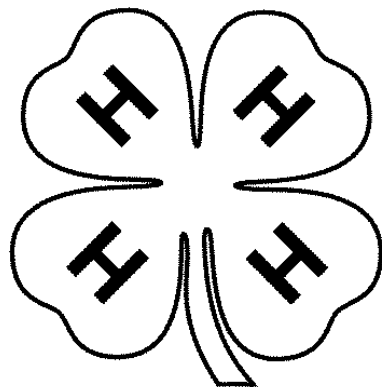


FRACTION POWER

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FRACTION POWER

Suggested Grades: 3rd & 4th

People have been using math principles for thousands—even millions—of years. Their use is spread across countries and continents; whether sailing a boat off the coast of Japan or building a house in Peru, math principles are used to get things done.

How can math be so universal? First, human beings didn't invent math concepts; we discovered them. Also, the language of math is numbers, not English or German or Russian. If we are well versed in this language of numbers, it can help us make important decisions and perform everyday tasks.

One essential math concept is fractions. Because we know about fractions, we are able to fix a tasty meal, travel around our neighborhood or farther in our cars, arrive at school on time, buy our favorite toy, or share a treat with our friends.

This lesson will use the hands-on activity of constructing a dry cookie mix to explore the math principles of fractions and the highlight the importance of fractions in daily life.

Why are fractions important?

How are they used in our daily lives?

OBJECTIVES

- ✓ List three ways fractions are used in daily life and describe why they are needed to complete the stated tasks
- ✓ Apply knowledge of fractions to successfully solve real-world problems.

MATERIALS

- One copy of “Fractions Don’t Bug Me” for each student (p10)
- One 2" X 11" (approx) strip of plain paper for each student
- Pen or pencil for each student
- One quart-sized jar or clear deli container with lid for each student
- One set of measuring cups AND measuring spoons for each four students
- One plastic knife for each four students
- One copy of recipe card for each student
- Flour
- White sugar
- Brown Sugar (light or dark)
- Baking Soda
- Salt
- Oatmeal (old-fashioned or quick-cooking)
- Chocolate chips



PREPARATION ACTIVITIES

- Introduce the concept of fractions using the “Fractions Don’t Bug Me” activity sheet on page 10. Discuss the meaning of *numerator*, *denominator*, and *fraction* with the students as you guide the class through the first few items on the worksheet if necessary. Allow groups of 3 to 4 students to complete the remainder of the activity on their own if possible.

- Introduce the importance of fractions in daily life. With the students’ help, make a list of ways that fraction are used every day, and tell why fractions are essential for each task. Some suggestions are:
 - Clock- knowing about three quarter, half and quarter hours makes it possible to tell time
 - Gas gauge in car- tells how much fuel is left so car doesn’t run out
 - Money- allows people to compute cost and pay for goods and services
 - Cooking- need to know fractions so recipes will taste good

- Introduce the concept of equivalent fractions with the Critter Crawl exercise, below.

Critter Crawl

1. Tell students that you have invented a totally new unit of measurement called the “critterfoot”. It is the distance that a creepy crawly critter can squirm, slither or slide in one minute. Tell them that they are going to spend some time investigating it now.
2. Distribute one 2" x 11" (approximately) strip of paper to each student.
3. Ask students to fold the paper in half, then unfold and look at the crease that was formed. Talk about the fact that the critterfoot is now in 2 parts. If a critter walked to the fold and stopped, he would only have walked over 1 of the 2 parts ($\frac{1}{2}$) of the distance.
4. Ask them to write the fraction $\frac{1}{2}$ on the fold, near the edge of the paper.

5. Fold the strip of paper back into halves, then fold it again. Ask students to open the paper and observe that it is now divided into 4 sections.
6. Write the fractions $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$ on the appropriate folds. Write $\frac{2}{4}$ below the $\frac{1}{2}$ that is already written there.
7. Repeat the process twice more, dividing the piece of paper into eighths ($\frac{1}{8}$ s) and sixteenths ($\frac{1}{16}$ s).
8. When writing a new fraction on a fold that already has one or more fractions written on it, ask the students to write the new fraction below the previous one(s).
9. After all the fractions are written, tell students that those written on the same fold are *equivalent fractions*. Discuss what the term *equivalent* means using the questions below as a guide:

What happened when you folded the paper?

Were some of the folds the same for halves, fourths, eighths and sixteenths?

Each fraction has a different name, but some of the names are in the same place. What does that mean?

If the fractions are the same, does it matter what you call them?

