional programs should include attention to geometry and spatial sense so that all students will apply their ability to determine fractional value to given one and two-dimensional objects.

- **Standard 5: Data Analysis, Statistics, and Probability**

Mathematics instructional programs should include attention to data analysis, statistics, and probability so that all students pose questions and collect, organize, and represent data to the indigenous people of the rain forest; and interpret a given graph by exploring data analysis.

- **Standard 6: Problem Solving**

Mathematics instructional programs should focus on solving problems as part of understanding mathematics so that all students build new mathematical knowledge through their work with problems; develop a disposition to formulate, represent, abstract, and generalize in situations within and outside mathematics by completing a rain forest puzzle; apply a wide variety of strategies to solve problems and adapt the strategies to other academic areas; and monitor and reflect on their mathematical thinking in solving problems.

- **Standard 7: Reasoning and Proof**

Mathematics instructional programs should focus on learning to reason and construct proofs as part of understanding mathematics so that all students recognize reasoning and proof as essential and powerful parts of mathematics; and make and investigate mathematical conjectures.

- **Standard 8: Communication**

Mathematics instructional programs should use communication to foster an understanding of mathematics so that all students organize and consolidate their mathematical thinking to communicate with others; express mathematical ideas coherently and clearly; extend their mathematical knowledge by considering the thinking and strategies of others; and use the language of mathematics as a precise means of mathematical expression when answering given questions.

- **Standard 9: Connections**

Mathematics instructional programs should emphasize connections to foster an understanding of mathematics so that all students recognize and use connections among different mathematical ideas; understand how mathematical ideas build on one another to produce a coherent whole; and recognize, use, and learn about mathematics in contexts outside of mathematics.

- **Standard 10: Representation**

Mathematics instructional programs should emphasize mathematical representations to foster an understanding of mathematics so that all students create and use representations to organize, record, and communicate mathematical ideas; and develop a repertoire of mathematical representations that can be used purposefully, flexibly, and appropriately.

Grade/Level:

Grades 3-4

Duration/Length:

4-5 class periods (45 minutes long each)

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Identifying parts of a whole
- Creating equivalent fractions
- Adding and subtracting fractions with common denominators
- Analyzing and constructing bar graphs

Student Outcomes:

Students will:

- work cooperatively in groups.
- define and name fractional parts of sets.
- determine equivalent fractions using given data.
- add and subtract fractions with common denominators.
- analyze and create a bar graph.
- use calculators to convert fractions into tenths, fifths, and halves.

Materials/Resources/Printed Materials:

- The Great Kapok Tree, by Lynn Cherry
- Student resource sheets

- Envelopes containing layers of the rain forest puzzle
- Crayons or colored pencils
- Completed bar graph of poison dart frogs
- Manipulatives used to reteach fractions
- Four types of beans and bags per cooperative group (50 beans per bag)
- Household products that come from the rain forest resources
- Calculators for each student
- Construction paper
- Glue or paste
- Highlighters

Development/Procedures:

Day 1

- Introduction: Review the names of animals that are found in the rain forest. Create an animal web with the class. Read The Great Kapok Tree to the students to identify the animals from the class web that are present in the story. Make copies of Student Resource Sheet 1a, cut each sheet into puzzle pieces, and place in an envelope (one sheet for each group of four students).
- Give each group of four students an envelope containing the Layers of the Rain Forest puzzle (Student Resource Sheet 1a). Allow them to work cooperatively to complete the puzzle, and then glue their final product onto a piece of construction paper. The final product should clearly show the three layers of the rain forest (canopy, understory, and forest floor) as well as the animals that live within each layer.
- As a whole class, discuss the animals found within each layer. Model how to determine the fractional portion of the layer population by counting the number of each type of animal in one particular layer. That number will be written as the numerator, and the denominator will be the number of total layer population (Student Resource Sheet 1b). Reinforce fraction skills by completing Student Resource Sheets 1c-1e.

Day 2

- Model for the students how to determine equivalent fractions. Provide skill reinforcement using the student resource sheet.
- Discuss how bananas grow and how they are organized in bunches. Help the students to understand the conditions that are conducive to growing bananas (i.e., climate, location).
- Review the processes of how to Read to Perform a Task. Have the students read all of the directions with their group first, and then highlight key pieces of information. The teacher should act as facilitator by having groups who are on the right track share the words that they chose to highlight.
- The students will illustrate a banana tree using the description provided in the vignette. They must follow the task directions instructing them to use 16 bananas, and the colors to use for each banana (Student Resource Sheets 2a-2b).

Day 3

- Make a concept attainment chart on the board. Model two examples of fractions that have common denominators in the “YES” column. Model two examples of fractions that have uncommon denominators in the “NO” column. Allow the students to classify their own fraction examples on the class chart.
- The students analyze a graph of the poison dart frogs of the rain forest (Student Resource Sheet 3a). Data from the graph is interpreted by finding the fractional parts of the whole. The data is then checked using addition and subtraction of fractions with common denominators.
- Each student is responsible for interpreting data provided about the occupations of members of the Manu tribe in the rain forest. The occupational data is then used to create a bar graph (Student Resource Sheets 3b-3c). Reinforcement is provided in Student Resource Sheet 3d.

Day 4

- Prior to the arrival of the students, create a table top display of household products manufactured from rain forest resources. Samples of products can include: cocoa, coffee, rubber items, bananas, mangoes, empty medicine bottles, sandalwood, allspice, cayenne, vanilla, nutmeg, paprika, sesame seeds, cashews, chocolate, coconut, cucumbers, peanuts, sugar, sweet potatoes, insecticides, perfume, eucalyptus cough drops, shampoo, detergent, and chewing gum. Facilitate a whole class discussion on interdependence. The students will write in their journal four or more ways that our society would change if the rain forest was completely depleted.
- Distribute to each cooperative group a bag containing four different types of beans such as coffee, pinto, lima and kidney. There should be a total of fifty (50) beans in each bag. The groups will use their sorting sheet to sort the different beans. Students will calculate and record the fraction that each group of beans represents. (The number of beans in each group will become the numerator, and the common denominator will be 50.) The fractions found will then be converted from fiftieths to fifths, tenths, and halves. The conversions will be checked by adding the fractions having the common denominator to ensure that the sum is equivalent to one whole (Student Resource Sheets 4a-b).

