Grade 3

Grandfather Tang's Story

Written by: **Ann Tompert**
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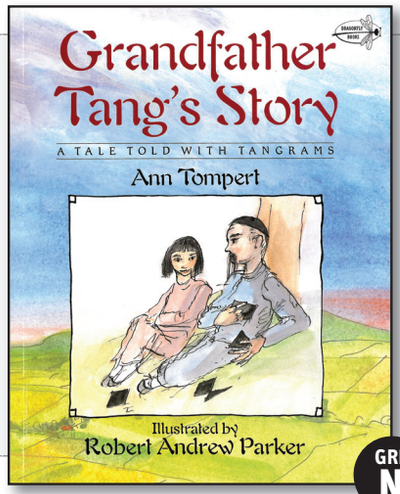
SCHOLASTIC

Math Reads™ from Marilyn Burns

TOPICS	
Fractions	Shapes



GRL N

When Little Soo asks her grandfather to tell her a story, Grandfather Tang obliges. Using his tangrams, he tells the story of two fox fairies that challenge each other. Each fox fairy rapidly changes shape to outdo the other until one is shot by a hunter's arrow. The other comes to his friend's rescue and after changing shape into a lion to scare off the hunter, both return to their original fox fairy selves. This imaginative story provides an excellent context for lessons about shapes and fractions.

Standards for Mathematical Practice

- Make sense of problems and persevere in solving them.
- Attend to precision.

Standards for Mathematical Content

- Number & Operations—Fractions
- Geometry

Objectives

- Reason with shapes and their attributes.
- Partition shapes into parts with equal area.
- Understand a fraction as a part of a whole.

Getting Started

Show the cover and read the title aloud. Say: *In this book, Grandfather Tang tells Little Soo a story using tangrams to show different animals.* Tell students that a tangram is an ancient Chinese puzzle that has seven pieces. Read the book and then use the following lesson ideas in the order they appear.

LESSON IDEAS

Partition Shapes Into Halves

- Copy the tangram pattern at the back of the book onto construction paper and make enough copies so each student has at least one.
- Give each student a tangram pattern and a pair of scissors. Ask students to carefully cut out the seven tangram pieces. Say: *You are going to partition, or divide, each of the seven pieces into two equivalent parts, or halves. Watch as I show you how to do this.* Use a pencil to sketch a line that splits one of the large triangles into two equivalent parts. Label each part $\frac{1}{2}$.
- Ask the students to draw a line across each tangram piece to partition it into two equivalent parts and label each part with a fraction. Explain: *There are more ways than one to partition the square or parallelogram into two equal pieces.*
- Provide students with envelopes to store their tangrams.

CONTINUE

Explore Congruent and Similar

- Tell students that they are going to use their tangrams to think about two mathematical ideas. Write **congruent** and **similar** on the board.
- Say: *When two things are congruent, they are exactly the same size and shape.* Ask students to find examples of congruent shapes in their tangrams. (the two large triangles and the two small triangles)
- Explain: *When shapes are similar, they are the same shape but their size is different. One is an enlargement of the other, or one is a reduction of the other.* Ask students to look at their tangram pieces to find similar shapes. (The large, medium, and small triangles are similar.)
- Write two statements on the board and discuss why they are true.

  All squares are similar.

  All squares are not congruent.

- Repeat with two other statements.

  All triangles are not similar.

  All triangles are not congruent.

- Be sure to point out that many triangles are not shaped like the tangram triangles. Draw examples on the board.

Sort and Compose Shapes

- Ask students what they know about triangles and quadrilaterals. After they share their ideas, record the information in a chart as shown below.

Triangles	Quadrilaterals
3 straight sides	4 straight sides
3 angles	4 angles
flat, closed	flat, closed

- To check for understanding, ask students to use their tangrams and hold up an example of a triangle. Repeat for quadrilaterals.
- Have students sort their seven tangram pieces into triangles and quadrilaterals. (There are five triangles and two quadrilaterals.)
- Give students the challenge of building squares using tangram pieces. Have them try to build a square using any two, three, four, five, or all seven pieces. Explain: *It is not possible to build a square with six of the tangram pieces.*

Write a Tangram Story

- Tell students that they will create their own story and use the tangram pieces to show the characters. Explain that they must use all seven pieces, that the pieces must touch, and that none may overlap. Invite the students to return to the book and examine the pictures of the tangram elements of the story. Provide paper, crayons, or color pencils, and the books for students to study.
- When students finish their tangram stories, have them share with the rest of the class.

