

RIGHTSTARTTM MATHEMATICS

by Joan A. Cotter, Ph.D.
with Tracy Mittleider, MEd

FIRST GRADE LESSONS
Second Edition

A special thank you to Kathleen Cotter Clayton for all her work on the preparation of this manual.

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RIGHTSTART™ MATHEMATICS OBJECTIVES FOR FIRST GRADE

Numeration

- Can recognize quantities 1 to 10 without counting
- Can enter and recognize quantities to 100 on the abacus
- Knows even numbers and odd numbers
- Can identify even/odd numbers to 120
- Can count by 2s, 5s, 10s

Quarter 1 Quarter 2 Quarter 3 Quarter 4

Place Value

- Knows 37 as 3-ten 7
- Knows traditional names: e.g., 18 as eighteen as well as 1-ten 8
- Can trade 10 ones for 1 ten
- Can trade 10 tens for 1 hundred
- Can trade 10 hundreds for 1 thousand
- Can write and read 4-digit numbers

N/A			
N/A			
N/A			
N/A			

Addition

- Understands addition as combining parts to form a whole
- Knows number facts to 18
- Can add 2-digit numbers mentally
- Can add 4-digit numbers

N/A	N/A		
N/A			
N/A	N/A		

Subtraction

- Understands subtraction as missing addends
- Understands subtraction as partitioning
- Knows subtraction facts up to 10

N/A	N/A		
N/A	N/A		
N/A	N/A		

Problem Solving

- Can solve word problems
- Perseveres in solving problems

Geometry

- Knows parallel and perpendicular lines
- Knows square is a special rectangle
- Knows lines of symmetry
- Composes shapes from existing shapes
- Knows names of special quadrilaterals

N/A	N/A	N/A	
N/A			
N/A	N/A	N/A	

Measurement

- Can measure to one half of a centimeter
- Can measure to one half of an inch
- Can measure around a shape

N/A	N/A	N/A	
N/A	N/A	N/A	
N/A	N/A	N/A	

Fractions

- Can partition into halves and fourths
- Knows that one fourth is also called a quarter
- Knows unit fractions up to tenths

N/A	N/A	N/A	
N/A	N/A	N/A	
N/A	N/A	N/A	

Time

- Knows days of the week and months of the year
- Can tell and write time in hours & half hours on analog & digital clocks
- Can tell time to five-minute intervals

N/A			
N/A	N/A		
N/A	N/A		

Money

- Knows name and value of penny, nickel, dime, and quarter
- Can determine the value of three coins

N/A	N/A	N/A	
N/A	N/A	N/A	

Calculator

- Can add and subtract whole numbers

N/A	N/A	N/A	
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FIRST GRADE: TABLE OF CONTENTS

Lesson 1	Review Subitizing 1 to 5
Lesson 2	Review Subitizing 6 and 7 & the Cotter Abacus
Lesson 3	Review Subitizing Quantities 8 to 10
Lesson 4	Review Subitizing Quantities 1 to 10
Lesson 5	Review Partitioning with Part-Whole Circle Sets
Lesson 6	Review Partitioning Ten
Lesson 7	Review Go to the Dump
Lesson 8	Review Introducing the Math Balance
Lesson 9	Review Writing Addition Equations
Lesson 10	Review Tens on the Abacus
Lesson 11	Review Tens and Ones
Lesson 12	Adding One
Lesson 13	More Adding One
Lesson 14	Evens and Odds
Lesson 15	Even Numbers Plus 2
Lesson 16	Odd Numbers Plus 2
Lesson 17	The Doubles 1 to 5
Lesson 18	The Doubles 6 to 10
Lesson 19	Practicing the Doubles
Lesson 20	The Commutative Property
Lesson 21	Applying the Commutative Property
Lesson 22	Solving “Add To” Problems
Lesson 23	Quadrilaterals
Lesson 24	Building Rectangles
Lesson 25	Triangles with Right Angles
Lesson 26	Adding Ten to a Number
Lesson 27	Adding Ones and Adding Tens
Lesson 28	Introducing Hundreds
Lesson 29	Numbers 100 to 120
Lesson 30	More Hundreds
Lesson 31	Enrichment Working with 100s and 1000s
Lesson 32	Two-Fives Strategy
Lesson 33	More Two-Fives Strategy
Lesson 34	Adding Five to a Number
Lesson 35	Partitioning 5, 10, and 15