Performance Assessment:

Each child is then given thirty (30) blank squares to use in their own rain forest quilt. In order to correctly construct the quilt, the students will have to independently convert fractions finding parts of the whole (Student Resource Sheets 5a-d).

Extension/Follow Up:

The data compiled from Days 1-4 can be used to create a travel brochure of a rain forest city. Technology can be incorporated through a number of rain forest CD-Roms such as *Amazon Trail*, which combines mathematics, science, and language usage.

Related Websites:

<http://edtech.kennesaw-edu/web/rforest.html>
<http://www.pbs.org/edens/manu/people.html>
<http://www.rainforest-alliance.org>

Recommended Book List:

Amazon Basic: The Vanishing Cultures Series

written and photographed by Jan Reynolds

Jungle

written by Diane Willow, photographed by Geoff Dann

At Home In the Rain Forest

written by Diane Willow, illustrated by Laura Jacques

Rain Forest

written and illustrated by Sheri Amsel

Rain Forest: First Starts Series

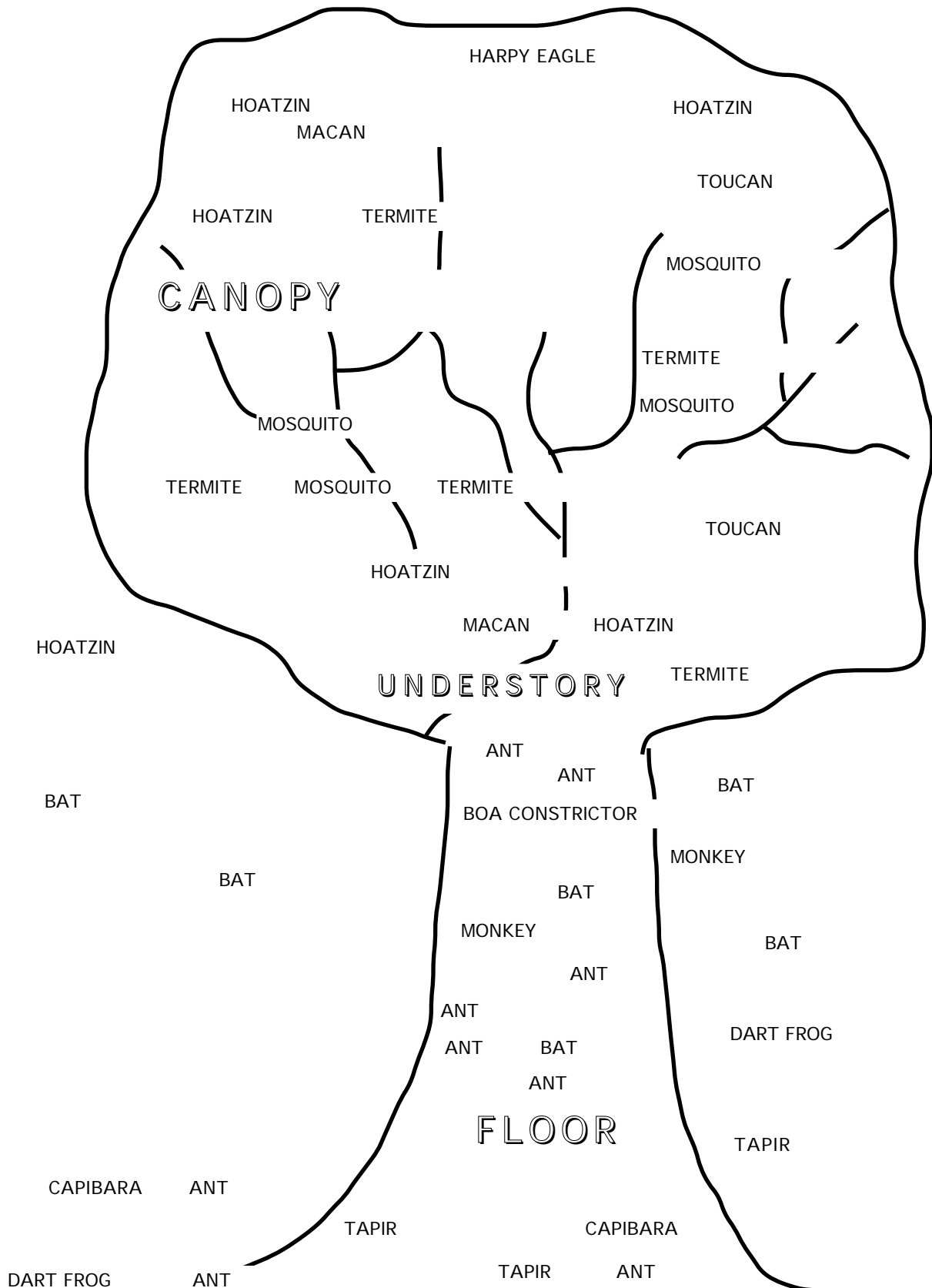
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Life in the Layers

1. Count the number of insects and animals in the canopy. List the fractional number that each animal represents in the canopy.

Toucan = _____ Macaw = _____

Termites = _____ Mosquito = _____

Harpy Eagle = _____ Hoatzin = _____

2. Count the number of insects and animals in the understory. List the fractional number that each animal represents in the understory.

