

RIGHTSTARTTM FRACTIONS

Learn Fractions in $42\frac{1}{2}$ Days

based on the work of Joan A. Cotter, Ph.D.

Lessons

INTRODUCTION

This book is based on fractions lessons, activities, and games from the RightStart™ Mathematics curriculum and from Math Card Games, 5th edition, both written by Dr. Joan A. Cotter. It is intended for both students and adults who need and want to understand fractions from the basic understanding to dividing fractions. This manual can be used with any mathematics program; knowledge of the RightStart™ Mathematics program is not needed.

Fractions are introduced with a linear visual model, including all fractions from $\frac{1}{2}$ to $\frac{1}{10}$. Most work with fractions should be done with fraction charts, a copy of which is in the Appendix on page 1. Sturdier charts, wood, plastic, and magnetic, are available from Activities for Learning, Inc. at RightStartMath.com. The charts promote investigation using informal solutions before learning procedures. When working with fractions, students should only use the horizontal form, not the slanted line.

The most frequent reason for confusion with fractions is a vague understanding of what fraction are and how they are related to each other. This uncertainty creates an environment of minimal or no understanding while memorizing of the procedures with marginal success. In these 42½ days of lessons and games, we will lay a solid foundation, and proceed step by step to create clear understanding. Asians and Europeans have the philosophy of learning that anyone can learn mathematics, including fractions, or play the violin. It is not a matter of talent, but of good teaching and hard work. This book will provide the teaching guide and makes the work interesting with games and activities. There are 56 games and 17 worksheets over 42½ days of lessons.

Some might feel that fractions are becoming obsolete because the metric system does not need them and calculators use decimals. However, fractions are the culmination of arithmetic and are essential for understanding algebra and other advanced topics. In essence, fractions are division. To be successful with more advanced fractions, students must be thoroughly familiar with multiplication and division of whole numbers. This background is needed to simplify a fraction to lowest terms and to find a lowest common denominator.

We hope that through these lessons and games, students will develop a renewed interest and enjoyment in mathematics, thereby enriching their lives. We also hope some of them will become tomorrow's mathematicians, scientists, and engineers.

We really want to hear how this program is a success for you and your students. Please share your experience and let us know!

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DAILY LESSONS

Lightbulb and Target

This identifies why the day's topic is important and the goal of the lesson.

You will need

Materials needed for the day's activities will be identified. It might be the fraction chart or fraction pieces, cards, or common objects such as ruler or paper and pencil. If an appendix page or worksheet is needed, it will be listed here.

Manipulatives, such as the fraction chart or multiplication table, are not to be regarded as crutches. They enable the student to build a mental model, necessary for concept formation. In practice, they will refer to them less and less and finally not at all. Let each student decide when they no longer needs them. Sometimes just the security of having them nearby helps, even if they are not looked at. At the right time, a student may respond to the challenge of playing without them.

Activities

This section is the heart of the day's lesson. These are the instructions for teaching the lesson. The expected answers from the student is given in square brackets.

Research shows that the quiet time for thoughtful response should be about three seconds. Avoid talking during this quiet time; resist the temptation to rephrase the question. This quiet time gives the slower student time to think and the quicker student time to think more deeply. Encourage the student to develop persistence and perseverance. Avoid giving hints or explanations too quickly. Students, and people in general, tend to stop thinking once they hear the answer.

Games

Games, not worksheets or flash cards, provide practice. The games can be played as many times as necessary until proficiency takes place. They are as important to learning math as books are to reading. Reviewing old games lets the student see their progress while reinforcing familiar concepts.

Checkmark

Each lesson ends with a summary check where the student answers a one or two short questions based on the day's activities.

Worksheets

The 17 worksheets are designed to give the student a chance to think about and to practice the day's lesson. Many lessons have no worksheet. Worksheets are available in a separate book and are copywritten for a single student's use. Additional worksheet books may be ordered from RightStartMath.com.

THE MATH GAMES

The games teach the players math while they play. The players need not know their facts before playing. The principles that influenced the design of these games are as follows.

1. A logical and organized approach using strategies.
2. Concrete and mental work before paper work.
3. Concept or strategy explained.
4. Interesting repetition.

Strategies give students confidence and independence. Rote memorizing, on the other hand, is a low-level thinking skill. What looks like a simple step to someone who knows fractions is often several steps for a student. That explains the variety of games and activities. Often a concept can be learned in more than one way, resulting in several games for the same concept.

Do not be in a hurry to play the next game. Frequently go back to games already learned; the student will often play them from a new perspective.

DESCRIPTION OF THE CARDS

To play the daily games, you need three decks of special cards, which are available from Activities for Learning, Inc. The descriptions are as follows:

Fraction Cards

There are 75 fraction cards with 20 different fractions and 20 matching percent cards:

1. Two each of $\frac{4}{5}$, $\frac{7}{10}$, $\frac{9}{10}$.
2. Three each of $\frac{3}{4}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{5}{6}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$, $\frac{3}{10}$.
3. Four each of $\frac{2}{3}$, $\frac{1}{8}$, $\frac{1}{10}$.
4. Five each of 1, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$.
5. Eight each of $\frac{1}{2}$.
6. Twenty percent cards, corresponding to each fraction.