Why do you think so?

10. To ensure students' understanding of fractions and equivalencies, pose some problems that they can answer with the help of their critterfoot ruler. Some examples are:

If Anthony Ant crawled to the $\frac{3}{4}$ mark, and William Worm squirmed to $\frac{7}{8}$, who walked the farthest?

Christopher Cockroach, Inez Inchworm, and Fezziwig Fly decided to race. They made it to $\frac{3}{8}$, $\frac{3}{16}$, and $\frac{3}{4}$ of a critterfoot, respectively, by the end of the race. Who won the race?

Bobbi Beetle ran to the $\frac{3}{4}$ critterfoot line and Earnestine Earwig scurried to the line that marked $\frac{12}{16}$ in the same length of time. Who traveled farthest? Why do you think that?

Sylvester Silverfish scurried across $\frac{4}{8}$ of a critterfoot to get to Sally Spider's house. How many different names can you think of that mean the same as $\frac{4}{8}$?

PROCEDURAL STEPS

- ① Divide class into groups of four. Place each group at a work station.
- ② Distribute activity supplies. Each activity group will need:

- One set of measuring cups
- One set of measuring spoons
- One plastic knife
- Four quart jars or clear delicatessen containers with lids
(one for each student in the group)
- All purpose flour (about 5 cups)
- Baking soda (about 1/4 cup)
- Salt (about 1/4 cup)
- Brown sugar (about 3 cups)
- White Sugar (about 3 cups)
- Chocolate chips (about 2 cups)
- Uncooked oatmeal (about 3 cups)

You may wish to place the dry ingredients on a cafeteria tray and cover each work station with table paper to help contain the mess.

- ③ One at a time, direct students to layer the dry ingredients into their jar or delicatessen container. An attractive-looking mix can be constructed if the ingredients are added in the order and amount listed below.

Allow enough time for all students in every group to complete the measuring process before introducing the next ingredient. You may wish to keep all ingredients at a central location and distribute only one ingredient at a time to the student groups.

For proper measurement, the students should fill the measuring cups or spoons over-full with each ingredient first. Then, **HOLDING THE CUP OR SPOON OVER THE APPROPRIATE CONTAINER**, slide the plastic knife across the top of the cup or spoon until the top of the ingredient is level with the top of the measuring cup or spoon. This measuring technique is used for all dry ingredients except brown sugar, which should be pressed firmly into the measuring cup.

- ④ As each ingredient is added, ask students for another name for the fraction or discuss alternate ways in which that fraction might be measured. For a more challenging exercise, you may wish to remove one or more of the measuring cups and/or spoons from the activity supplies so that students will have to determine an equivalent fraction that uses only the cups/ spoons that are available.

Cookie Mix Dry Ingredients

1 cup all purpose flour

$\frac{1}{2}$ tsp baking soda

$\frac{1}{2}$ tsp salt

$\frac{1}{3}$ cup brown sugar, packed

$\frac{1}{3}$ cup white sugar

$\frac{1}{2}$ cup uncooked oatmeal

2 Tbsp chocolate chips (can add an additional 2 Tbsp, if desired)

- ⑤ Make sure that the container lids are securely in place after all the students have completed their dry mixes. If desired, the containers may be decorated with fabric or paper lid covers and/or ribbon or raffia. Warn the students that shaking or tipping their container will damage the decorative layers of their cookie mix!
- ⑥ Make one copy of the cookie recipe card on page 11 for each student and tie, tape or glue the card to the dry cookie mix container. This quarter-page card lists the remaining ingredients needed to make the cookies, and gives mixing and baking instructions.

INQUIRY AND FOLLOW UP ACTIVITIES

- ✎ Using the same techniques as before, construct a dry cocoa mix from the following ingredients:

- 1 3/4 cup nonfat dry milk powder
- 1 cup sifted powdered sugar
- 1/2 cup powdered nondairy creamer
- 1/4 cup sifted unsweetened cocoa powder
- 1 cup miniature marshmallows

Decorate the container with peppermint sticks or small candy canes and tie or glue a copy of the recipe card on page 13 to each container.

- ✎ Conduct a **Mars Fraction Hunt** using the directions below. This lesson is designed to provide practice in the use of fractions, changing fractions, using equivalent fractions, and paying attention to detailed instructions.

Materials Needed:

- A note that says: "Bring this note to my desk to receive your prize of a MARS candy bar for each person in your group."
- Three or four MARS candy bars (depending on the size of the groups)
- Classroom globe (on a small stand or cradle)
- One copy of Fraction Hunt (pages 12-13) for each student.