Ants = _____ Bat = _____

Monkey = _____ Boa Constrictor = _____

3. Count the number of insects and animals in the forest floor. List the fractional number that each animal represents in the forest floor.

Capibara = _____ Tapir = _____

Poison Dart Frog = _____ Ants = _____

- *4. (With your group)
Count the total population of plants and animals all three layers.

How many are there? _____

Number the animals and insects below from greatest to least.

Toucan _____

Macaw _____

Harpy Eagle _____

Hoaztin _____

Termites _____

Mosquito _____

Ants _____

Bats _____

Boa Constrictor _____

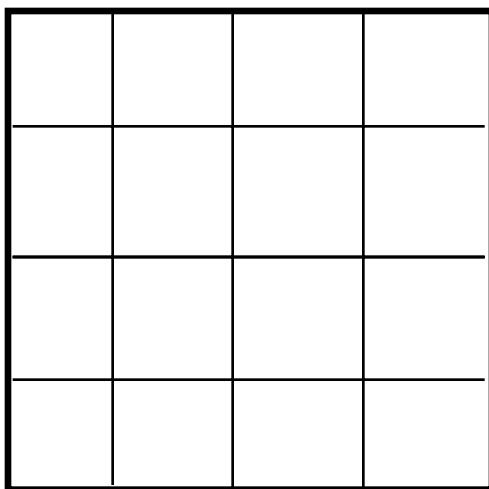
Monkey _____

Capibara _____

Tapir _____

Poison Dart Frog _____

Creative Colors

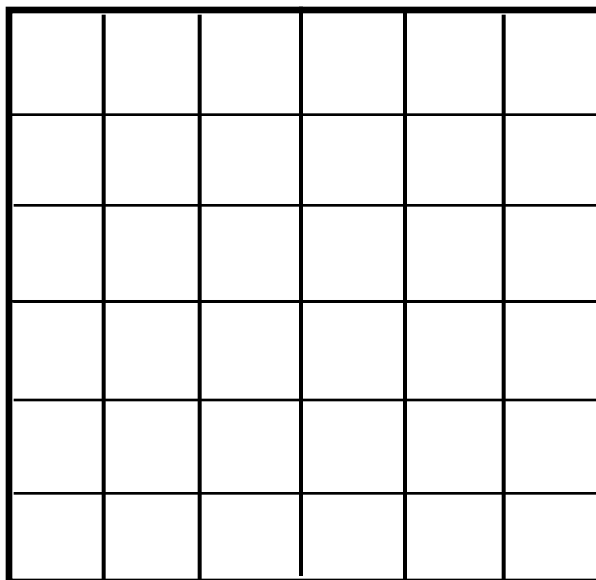


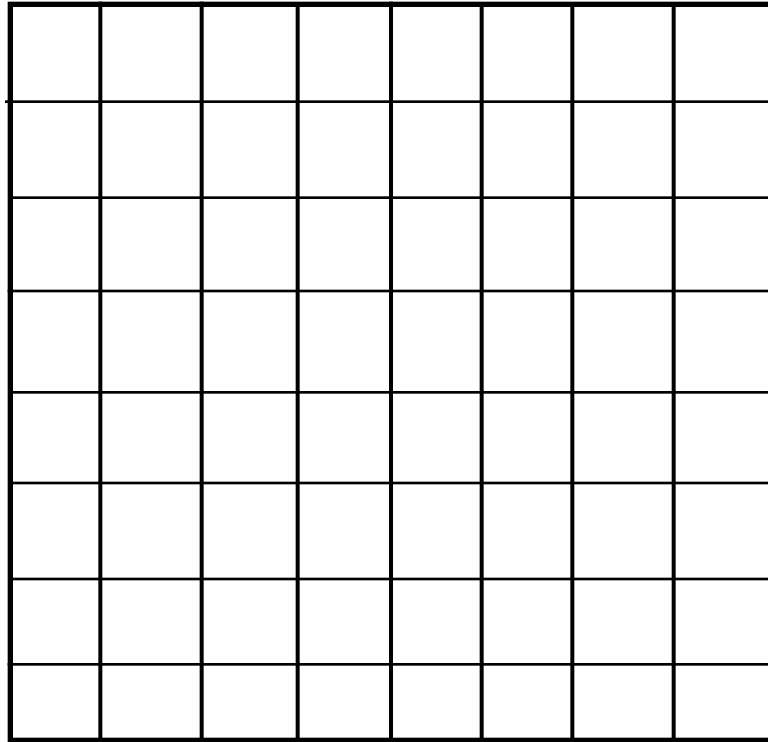
How many small squares will equal $\frac{1}{2}$ (one half) of the large square?

Can you create a pattern by shading in half of the large square?

How many small squares are in $\frac{2}{6}$ (two sixths) of the larger square?

Create an animal by shading in $\frac{2}{6}$ of the larger square.





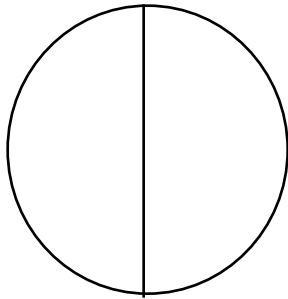
How many small squares does it take to equal $\frac{1}{4}$ (one fourth) of the larger square?

Divide the larger square into fourths. Each fourth does not need to be the same size, but each must have the same number of squares.

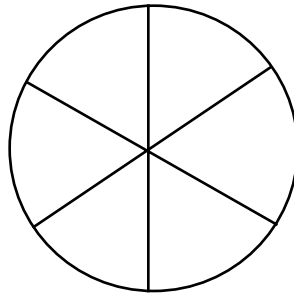
Create a puzzle by shading in each fourth using a different color.