FIRST GRADE: TABLE OF CONTENTS

Lesson 36	Corners™ Exercise without Scoring
Lesson 37	Corners™ Exercise with Scoring
Lesson 38	Basic Corners™ Game
Lesson 39	Solving “Combine” Problems
Lesson 40	Sums Equal to 11
Lesson 41	Review
Lesson 42	Assessment 1
Lesson 43	Making Rectangles with Tangrams
Lesson 44	Continuing Patterns
Lesson 45	Continuing Patterns with Geoboards
Lesson 46	Designs with Diagonals
Lesson 47	The Greater Than Symbol
Lesson 48	Adding 9 to a Number
Lesson 49	Adding 8 to a Number
Lesson 50	Two-Fives Strategy Practice
Lesson 51	Adding 8s and 9s Practice
Lesson 52	Thousands
Lesson 53	Base-Ten Picture Cards
Lesson 54	Trading with Base-10 Cards
Lesson 55	Adding with Base-10 Cards
Lesson 56	More Adding with Base-10 Cards
Lesson 57	Enrichment Cotter Tens Fractal—Prep
Lesson 58	Enrichment Cotter Tens Fractal
Lesson 59	Adding Even Numbers Practice
Lesson 60	Adding up to 10 and up to 15
Lesson 61	Adding Several Numbers
Lesson 62	Solving Problems with Three Addends
Lesson 63	Introducing Side 2 of the Abacus
Lesson 64	Bead Trading
Lesson 65	Adding 2-Digit Numbers and Tens
Lesson 66	Corners™ Game
Lesson 67	Mentally Adding 2-Digit Numbers
Lesson 68	Long Chain Solitaire
Lesson 69	Addition Bingo Game
Lesson 70	Days in a Year Problem

FIRST GRADE: TABLE OF CONTENTS

Lesson 71	Adding 1, 10, and 100
Lesson 72	Adding 4-Digit Numbers
Lesson 73	Continuing the Pattern
Lesson 74	Review
Lesson 75	Review Games
Lesson 76	Assessment 2
Lesson 77	Hours on a Clock
Lesson 78	Hours and Half-Hours
Lesson 79	Minutes on the Clock
Lesson 80	More Minutes on the Clock
Lesson 81	Hours and Minutes
Lesson 82	Adding 4-Digit Numbers on Paper
Lesson 83	Enrichment Adding Very Large Numbers
Lesson 84	Solving “Take From” Problems
Lesson 85	Ten Minus a Number
Lesson 86	Subtraction as the Missing Addend
Lesson 87	Subtracting by Going Back
Lesson 88	Subtracting Consecutive Numbers
Lesson 89	Subtracting from 9 and 11
Lesson 90	Subtracting with Doubles and Near Doubles
Lesson 91	Subtracting by Taking All from Ten
Lesson 92	Subtracting by Taking Part from Ten
Lesson 93	Finding the Difference
Lesson 94	Solving Compare Problems
Lesson 95	Addition and Subtraction Equations
Lesson 96	Continuing Patterns in the Hundreds
Lesson 97	Higher Even and Odd Numbers
Lesson 98	Pages in Books and Reading Years
Lesson 99	Greater Than or Less Than Symbols
Lesson 100	Introducing Area
Lesson 101	Halves and Fourths
Lesson 102	Fourths and Quarters
Lesson 103	Finding Quarter Parts
Lesson 104	Measuring with Centimeters
Lesson 105	Graphing

FIRST GRADE: TABLE OF CONTENTS

Lesson 106	Measuring with Inches
Lesson 107	Paper Measuring Problems
Lesson 108	Making Rectangles with Tiles
Lesson 109	Enrichment Geometry Solids
Lesson 110	Building with Cubes
Lesson 111	Mentally Adding with Sums over 100
Lesson 112	Pennies, Nickels, and Dimes
Lesson 113	Coin Problems
Lesson 114	Choosing Coins
Lesson 115	Counting Money with Quarters
Lesson 116	Using the Fewest Coins
Lesson 117	Making Change
Lesson 118	Adding with a Calculator
Lesson 119	Introducing Multiplication as Arrays
Lesson 120	Multiplication as Repeated Addition
Lesson 121	More Calculator Activities
Lesson 122	Introducing Division
Lesson 123	Beginning Fractions
Lesson 124	Unit Fractions
Lesson 125	Fractions of Twelve and Eight
Lesson 126	Comparing Fractions by Weighing
Lesson 127	Lines of Symmetry
Lesson 128	Finding Symmetry
Lesson 129	Tangram and Geoboard Figures
Lesson 130	Enrichment Introducing Angles
Lesson 131	Number and Operations in Base-10 Review
Lesson 132	Number and Operations in Base-10 Games
Lesson 133	Number and Operations in Base-10 Assessment
Lesson 134	Operations & Algebraic Thinking Review
Lesson 135	Operations & Algebraic Thinking Games
Lesson 136	Operations & Algebraic Thinking Assessment
Lesson 137	Measurement and Data Review and Games
Lesson 138	Measurement and Data Assessment
Lesson 139	Geometry Review and Games
Lesson 140	Geometry Assessment