Basic Number Cards

These 132 cards are numbered from 0 to 10. There are 12 of each number.

Multiplication Cards

Each card corresponds to a number in the multiplication table from 1×1 to 10×10 . Thus, it has 100 cards. Some numbers, such as 1, are found only once and others, such as 6, are repeated as often as four times.

RIGHTSTART™ FRACTIONS: TABLE OF CONTENTS

Day 1	Introduction to Fractions	Game 1	Beginning Fraction Exploration
Day 2	Naming Fractions	Game 2	Unit Fraction War
Day 3	Making One	Game 3	Concentrating on One
Day 4	Game Day	Game 4	One
		Game 5	Fraction Old Main
Day 5	Comparing Fractions	Game 6	Fraction War
Day 6	Making One Half	Game 7	One Half
Day 7	Drawing Fractions	Game 8	What Fraction of Six
Day 8	Fractions of a Dollar	Game 9	Fraction of Ten
Day 9	Game Day	Game 10	Harder Fraction War
		Game 11	Double the Fraction
Day 10	Fractions in Time	Game 12	Fraction of Twelve
Day 11	The Ruler Chart	Game 13	What Fraction of Eight
Day 12	Fraction Problems	Game 14	Name Either Fraction
Day 13	Equivalent Fractions	Game 15	Series Solitaire
Day 14	More Equivalent Fractions	Game 16	Follow the Series
Day 15	Simplifying Fractions	Game 17	Simplifying with the Multiplication Table
Day 16	Whole Numbers and Fractions	Game 18	One or Two
Day 17	Mixed Numbers to Improper Fractions	Game 19	Mixed to Improper Fractions
Day 18	Game Day	Game 20	Concentrating on Sixths
		Game 21	Concentrating on Eighths
		Game 22	Concentrating on Tenths
Day 19	Improper to Mixed Numbers	Game 23	Hardest Fraction War
Day 20	The Dividing Line	Game 24	Equivalent Fractions
Day 21	More Simplifying Fractions	Game 25	Equivalent Fraction Matchin’
Day 22	Finding Factors	Game 26	Gathering the Factors
Day 23	Factoring into Prime Numbers	Game 27	Factoring
Day 24	Greatest Common Factor	Game 28	GCF
Day 25	Simplifying Fractions Using GCFs	Game 29	Simplifying Fractions
Day 26	Game Day	Game 30	Gathering the Factors Solitaire
		Game 31	Factoring Golf
Day 27	Multiples in Common	Game 32	Multiples in Common
Day 28	Lowest Common Multiple	Game 33	LCM
Day 29	Fraction Addition	Game 34	Fraction Addition
Day 30	Fraction Subtraction	Game 35	Fraction Subtraction
Day 31	More Fraction Addition and Subtraction	Game 36	Harder Fraction Subtraction
Day 32	Game Day	Game 37	Fraction Addition War
		Game 38	Fraction Sum Rummy

RIGHTSTART™ FRACTIONS: TABLE OF CONTENTS

Day 33	Fraction Multiplication	Game 39	Fraction of Twelve on Paper with Cards
		Game 40	Fraction of Ten on Paper with Cards
		Game 41	Fraction of Sixteen on Paper with Cards
Day 34	Fraction Times a Fraction	Game 42	Fraction Times a Fraction
Day 35	More Fraction Times a Fraction	Game 43	Fraction Times a Fraction War
Day 36	Game Day	Game 44	Whole Number Times Fraction War
		Game 45	Mixed Fraction Times a Whole Number
		Game 46	Fraction of a Fraction of Twenty-Four
Day 37	Fraction Division	Game 47	Fraction Division War
Day 38	More Fraction Division	Game 48	Harder Fraction Division War
Day 39	Fractions and Percents	Game 49	Percent Memory
Day 40	More Fractions and Percents	Game 50	Percent Old Main
		Game 51	Percent War
Day 41	Game Day	Game 52	One Hundred Percent Memory
		Game 53	Percent One or Two
		Game 54	Circle Fun
Day 42	Sale Price	Game 55	Sale Price
Day 42 $\frac{1}{2}$	Game Day	Game 56	Fractions In Four Operations

DAY 2 - Naming Fractions



This lesson will help the student begin to recognize the various fractions by size and in written format. Students need time to adjust to the concept that the larger the denominator, the smaller the fraction.