Friendly Fractions

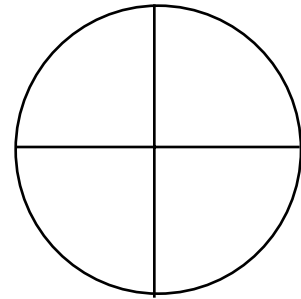
Directions: Shade in the portion of the shape that represents the fraction below it.



$$\frac{1}{2}$$

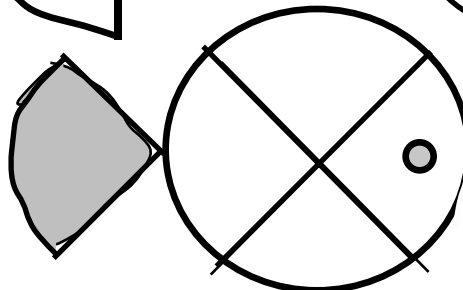
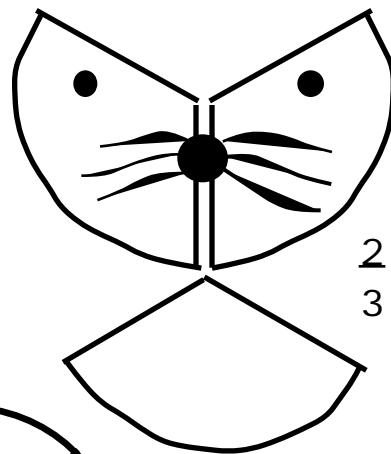
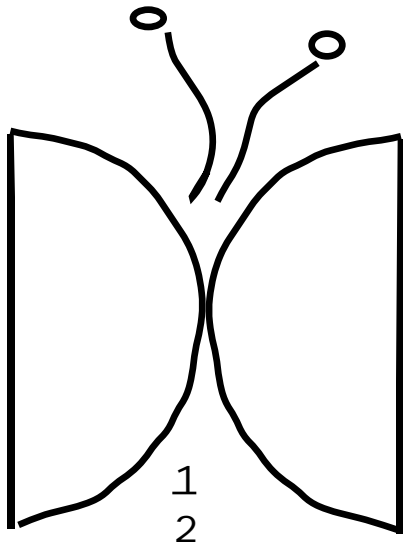


$$\frac{4}{6}$$



$$\frac{3}{4}$$

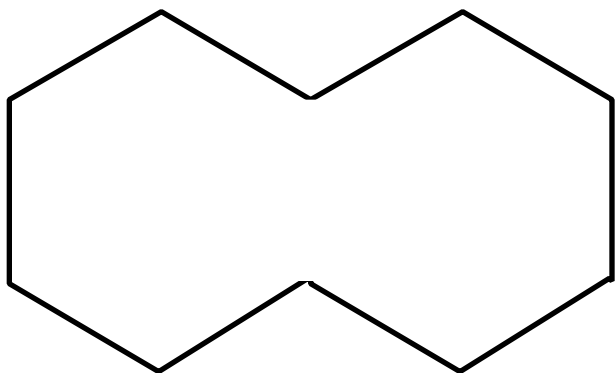
Directions: Shade the correct portion of each figure.



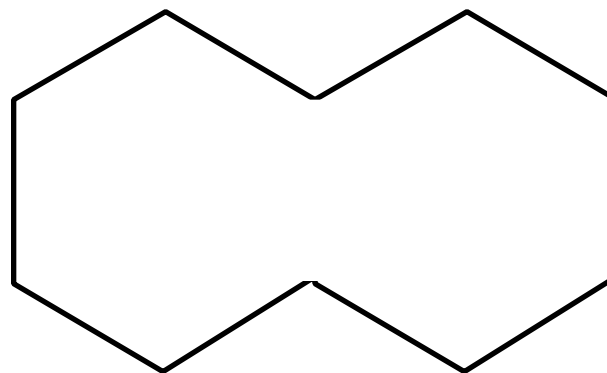
$$\frac{3}{4}$$

Equivalent Patterns

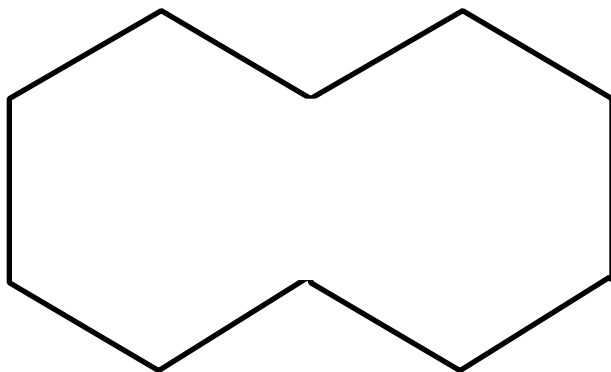
Directions: Below are four sets of equivalent fractions. Use your pattern blocks to cover each diagram. You will need to demonstrate equivalent fractions. As you complete each problem, be sure to explain why they are equivalent fractions.



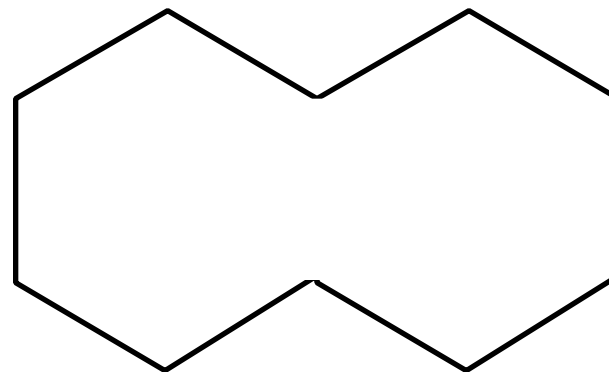
1) $\frac{1}{2} = \frac{3}{6}$



2) $\frac{1}{4} = \frac{3}{12}$



3) $\frac{3}{4} = \frac{9}{12}$



4) $\frac{4}{4} = \frac{12}{12}$

Going Bananas!!!