LESSON 20: THE COMMUTATIVE PROPERTY

OBJECTIVE:

1. To understand and apply the commutative property ($a + b = b + a$)

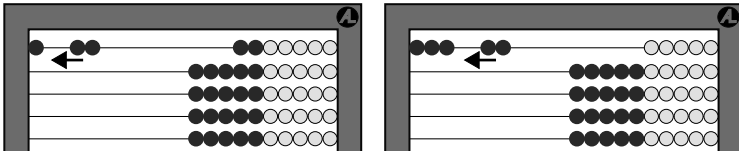
MATERIALS:

1. Cotter Abacuses
2. Dry erase boards
3. Worksheet 6, The Commutative Property

ACTIVITIES FOR TEACHING:

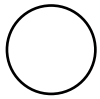
Warm-up. Ask the children to say the months of the year. Then play the Comes After game with the months. Ask: What month comes after April? [May] What month comes after August? [September] What month comes after January? [February]

Ask the children to enter 1 on their abacuses and to name the quantity. [1] Ask them to add another 2 and name the amount. [3] See figure below. Continue to 9. Ask: What was special about the numbers you said? [odd numbers]

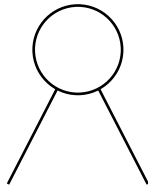


Adding 2s to count by twos.

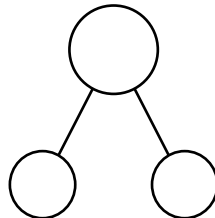
Drawing part-whole circle sets. Show the children how to draw part-whole circle sets as shown below. First, draw the large circle. Second, draw the two lines. Third, draw the small circles by starting at the end of the lines.



Drawing the large circle.



Drawing the lines.



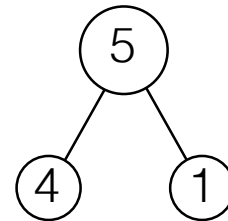
Drawing the small circles.

Commutative property with part-whole circle sets.

Ask the children to draw two part-whole circle sets. Ask them to write parts 4 and 6 in one set and parts 6 and 4 in the other as shown on the top of the next page. Ask the children to find the whole for both. [10]

EXPLANATIONS:

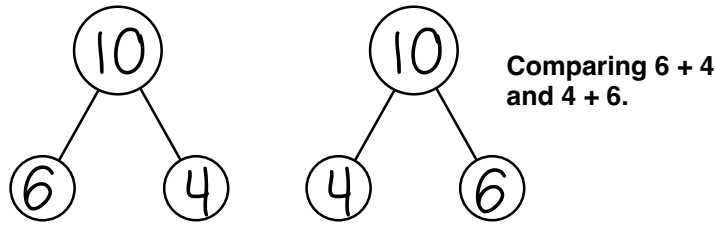
Part-whole circle sets are a visual tool that help children understand partitioning. The whole is written in the larger circle and the parts, in the smaller circles. Research shows children using them do better in solving story problems.



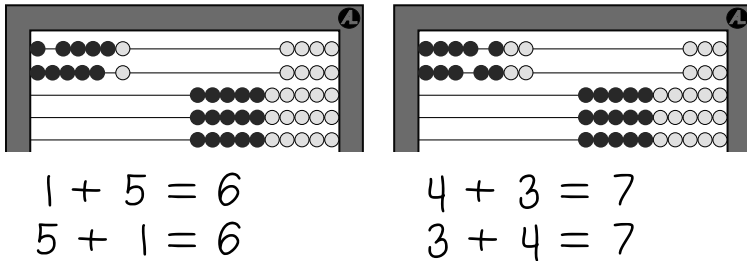
Some children discover the commutative property on their own, but others need experiences to realize and apply it.