1. Before the activity, hide the note above under the classroom globe.
2. Divide the class into groups of three or four students.
3. Tell students that they will be using their fraction skills to decode the hidden message on the activity sheet. Each clue forms a new word that is part of the clue. When all the words are decoded, the first group to complete the puzzle can follow the clues to a prize.
4. The ANSWER KEY for the activity is:

FOR THE FIRST ONE TO FINISH THIS THERE WAITS A PRIZE IF YOU
USE YOUR HEAD PERIOD CLUE MARS IS DIRECTLY BENEATH THE
SOUTH POLE PERIOD GO LOOK

5. After the winning group has claimed the prize, the assignment should be reviewed. During this exercise, some students may claim that "no such words exist." This is where it is necessary for them to pay attention to the details of the instructions relating to "first", "last", "second", etc.

🗨️ Hold a school spirit flag design contest in your classroom. Students will use the design grid on page 14 to plan the flag, then complete the entry form on page 15 when it is completed. You may wish to invite a "celebrity" judge to choose one or two finished design winners based on adherence to the design criteria and the creativity shown by the students.

This activity may be completed as an individual or group project.

Before beginning the activity, read through the flag design instructions on page 14 with the students. Discuss how to determine how many squares of each color will be needed. Discuss ways that students can combine portions of squares to create whole squares. (Coloring 2 different squares $\frac{1}{2}$ blue counts as 1 whole blue square.)

Then read through the entry form (p15) with students. Recommend that students use complete sentences to answer the questions on the form. Share the information on the scoring guide with the students, so they will know what is expected. Encourage the students to be creative.

OTHER RESOURCES

AskERIC has a number of lesson plans that deal with fractions and other mathematics concepts, as well as all other classroom and research topics. This website includes only lessons that have been recommended by education professionals or institutions. It can be accessed at:

<http://askeric.org/Virtual/Lessons>

Lesson Plans.com is a teacher-centered website that allows educators to post lesson plans that have worked well for them. All classroom topics are included in the searchable database. It can be accessed at:

<http://www.lessonplans.com/>

LESSON SOURCE

Lesson Authors:

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Wichita, KS 67205
(316) 660-0100

Lesson Resources:

Ant Ruler
C. Damigo
Elkins, WV <http://www.pacificnet.net/~mandel/Math.html>
Downloaded March 3, 2003

Introduction to Fractions
<http://www.edhelper.com/fractions.htm>
Downloaded March 3, 2003

Mars Fraction Hunt
Paul T. Williams
Vanguard Honors Program
Phoenix, AZ
Lesson Plan #:AELP-ATH0012
<http://askeric.org/Virtual/Lessons/Mathematics/Arithmetic/ATH0012.html>
Downloaded March 3, 2003

Spirit Contest

Ann McCoySuccessLink

1111 Madison St., Suite 4Jefferson City, MO 65101<http://www.successlink.org/>

Downloaded March 3, 2002

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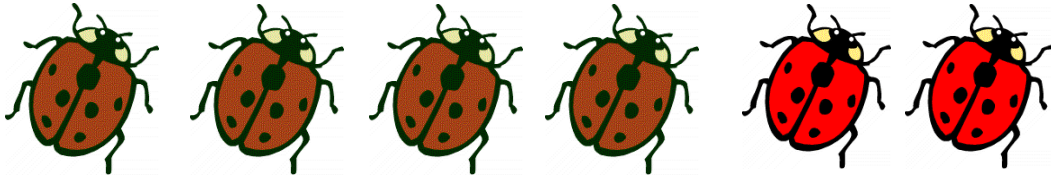
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FRACTIONS DON'T BUG ME!



There are six (6) ladybugs. Four (4) are dark and two (2) are light.