Reading to Perform a Task

- Read all of the note twice.
- Highlight the key words (or adjectives) in the description.
- Use scrap paper to determine the fractions before drawing.
- Imagine how the finished product will look.
- Draw the banana tree.
- Go back and check your work by making sure that no steps were forgotten.

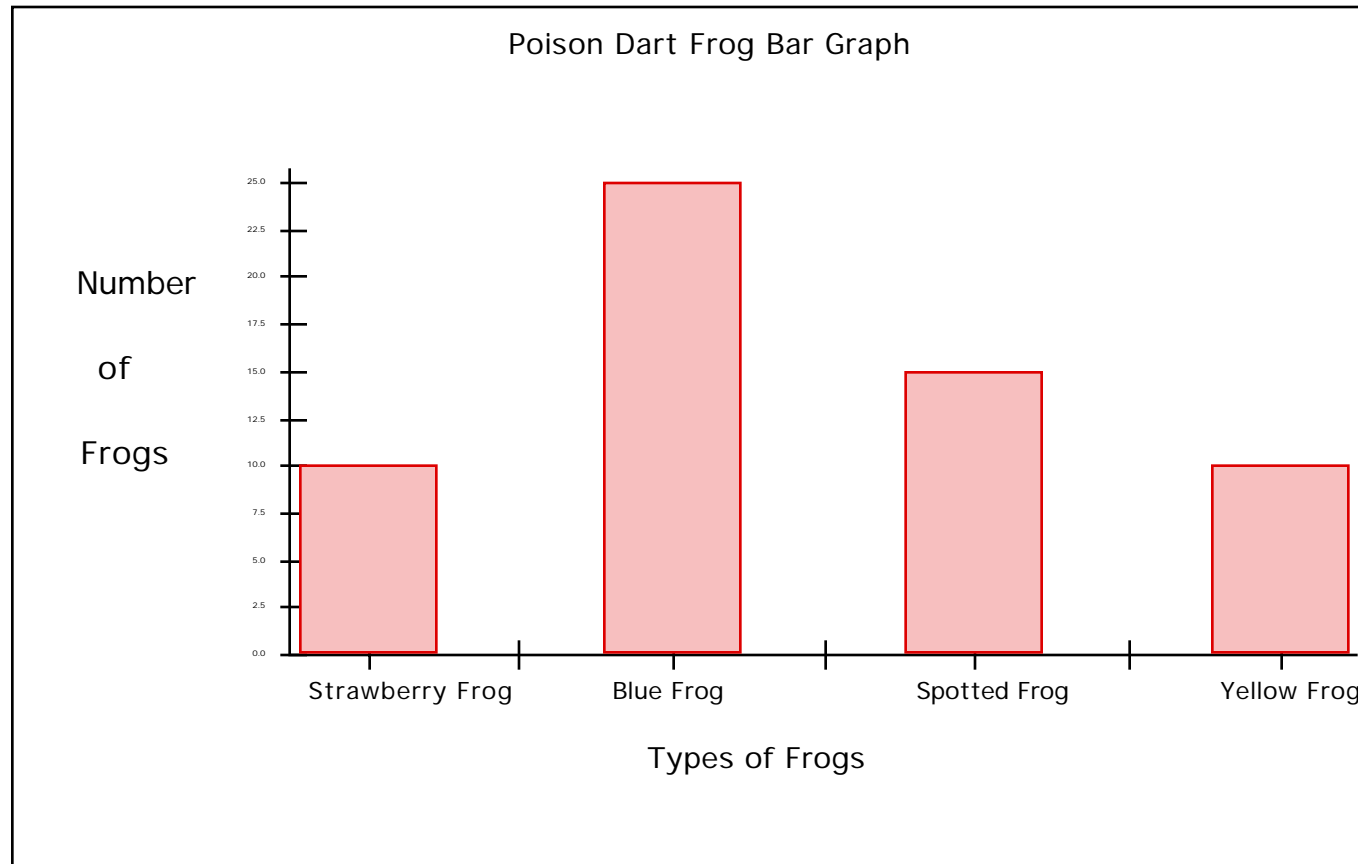
Introduction: Our class has purchased a banana tree to help save the rain forest. The Botanist Bob who takes care of our tree has written a note describing what the first bunch of bananas looks like. Since we cannot get to the rain forest ourselves to see the tree, we will draw it according to the description that the botanist sent.

Material: crayons- yellow, green, brown
blank piece of paper

Dear Class,

The banana tree has grown very tall. The first bunch of bananas can be seen from the ground. There are sixteen (16) bananas in the bunch. Two eighths of the bananas have turned brown. One half of the bananas remain yellow, and one fourth of the bananas are still green. In all, the tree is looking quite healthy.