Do not teach the term *commutative* at this point. The children must thoroughly understand the concept before the word is introduced.

ACTIVITIES FOR TEACHING:



Commutative property with the abacus. Ask them to enter $1 + 5$ on the first wire of their abacuses and $5 + 1$ on the second wire. Tell them to write the sums in the whole-circles and to write the equations. See the left figure below.



Repeat for $4 + 3$ and $3 + 4$. See the right figures above. Ask them to notice how the equations are the same and how they are different. [same parts, different order] Encourage them to try their own numbers and discuss their conclusions.

Worksheet 6. This worksheet provides more practice in applying the commutative property. Using abacuses helps the children “see” the concept.

$4 + 5 = 9$	$7 + 2 = 9$
$5 + 4 = 9$	$2 + 7 = 9$
$6 + 3 = 9$	$3 + 5 = 8$
$3 + 6 = 9$	$5 + 3 = 8$
$4 + 3 = 7$	$7 + 1 = 8$
$3 + 4 = 7$	$1 + 7 = 8$
$8 + 1 = 9$	$3 + 7 = 10$
$1 + 8 = 9$	$7 + 3 = 10$

In conclusion. Write on a dry erase board $40 + 30 = 70$ and $30 + 40 = 70$. Ask the children: What do you notice about the equations? [The answers are the same.]

EXPLANATIONS:

The commutative property is sometimes referred to as the commutative law. Property, meaning attribute or quality, is the preferred term.

Name: _____ Date: _____

4	+	5	=
5	+	4	=

6	+	3	=
3	+	6	=

4	+	3	=
3	+	4	=

8	+	1	=
1	+	8	=

7	+	2	=
2	+	7	=

3	+	5	=
5	+	3	=

7	+	1	=
1	+	7	=

3	+	7	=
7	+	3	=

LESSON 61: ADDING SEVERAL NUMBERS

OBJECTIVES:

1. To practice adding several numbers
2. To find 2, 3, or 4 numbers that total 15

MATERIALS:

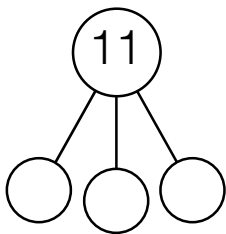
1. Dry erase boards
2. Worksheet 21, Adding Several Numbers
3. *Math Card Games* book, A53

ACTIVITIES FOR TEACHING:

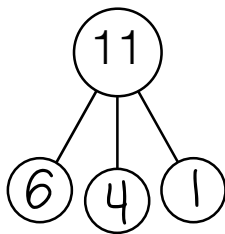
Warm-up. Ask: How can you add three numbers? [First add any two numbers, then add the last number.]

Ask the children to solve the following problem using a part-whole circle set:

John has 11 apples and 3 friends to share the apples with. How could John split the apples among the 3 friends?



The part-whole circle set with three parts.



One way to partition 11 into 3 parts.

Ask the children: 9 and what equals 15? [6] 7 and what equals 15? [8] 5 and what equals 15? [10] 8 and what equals 15? [7] 6 and what equals 15? [9]

Ask: What kind of number do you always get when you add two even numbers? [even number]

Ask the children to give the ways to make 11; 3 and what? [8] 4 and what? [7] 10 and what? [1] 9 and what? [2]

EXPLANATIONS:

ACTIVITIES FOR TEACHING:

Worksheet 21. Give the children the worksheet. Remind them they can add the numbers in any order. The problems and solutions are below:

$$3 + 2 + 1 = 6$$

$$5 + 2 + 2 = 9$$

$$4 + 3 + 2 = 9$$

$$1 + 2 + 7 = 10$$

$$2 + 3 + 6 = 11$$

$$3 + 5 + 5 = 13$$

$$2 + 7 + 8 = 17$$

$$10 + 2 + 3 = 15$$

$$6 + 5 + 6 = 17$$

$$2 + 9 + 9 = 20$$

Preparation for Rows and Columns game. Write the following numbers:

$$9 \quad 4 \quad 1 \quad 5$$

and ask the children which numbers they could use to make 15. [9, 1, 5] Ask several children how they found the numbers. They may see the 9 and 1 making 10 and with the 5 making 15.

Repeat for

$$4 \quad 4 \quad 9 \quad 7$$

This sum [4, 4, 7] can be seen with the 4 and 4 giving 8, which added to 7 is 15.