What fraction of the bugs are dark? _____ What fraction are light? _____

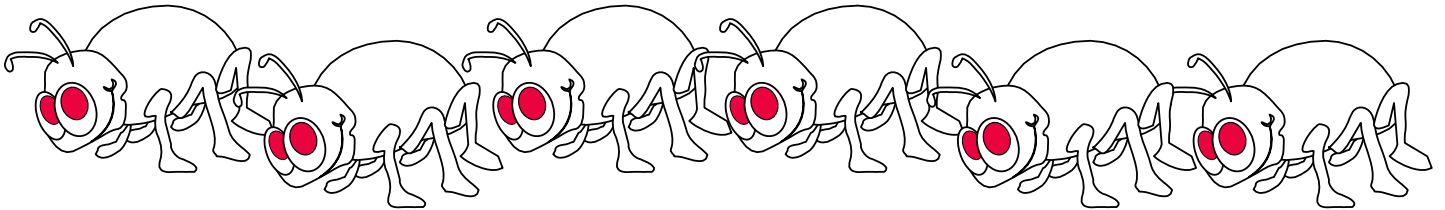
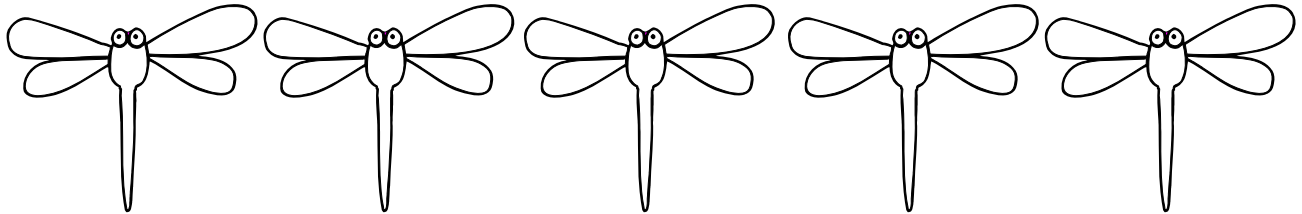


There are 8 Ladybugs. Color 3 ladybugs brown and 5 ladybugs red.

What fraction of the ladybugs are red? _____ Brown? _____

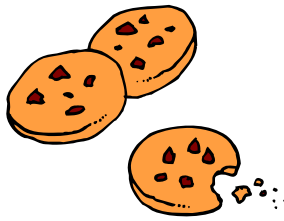
There are 6 dragonflies. Color 4 dragonflies yellow and 2 blue.

What fractional part of the dragonflies are yellow? _____ Blue? _____



How many spiders are there? _____ Color 5 green and the others purple.

What fraction of the spiders is purple? _____ Green? _____



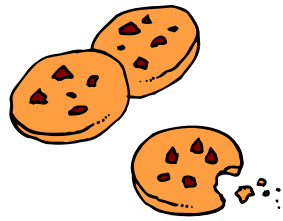
CHOCOLATE CHIP COOKIES

Pour dry ingredients into a mixing bowl and stir well.

Add to the dry ingredients and mix well:

- 1/4 cup softened butter or margarine
- 1 tsp vanilla
- 1 egg

Drop by rounded teaspoons onto an ungreased cookie sheet. Bake at 350° for 8 to 10 minutes until golden brown.



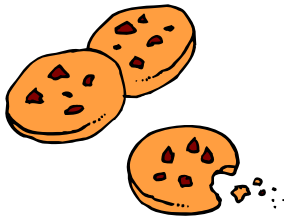
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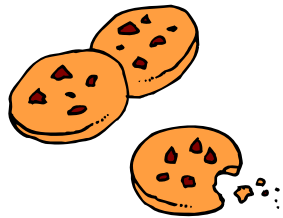
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CHOCOLATE COCOA MIX



Mix

Combine all ingredients in a medium mixing bowl. Store in an airtight container up to 3 months.

Candy-Flavored Cocoa

For each serving, place 1/3 cup of the cocoa mix and some finely crushed peppermint candy in a cup. Add 3/4 cup boiling water. Stir well. Top with 1/4 cup miniature marshmallows and sprinkle with additional finely crushed peppermint candy, if desired.

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FRACTION HUNT

Complete the clues below to the Fraction Hunt. When you have finished decoding the clues, use them to find your way to the prize.