SUPPORTING INSTRUCTION

Have students experiment with the tangram pieces to make familiar things like a candle, a cat, letters of the alphabet, or the numerals 1 to 9. Tell students to trace the pieces on a piece of paper once they make something they like. Remind them that pieces must touch without overlapping. For a greater challenge, ask students to build a triangle or a rectangle using two, three, four, five, six, or all seven tangram pieces.

Vocabulary

Math Vocabulary

ENGLISH	SPANISH*
congruent	*congruente*
half	*mitad*
parallelogram	*paralelogramo*
partition	*dividir*
quadrilateral	*cuadrilátero*
rectangle	*rectángulo*
similar	*parecido*
square	*cuadrado*
triangle	*triángulo*

Context Vocabulary

ENGLISH	SPANISH*
flock	*rebaño*
rivalry	*rivalidad*
tangram	*tangrama*

HOME CONNECTION

Have students share their tangram stories with someone at home. Tell them to use their tangrams to help tell the story.

**Pointing out Spanish cognates will help students make meaning-based connections.*

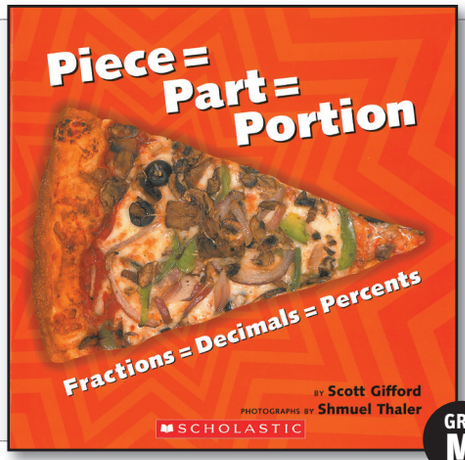
Grade 4

Piece = Part = Portion

Written by: **Scott Gifford**
Photographs by: **Shmuel Thaler**

SCHOLASTIC Math Reads™ from Marilyn Burns

TOPICS	
Fractions	Problem Solving



GRL M

This photographic essay communicates the important mathematical idea that fractions, decimals, and percents are various ways to talk about part of a larger whole. Beautiful images of everyday objects illustrate fractional parts and accompanying text helps students connect the different symbols used to represent them. Students and teachers will want to revisit this text many times.

Standards for Mathematical Practice

- Reason abstractly and quantitatively.
- Look for and express regularity in repeated reasoning.

Standards for Mathematical Content

- Number & Operations—Fractions

Objectives

- Extend understanding of fraction equivalence and ordering.
- Use decimal notation for fractions with denominators of 100.

Getting Started

Show the cover and read the title aloud. Discuss how the words "piece," "part," and "portion" can be used to describe a slice of pizza that is cut from a whole pizza. Have students predict other everyday objects that could be in the book to illustrate pieces, parts, or portions of a whole. Read the book and then use the following lesson ideas in the order they appear.

LESSON IDEAS

Name Fractions Equal to $\frac{1}{2}$

- Show the students the first photo of the shoe. Ask: *Why does this picture illustrate $\frac{1}{2}$?* (1 shoe is half of a pair of 2 shoes.) Show the next page with the photo of an egg carton with 1 egg in it. Ask: *Why does this picture illustrate $\frac{1}{12}$?* (There are 12 eggs in a dozen but only 1 egg in the carton.) *How could we change the picture so that it illustrates $\frac{1}{2}$?* (Show 6 eggs.) Write on the board: $\frac{6}{12} = \frac{1}{2}$.
- Revisit the rest of the pages in the book, each time asking the same two questions: *Why does this picture illustrate ___? How could we change the picture so that it illustrates $\frac{1}{2}$?*
- Discuss why it isn't possible to change the picture for odd numbers—11 members on a soccer team, 9 squares on a Tic-Tac-Toe board, and so on. When solutions are possible, write equations on the board: $\frac{5}{10} = \frac{1}{2}$, $\frac{4}{8} = \frac{1}{2}$, $\frac{3}{6} = \frac{1}{2}$, and $\frac{2}{4} = \frac{1}{2}$.

CONTINUE

Name Fractions Greater Than $\frac{1}{2}$

- Write **>** and **<** on the board and review the meaning of each. Explain that $\frac{1}{2}$ is an important benchmark for comparing fractions. Say: *Let's revisit the photos in the book and think about fractions that are greater than $\frac{1}{2}$.*
- Open to the page with $\frac{1}{12}$ and a dozen eggs. Ask: *Is this fraction greater than or less than $\frac{1}{2}$? How do you know?* ($\frac{1}{12}$ is less than $\frac{1}{2}$ because half of 12 is 6.) *How could we change the photo so it shows a fraction greater than $\frac{1}{2}$?* (Show 7, 8, 9 10, 11, or 12 eggs.) Have students offer different ways. For each response, ask for a number sentence and write it on the board.