Repeat for

$$3 \quad 3 \quad 6 \quad 9$$

This time there are two solutions. [3, 3, 9 or 6, 9] Since the object of this new game will be to collect the most cards, the first solution is preferred.

Rows and Columns game. Play the Rows and Columns game from the *Math Card Games* book, A53.

In conclusion. Ask: What is $1 + 2 + 3 + 4 + 5$? [15]

EXPLANATIONS:

There are many different ways to find the numbers. Children listening to each other can learn some of them. Encourage listening by asking the children to discuss which ways are easiest, or fastest.

Name: _____

Date: _____

$$3 + 2 + 1 = \underline{\quad}$$

$$5 + 2 + 2 = \underline{\quad}$$

$$4 + 3 + 2 = \underline{\quad}$$

$$1 + 2 + 7 = \underline{\quad}$$

$$2 + 3 + 6 = \underline{\quad}$$

$$3 + 5 + 5 = \underline{\quad}$$

$$2 + 7 + 8 = \underline{\quad}$$

$$10 + 2 + 3 = \underline{\quad}$$

$$6 + 5 + 6 = \underline{\quad}$$

$$2 + 9 + 9 = \underline{\quad}$$

LESSON 93: FINDING THE DIFFERENCE

OBJECTIVES:

1. To learn the term *difference*
2. To solve compare problems

MATERIALS:

1. Sums Practice 4
2. Geared clocks
3. Large Cotter Abacus
4. Cotter Abacuses
5. *Math Card Games* book, S13

ACTIVITIES FOR TEACHING:

Warm-up. Ask the children to do the next two problems on Sums Practice 4 without their abacuses:

$$\begin{array}{r} 1398 \\ + 1406 \\ \hline 2804 \end{array} \qquad \begin{array}{r} 3149 \\ + 7788 \\ \hline 10937 \end{array}$$

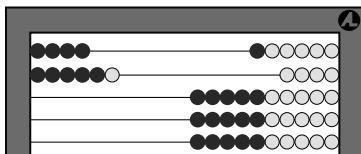
Ask: How could you use the Taking Part From Ten strategy for finding $14 - 7$? [Take 4 from the 4 and 3 from the ten to get 7.] How could you use this strategy for finding $17 - 7$? [Take 7 from the 7 to get ten.]

Ask: How could you use the Taking All From Ten strategy for finding $12 - 7$? [Take 7 from 10 and adding $3 + 2 = 5$.] How could you use this strategy for finding $13 - 6$? [$4 + 3 = 7$]

Set the hands of the geared clock to 4:15 and ask the children to say the time. [4:15] Ask them to set their clocks for various times and state those times.

Finding differences on the abacus. Enter 4 and 6 on the top two wires of the large abacus. See the left figure below. Ask the children: What is the *difference* in quantity between the 4 and 6? [2]

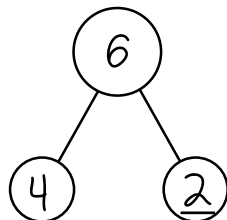
Ask: Did you add 4 and 6 to find the difference? [no] What did you do? [subtract] Ask them to put the numbers in a part-whole circle set. See the right figure below. Explain that the larger number goes in the whole-circle. The smaller number and difference go in the part-circles. Ask a child to write the equations.



Find the difference between 4 and 6.

$$6 - 4 = \underline{2} \text{ or}$$

$$4 + \underline{2} = 6$$

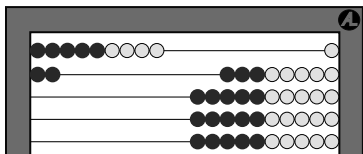


Larger number on top;
smaller number and
difference in part-circles.

EXPLANATIONS:

ACTIVITIES FOR TEACHING:

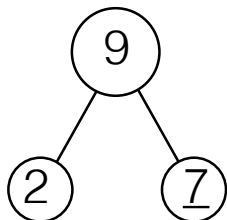
Repeat for difference between 9 and 2. See figures below.



Find the difference between 9 and 2.

$$9 - 2 = \underline{7} \text{ or}$$

$$2 + \underline{7} = 9$$



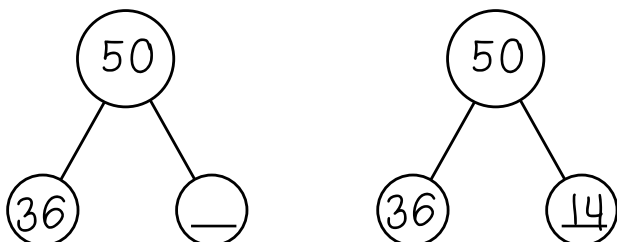
The difference is 7.