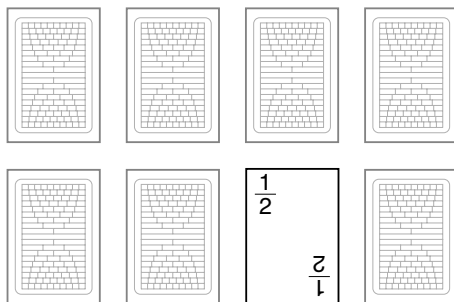
“I will learn to name and compare fractions.”

You will need. The fraction chart, individual fraction pieces, and these eight fraction cards: 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, and $\frac{1}{10}$.

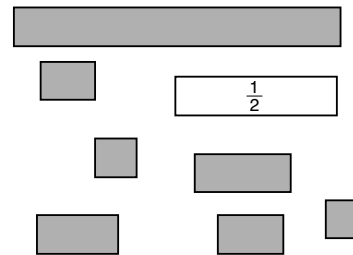
Assemble the fraction chart. Ask the student to assemble the fraction chart. If needed, use the completed chart for reference. Be certain to assemble the pieces next to the chart rather than on top of the completed chart.

Unit fraction practice. Ask the student to find and to set aside the following fraction strips as you say them: 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, and $\frac{1}{10}$. Do not use the $\frac{1}{7}$ and $\frac{1}{9}$ at this time as the differences are visually minimal to the $\frac{1}{8}$ and $\frac{1}{10}$.

Lay the corresponding fraction cards face down on the table. Nearby lay out the eight fraction pieces face down. First, turn over a card. Then turn over a fraction piece. If they match, he collects both pieces. If they do not match, both the card and fraction piece are returned face down.



Matching fraction cards and pieces.



Continue until all the cards are collected. Practice until the student is able to match the cards and the fraction strips with ease.

Finding fraction pieces. Ask the student to assemble the fraction chart. Then ask him to find and to set aside the following fraction strips as you say them:

three $\frac{1}{4}$ s	five $\frac{1}{8}$ s	two $\frac{1}{9}$ s	4 sevenths
5 ninths	2 fifths	5 tenths	2 tenths

Continue by writing, instead of saying, the fractions, for the student to find and set aside the corresponding fractions strips.

$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{3}$	$\frac{1}{6}$
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Also ask the student to participate in the fraction naming for the remaining strips. [the whole or 1, 1 half, 2 thirds, 2 fifths, 5 sixths, 3 sevenths, 2 eighths, 2 ninths, and 3 tenths]



Unit Fraction War

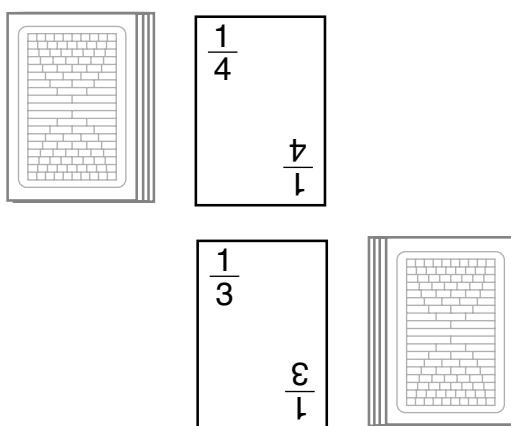
You will need: The fraction pieces or the fraction chart. Generally the younger students prefer the pieces while the older students like the chart.

Cards: Use all of the following unit fraction cards: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, and $\frac{1}{10}$, and five 1s.

Number of players: Two or two teams.

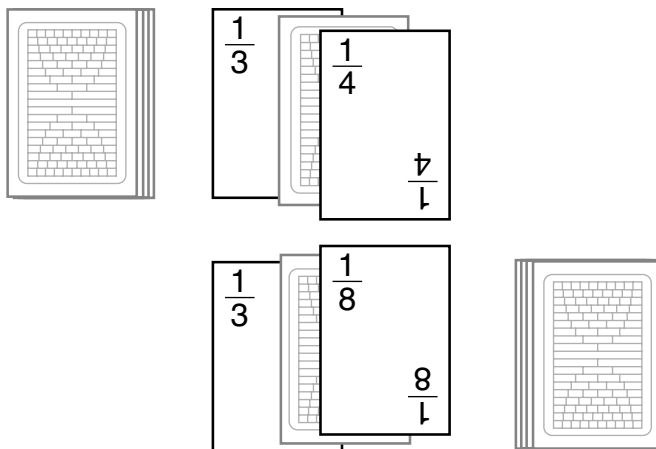
Layout: Keep the cards face down and divide them evenly between the two players.

Play: Each player takes the top card from his stack and lays it down in the middle of the table face up. The player whose card is greater takes both cards. Players alternate deciding whose card is greater.



Unit Fraction War game in progress.

Players continue comparing cards until they play identical cards, causing a “war.” To resolve a war, both players play one card face down and then play a third card face up to be compared. The player who has the higher card in the last comparison takes all six cards.



A “war”.



Ask: Which is more, one half or one fourth? [one half] Which is more, one third or one? [one]