$\frac{7}{12} > \frac{1}{2}$ $\frac{8}{12} > \frac{1}{2}$ $\frac{9}{12} > \frac{1}{2}$

$\frac{10}{12} > \frac{1}{2}$ $\frac{11}{12} > \frac{1}{2}$ $\frac{12}{12} > \frac{1}{2}$

- Organize the students into five groups and give each group a copy of the book. Have them page through the remaining photos. For each fraction less than $\frac{1}{2}$, have students write a number sentence that shows a fraction greater than $\frac{1}{2}$ and tell how the photo would change.

Name Fractions Less Than $\frac{1}{2}$

- On another day, revisit the book and have students name fractions less than $\frac{1}{2}$. Show the page with $\frac{1}{12}$ and a dozen eggs. Say: *We already know that $\frac{1}{12}$ is less than $\frac{1}{2}$ because half of 12 is 6. What are some other ways to show a fraction less than $\frac{1}{2}$?* (Show 0, 1, 2, 3, 4, or 5 eggs.) Write on the board:

$\frac{5}{12} < \frac{1}{2}$ $\frac{4}{12} < \frac{1}{2}$ $\frac{3}{12} < \frac{1}{2}$

$\frac{2}{12} < \frac{1}{2}$ $\frac{1}{12} < \frac{1}{2}$ $\frac{0}{12} < \frac{1}{2}$

- Organize the students into five groups and give each group a copy of the book. Have them page through the remaining photos and write number sentences for each.

Connect Fractions to Decimals, Percents, and Money

- Draw a 10-by-10 grid on the board and open the book to the photo of pennies. Verify with students that the pennies are in a 10-by-10 array and that there would be 100 pennies if all the pennies were shown. Point out the decimal and percent notation for $\frac{99}{100}$. Write **$0.99** on the board.
- Say: *Let's think how we could change the photo so it shows other fractions with the denominator of 100.* Draw 10 pennies in the first column of the grid on the board. Ask: *If these were the only pennies in the photo, what fraction could we write?* ($\frac{10}{100}$) *How would we write that as a decimal, percent, and money?* Write on the board: $\frac{10}{100}$ **= 0.10 = 10% = $0.10**. Draw 10 pennies in the next column and repeat. Continue until five columns are filled in.
- Say: *There are 50 pennies now. How do I know that I have filled $\frac{1}{2}$ of the grid?* (50 is half of 100) *How can we write $\frac{50}{100}$ as a decimal, percent, and money?* Write on the board: $\frac{1}{2}$ **=** $\frac{50}{100}$ **= 0.50 = 50% = $0.50**.
- Continue filling columns on the grid and writing equations.

SUPPORTING INSTRUCTION

Help students who need more support with connecting fractions, decimals, and percents by giving them a 10-by-10 grid and 100 pennies or other objects to work with to represent the amounts. Ask students ready for a challenge to revisit the page that shows the photo of 99 pennies. Ask them to figure out how many pennies would show $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{3}{4}$ of the array. Have them write equations to show that a fraction with a denominator of 100 can be written as a decimal, as a percent, and as money.

Vocabulary

Math Vocabulary

ENGLISH	SPANISH*
array	*matriz*
benchmark	*punto de referencia*
equals	*es igual a*
fraction	*fracción*

Context Vocabulary

ENGLISH	SPANISH*
part	*parte*
piece	*pedazo*
portion	*porción*

HOME CONNECTION

Have students check at home to see if they have more or less than $\frac{1}{2}$ of a dozen eggs. Ask them to draw a picture and write a number sentence.