1. The first half of food + the last quarter of door. _____

2. The last third of hat + the first $\frac{2}{5}$ of heavy. _____

3. The second $\frac{1}{3}$ of office + the last $\frac{1}{4}$ of door + the first $\frac{1}{3}$ of street. _____

4. The last half of go + the last $\frac{1}{2}$ of done. _____

5. The last $\frac{1}{8}$ of elephant + the first $\frac{1}{5}$ of order. _____

6. The first $\frac{3}{4}$ of fine + the last $\frac{3}{4}$ of dish. _____

7. The last $\frac{1}{6}$ of cement + the first $\frac{3}{7}$ of history. _____

8. The last half of bath + the first $\frac{1}{3}$ of end + the last $\frac{2}{7}$ of require. _____

9. The first $\frac{2}{5}$ of water + the last $\frac{3}{4}$ of fits. _____

10. The last $\frac{1}{6}$ of Glenda. _____

11. The first $\frac{1}{3}$ of principal + the first half of zero. _____

12. The first $\frac{1}{7}$ of instant + the first third of fat. _____

13. The first $\frac{2}{5}$ of young + the first $\frac{1}{10}$ of understand. _____

14. The first $\frac{1}{4}$ ugly + the first $\frac{1}{5}$ of settlement. _____
15. The first $\frac{1}{4}$ of youthful + the last half of pour. _____
16. The first $\frac{1}{4}$ of hesitate + the last $\frac{2}{3}$ of sad. _____
17. The first $\frac{1}{3}$ of permanent + the first half of iodine. _____
18. The first $\frac{2}{6}$ of clover + the last $\frac{2}{4}$ of blue. _____
19. The first $\frac{1}{4}$ of Mark + the last $\frac{3}{5}$ of stars. _____
20. The last $\frac{1}{4}$ of Meri + the first $\frac{1}{5}$ of Susan. _____
21. The first $\frac{3}{5}$ of dirty + the last $\frac{3}{7}$ of perfect + the first $\frac{2}{5}$ of Lynda. _____
22. The first $\frac{3}{4}$ of bent + the last $\frac{2}{3}$ of breath. _____
23. The first $\frac{1}{3}$ of Thomas + the first $\frac{1}{8}$ of Endicott. _____
24. The first $\frac{3}{5}$ of sound + the last $\frac{2}{9}$ of Aylsworth. _____
25. The first quarter of positive + the first two thirds of Lee. _____
26. The first $\frac{4}{9}$ of periscope + the last $\frac{2}{5}$ of blood. _____
27. The first third of get + the second fourth of Jody. _____
28. The first half of loud + the last half of book. _____

SCHOOL SPIRIT FLAG DESIGN CONTEST

The flags must be designed according to the following rules:

1. You must use 4 colors - no more, no less.
Color 1 must cover $\frac{1}{2}$ of the flag. Color 2 must cover $\frac{1}{4}$ of the flag. Color 3 must cover $\frac{1}{8}$ of the flag. Color 4 must cover $\frac{1}{8}$ of the flag.
2. Your design must be planned on the 16 square grid below.
3. You must complete the entry form on page 15

SCHOOL SPIRIT FLAG DESIGN ENTRY FORM

Name _____

What color did you choose for color 1? _____

How do you know that it covers 1/2 of your flag?

What color did you choose for color 2? _____

How do you know that it covers 1/4 of your flag?

How would your flag look different if these fractions were used as color guidelines?

- Color 1: 1/4 of the flag
 - Color 2: 1/4 of the flag
 - Color 3: 1/4 of the flag
 - Color 4: 1/4 of the flag
-
-
-

School Spirit Flag Design Scoring Matrix

	3 Points	2 Points	1 Point
<i>Planning Grid</i>	Used grid, design covers all 16 squares	Used grid, design does not cover all 16 squares	Did not use grid for design
<i>Color</i>	Used 4 colors		Did not use 4 colors
<i>Use of Fractions in Creating Design Entry Form</i>	All colors cover the space specified in guidelines	No more than 1 color fails to cover space specified.	More than 1 color fails to cover space specified.
	Form is complete, complete explanations given.	Form is complete, explanations need improvement.	Form is incomplete, explanations need improvement.

CURRICULAR CORRELATIONS

Mathematics Curricular Standards

Grades 2 - 4

✧ Standard 1: Numbers and Computations

Benchmark 1: The student demonstrates number sense for whole numbers, simple fractions, money and decimals in a number of situations.

Indicator 1: Uses appropriate representations of whole numbers to formulate and solve real-world problems.

Benchmark 2: The student demonstrates an understanding of whole numbers with a special emphasis on place value; recognizes uses and explains their properties; and extends these properties to simple fractions, mixed numbers, decimals and money

* Indicator 1: Uses place value and properties of the whole number system and money to explain his/her reasoning and to formulate and solve real-world problems.

Indicator 2: Uses place value and whole number properties to perform various computational procedures, extends these properties to simple fractions, mixed numbers and decimals and explains how the properties are used.

✧ Standard 3: Geometry

Benchmark 2: The student estimates and measures using standard and non-standard units in a variety of situations.

* Indicator 1: Formulates and solves real-world problems by applying measurements and measurement formulas.

* = assessed indicator