***Sincerely,
Botanist Bob***

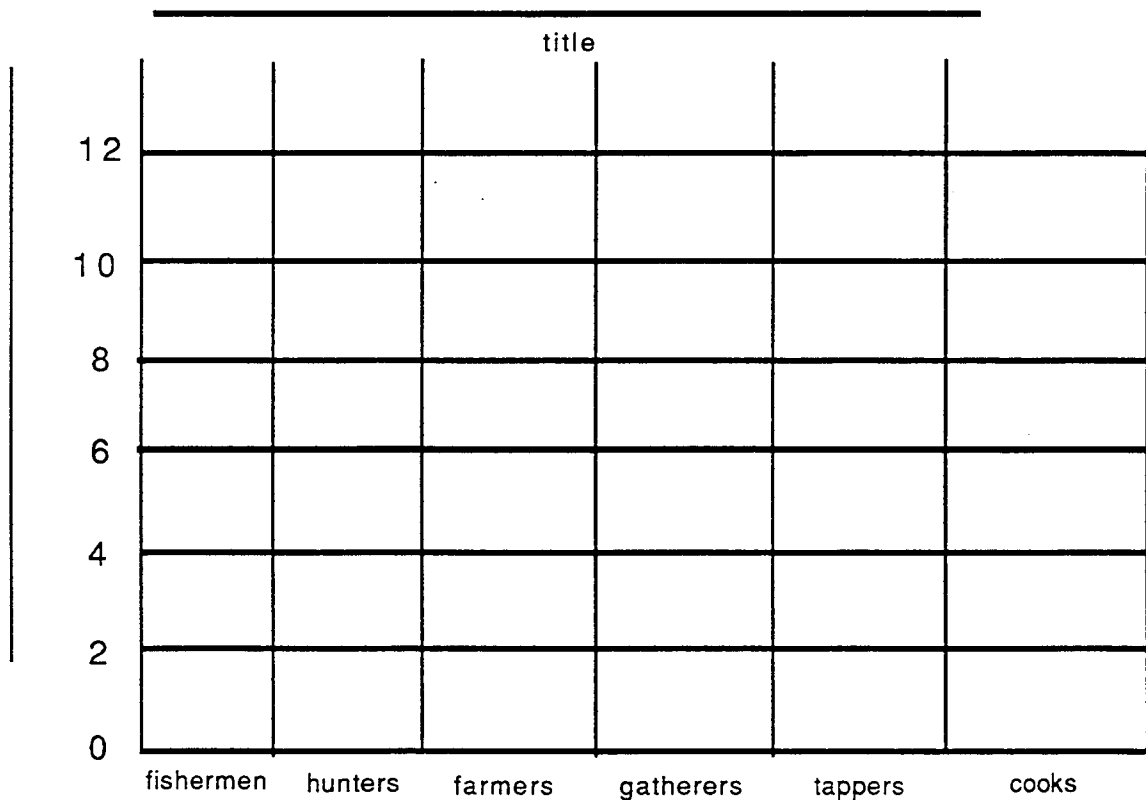
**Questions:**

1. How many frogs are there in all?
2. What is the fraction of strawberry frogs?
3. What is the fraction of spotted and yellow frogs?
4. How many more blue frogs are there than yellow frogs? Write as a fraction.

What can you do in a rain forest?

Directions: Use the information about the jobs of the Manu to create a bar graph.

Information: High in a rain forest mountain range, live the people of the Manu village. They work hard everyday to make sure that the village has enough to eat in order to survive. In this village, there are seven fishermen, eight hunters, twelve farmers, six gatherers, ten rubber tappers, and six cooks.



What can you do in a rain forest?

- A. Use the data from your graph to answer the following questions.

How many people in all work in the tribe? _____

What is the fractional number of :

fishermen _____ hunters _____

farmers _____ gatherers _____

tappers _____ cooks _____

- B. Use the fractions that you wrote above to answer the following questions. Show your work beneath each question.

What is the fraction of fishermen and cooks?

What is the fraction of hunters, farmers, and tappers?

How much greater is the fraction of rubber tappers than cooks?