**Pointing out Spanish cognates will help students make meaning-based connections.*

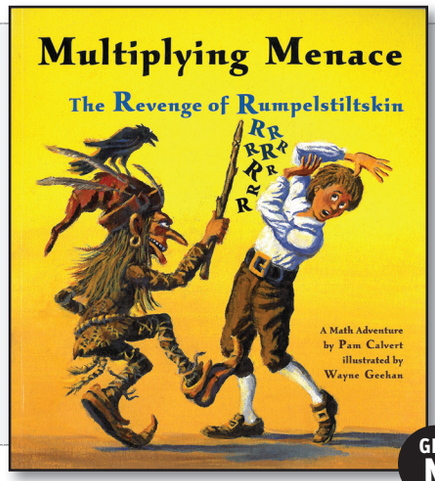
Grade 5

Multiplying Menace

Written by: **Pam Calvert**
Illustrated by: **Wayne Geehan**

SCHOLASTIC Math Reads™ from Marilyn Burns

TOPICS	
Multiplication	Fractions



GRL N

The crafty trickster Rumpelstiltskin returns for revenge, using math as his weapon. He makes good things diminish and bad things increase. The King's son Peter takes on the challenge of restoring the damage. He masters the power of multiplying whole numbers and fractions to reverse the curses and ultimately conquers Rumpelstiltskin once and for all. This book is an excellent springboard for introducing multiplication of fractions times whole numbers.

Standards for Mathematical Practice

- Reason abstractly and quantitatively.
- Model with mathematics.

Standards for Mathematical Content

- Operations & Algebraic Thinking
- Number & Operations—Fractions

Objectives

- Write and interpret numerical expressions.
- Apply and extend previous understandings of multiplication to multiply fractions.

Getting Started

Show the cover and read the title aloud. Discuss the meanings of the words "menace" and "revenge," and then ask students what they know about Rumpelstiltskin. Briefly summarize the original fairy tale then ask students to predict math's role in the story. Read the book and then use the following lesson ideas in the order they appear.

LESSON IDEAS

Write Equations

- Reread the book, pausing each time the story provides an opportunity to write an equation to describe the action. For example, on page 5, ten guards rush forward and Rumpelstiltskin makes eight of them disappear. Write on the board:

  Page 5 *10 – 8 = 2 guards*

- As you continue, ask students to listen for other opportunities to write equations with whole numbers. Record on the board:

Page 9	*1 × 6 = 6 noses*
Page 12	*1 × 8 = 8 candles*
Page 13	*4 × 10 = 40 branches*
Page 14	*(2 × 5) – 6 = 4 pies*
Pages 18–19	*(4 × 5) – 8 = 12 pies*
Page 21	*2 × 50 = 100 chairs*
Page 23	*3 × 9 = 27 stepping stones*

CONTINUE

Connect Multiplication to Addition

- Read the last line on the bottom of page 9: *Rumpelstiltskin pointed at the King. "Nose times six!" he said.* Ask students how to record this action with an equation with multiplication. (1 × 6 = 6) To help students think about how to multiply a whole number by a fraction, relate multiplication to repeated addition. Write on the board:

  6 noses: 1 × 6 = 6 × 1 = 1 + 1 + 1 + 1 + 1 + 1

- Continue reading through page 14 about Rumpelstiltskin's actions with candles, branches, and pies. On the board, record equations as shown.

  8 candles: 1 × 8 = 8 × 1 = 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1

  40 branches: 4 × 10 = 10 × 4 = 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4

  10 pies: 2 × 5 = 5 × 2 = 2 + 2 + 2 + 2 + 2

Multiply Whole Numbers by Fractions

- Reread page 20 and discuss Peter's problem. Say: *Peter has 12 pies but there should only be 4 pies.* Demonstrate how Peter solved the problem with multiplication. Write on the board:

  4 pies = $\frac{1}{3}$ of 12 pies *12 pies times $\frac{1}{3}$ is 4 pies* *12 × $\frac{1}{3}$ = 4*

- Tell students that thinking about multiplication as repeated addition can help them solve 12 × $\frac{1}{3}$. Write on the board:

  $$\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}$$

- Have students find the sum and share their strategies. Remind them that $\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=1$ and help them to see that there are 4 groups like this in the problem.
- Say: *We know that when you multiply by whole numbers greater than one, the product is always greater than both of the factors. But when you multiply by a fraction, the product is always less than or equal to one of the factors.*
- Tell students they are going to solve multiplication problems and ask them to use addition to figure out the answers. Write on the board:

  $5 \times \frac{1}{5}$ $8 \times \frac{3}{4}$ $12 \times \frac{1}{6}$ $4 \times \frac{2}{3}$

Investigate Fractional Products

- Pose a problem: *Peter had $\frac{1}{3}$ of a pie. Three friends came to visit, and Peter wanted pie for all four of them. Peter used the walking stick to multiply by 4. How much pie resulted?* Write on the board:

  $$4 \times \frac{1}{3} = \frac{1}{3}+\frac{1}{3}+\frac{1}{3}+\frac{1}{3} = \frac{4}{3} \text{ or } 1\frac{1}{3}$$

- Ask students to work with a partner to solve other problems. Write on the board:

  $7 \times \frac{1}{2}$ $10 \times \frac{1}{4}$ $3 \times \frac{3}{4}$

- Remind pairs to use addition to figure out the answers.