ADDING AND SUBTRACTING FRACTIONS

1) $\frac{1}{4} + \frac{2}{4} =$

2) $\frac{3}{8} + \frac{2}{8} =$

3) $\frac{4}{8} - \frac{3}{8} =$

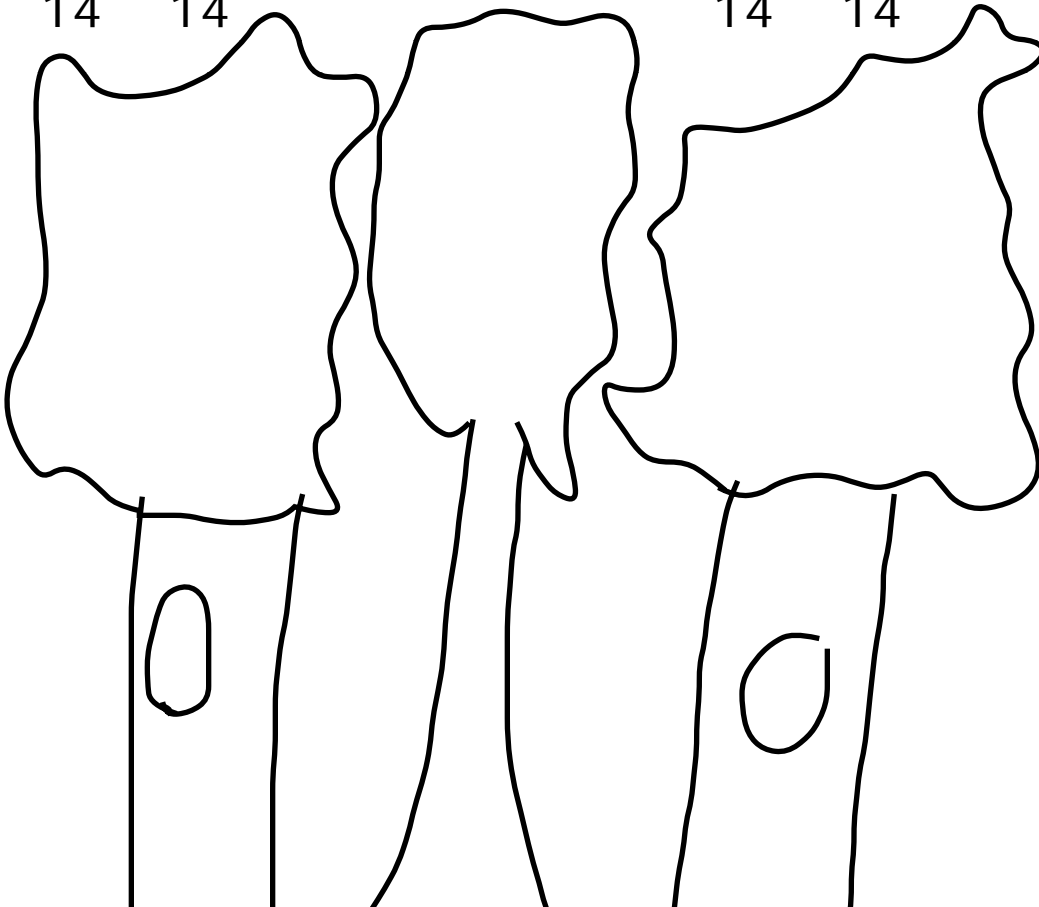
4) $\frac{2}{12} - \frac{1}{12} =$

5) $\frac{2}{5} + \frac{2}{5} =$

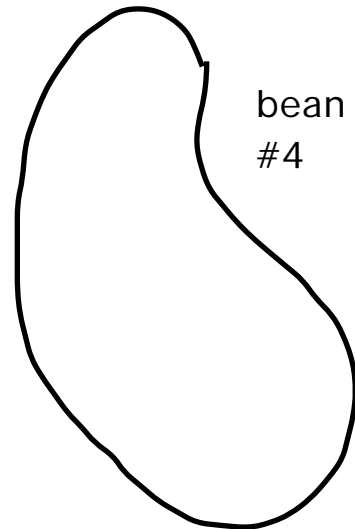
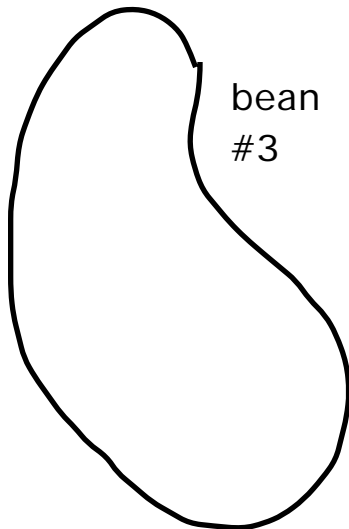
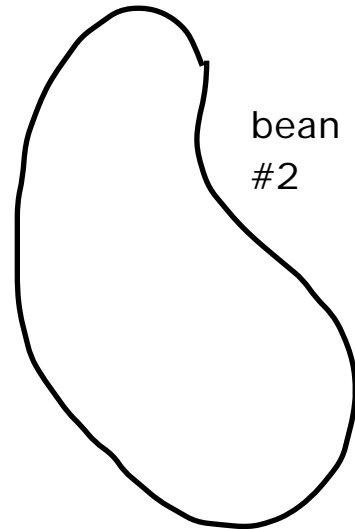
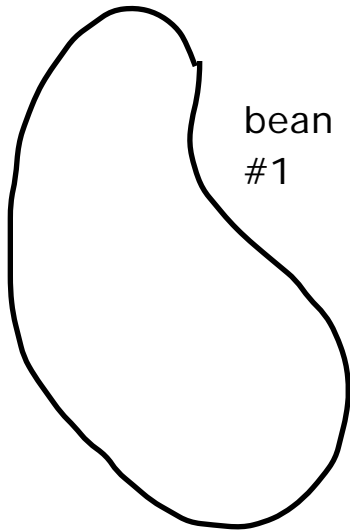
6) $\frac{4}{7} - \frac{3}{7} =$

7) $\frac{5}{14} + \frac{8}{14} =$

8) $\frac{8}{14} - \frac{3}{14} =$



Sorting Map



Parts of a Whole

Directions: Empty your bag of beans onto your table. Count the number of beans you have all together. Using your sorting map answer the questions below. Write the fractional value and simplify where necessary.

1. What is the total number of beans in section one? _____ What is the fraction of beans in section one? _____

2. What is the total number of beans in section two? _____ Can you divide the beans in section two into equal parts? Explain. _____

3. What is the total number of beans in section three? _____ If you place the beans from section two and the beans from section three together, can you divide the beans into equal parts? Explain. _____

4. What is the total number of beans in section four? _____ What is the fraction of beans in this section? _____

5. Using all of the beans on your sorting map, is it possible to divide all the beans into equal parts? Explain your answer below in writing and also make an illustration to justify your answer. _____



RAIN FOREST FRACTIONAL QUILT

Directions: In an effort to extend the focus on fractions, you are to research plants, animals, products, and people that are indigenous to the rain forest. When all the information is compiled, you are to create a quilt using a total of 30 squares. Utilize the following fractions to complete your quilt: $\frac{1}{5}$, $\frac{2}{15}$, $\frac{1}{3}$, and $\frac{2}{6}$.

Please be sure to use one of the fractions to represent the four groups that are indigenous to the rain forest (for ex., $\frac{1}{5}$ can represent animals).

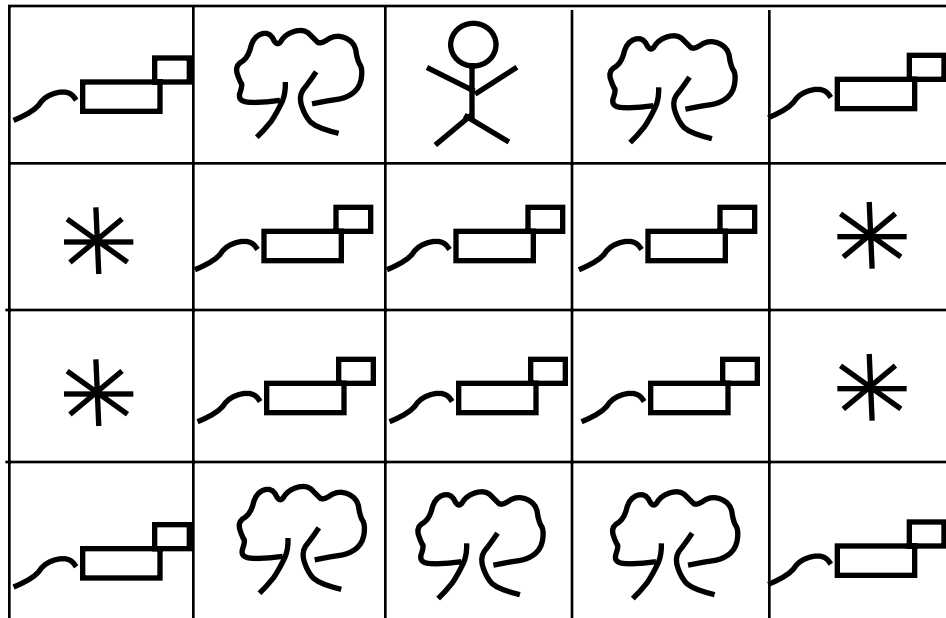
Please use symbols in place of the plants, animals, products, and people.

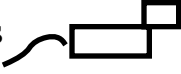


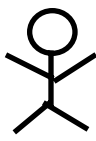
Students will need to know how to add fractions with unlike denominators.

Good luck and by all means, have fun!

Rain Forest Fractional Quilt Example

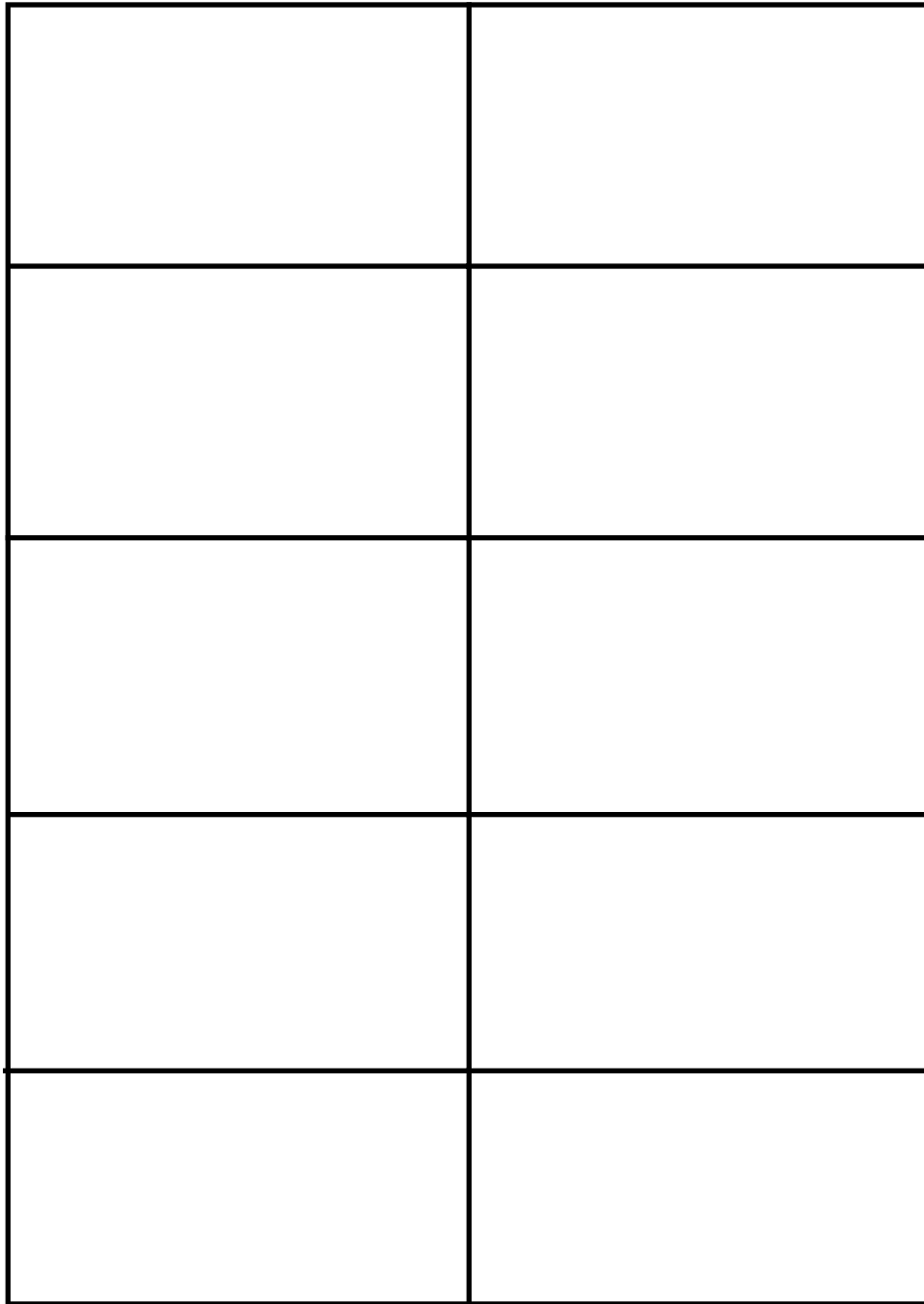
The following is an example of a quilt created by using 20 squares.



<u>KEY</u>	
$\frac{1}{2}$	= 10 animals 
$\frac{1}{5}$	= 4 products 
$\frac{1}{4}$	= 5 plants 
$\frac{1}{20}$	= 1 person 

Template for Use With the Rain Forest Quilt

Teachers: Each student will need three of these pages.



RUBRIC FOR QUILT

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- A symbol is used to represent each area studied (animals, plants, people, and products/resources).
- Students used the appropriate amount of blank squares per fractional part (30 in all) in a correct manner.
- The work is legible and neat.
- A key is used in the correct form.

2

- A symbol is used to represent each area studied (animals, plants, people, and products/resources).
- All 30 blank squares are filled.
- The work is legible.
- A partial key was used.

1

- Some symbols were used.
- Some squares were used.
- The work is not legible or neat.
- A key was not used.

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- Student made little or no attempt.