SUPPORTING INSTRUCTION

For more practice multiplying by fractions, give students examples of things they would like to decrease, such as eight pages of homework or 24 problems on a test, and multiply each by the fractions $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ to see which has the best effect for decreasing.

Vocabulary

Math Vocabulary

ENGLISH	SPANISH*
factor	*factor*
one-hundredth	*una centésima*
one-third	*un tercio*
one-thirtieth	*una trigésima*
product	*producto*

Context Vocabulary

ENGLISH	SPANISH*
menace	*amenaza*
seamstress	*costurera*
spools	*carrete*

HOME CONNECTION

Tell students to tell the story to someone at home who has heard of Rumpelstiltskin and show two examples of how to make the number of objects smaller by multiplying by a fraction.

**Pointing out Spanish cognates will help students make meaning-based connections.*

Compute & Compare With Cards C

DIRECTIONS

1

$1\frac{4}{8} - \frac{1}{3}$

$1\frac{4}{8} - \frac{1}{3} = 1\frac{1}{6}$

Choose a problem you think will give the greatest answer.
Record your fractions.
Subtract.
Write an equation.

2

$1\frac{6}{8} - \frac{2}{4}$

$1\frac{6}{8} - \frac{2}{4} = 1\frac{1}{4}$

Record the other team's fractions and equation.

3

$1\frac{4}{8} - \frac{1}{3} = 1\frac{1}{6}$

$1\frac{6}{8} - \frac{2}{4} = \textcircled{1\frac{1}{4}}$

Circle the greater answer.

	Your Team	Other Team
Game 1	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**
Game 2	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**
Game 3	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**

Compute & Compare With Cards C

DIRECTIONS

1

$1\frac{4}{8} - \frac{1}{3}$

$1\frac{4}{8} - \frac{1}{3} = 1\frac{1}{6}$

Choose a problem you think will give the least answer.
Record your fractions.
Subtract.
Write an equation.

2

$1\frac{6}{8} - \frac{2}{4}$

$1\frac{6}{8} - \frac{2}{4} = 1\frac{1}{4}$

Record the other team's fractions and equation.

3

$1\frac{4}{8} - \frac{1}{3} = \textcircled{1\frac{1}{6}}$

$1\frac{6}{8} - \frac{2}{4} = 1\frac{1}{4}$

Circle the lesser answer.

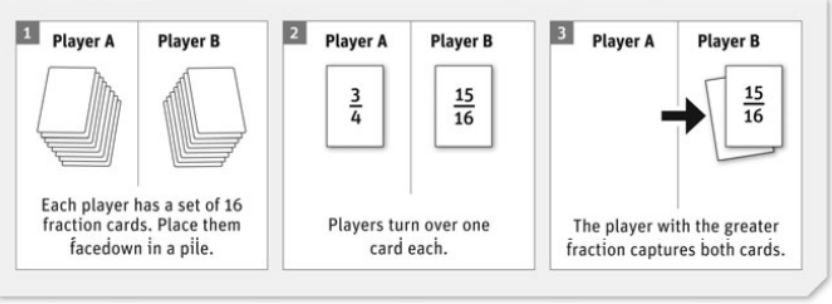
	Your Team	Other Team
Game 1	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**
Game 2	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**
Game 3	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**	$1\frac{\square}{\square} - \frac{\square}{\square}$ **Equation:**

Fractions Capture

➤ **This game will give your child practice with comparing fractions.**

To play you need paper or index cards and a pencil to make two sets of fraction cards as described to the right.

HOW TO PLAY



1															
$\frac{1}{2}$								$\frac{1}{2}$							
$\frac{1}{4}$				$\frac{1}{4}$				$\frac{1}{4}$				$\frac{1}{4}$			
$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$		$\frac{1}{8}$	
$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$

You may use the mini fraction strips on this page to help you decide which fraction is greater. Play continues until someone runs out of cards. The person who has the greatest number of cards set aside wins.

MAKE THESE

To make a set of fraction cards, write each of the 16 fractions on separate pieces of paper or index cards.

$\frac{1}{16}, \frac{1}{8}, \frac{3}{16}, \frac{1}{4}, \frac{5}{16}, \frac{3}{8}, \frac{7}{16}, \frac{1}{2}, \frac{9}{16}, \frac{5}{8}, \frac{11}{16}, \frac{3}{4}, \frac{13}{16}, \frac{7}{8}, \frac{15}{16}, 1$

Make a set for each player.