Problem. Read the following problem to the children:

Mikayla has a book with 36 pages and Nathan has a book with 50 pages. Whose book has more pages and how many more? [Nathan, 14 more pages]

Draw a part-whole circle set and ask: Which number goes in the whole-circle? [50] What number goes in a part-circle? [36] See the left figure below. Ask: Whose book has more pages? [Nathan] How many more? [14] Ask a child to write the equation.

$$50 - 36 = \underline{14} \text{ or } 36 + \underline{14} = 50$$



The part-whole circle set for a compare problem.

Harder Difference War game. Play the Harder Difference War game from the *Math Card Games* book, S13.

In conclusion. Ask the children: When you add, what do you call the answer? [sum] When you subtract, what do you call the answer? [difference]

EXPLANATIONS:

Children needing an easier game could play Difference War, S12.

LESSON 104: MEASURING WITH CENTIMETERS

OBJECTIVES:

1. To measure in centimeters
2. To collect information and categorize it
3. To learn the term *data*

MATERIALS:

1. Sums Practice 6
2. Worksheet 46, Measuring with Centimeters
3. Centimeter cubes
4. One set of tangrams per child

ACTIVITIES FOR TEACHING:

Warm-up. Ask the children to do the last two problems on Sums Practice 6. The solutions are:

$$\begin{array}{r} 7129 \\ + 1516 \\ \hline 8645 \end{array} \qquad \begin{array}{r} 4233 \\ + 726 \\ \hline 4959 \end{array}$$

Ask: What is another word for quarter? [a fourth] What are the two names for one half of a half? [one fourth, a quarter] How many quarters in a whole? [4] How many quarters in a half? [2]

Ask: Which is more, one half or two quarters? [same] Which is less, one half or three quarters? [one half]

Ask the children to solve the following problem.

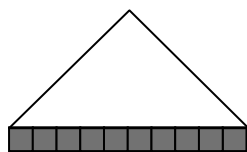
There are 15 butterflies flying by the flowers. In the group, 6 butterflies are yellow. How many of the butterflies are not yellow? [9 butterflies]

Ask the children to mentally add $47 + 32$, [77, 79] $47 + 22$, [67, 69] $100 + 87$, [180, 187] and $67 + 67$. [127]

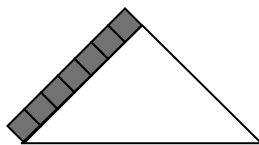
Tangrams lengths. Distribute the tangrams to the children. Ask: Are all edges of your tangram pieces the same length? [no] Explain: In this lesson you are going to find out how many different lengths the edges of the tangram pieces have. You will also find out which length is the most common and which is the least common.

Worksheet 46. Distribute the worksheet and the centimeter cubes to the children. Show them a centimeter cube and explain that the distance along an edge is 1 centimeter.

Ask them to measure the longest side of the large triangle in centimeters. Demonstrate as shown below in the left figure. Ask: How many centimeters long is it? [10 cm]



Longest side is 10 cm.



Shorter side is 7 cm.

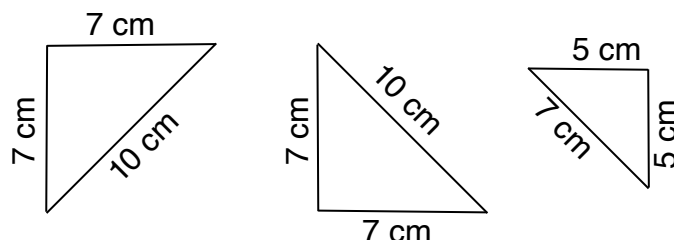
EXPLANATIONS:

According to Clements & Sarama, researchers found that children are often confused when asked to measure with various non-standard units. Only, after they are familiar with the concept of measurement, will they be able to understand the need for standard measurements.

ACTIVITIES FOR TEACHING:

Next ask them to measure the side of the large triangle. [7 cm] Repeat for the other side. [7 cm] See the right figure on the previous page.

Point the first figure from the worksheet so the children can see. Ask them what each side measured; write it on the corresponding side of the figure. Tell them that we write cm for centimeter. See the left figure below.

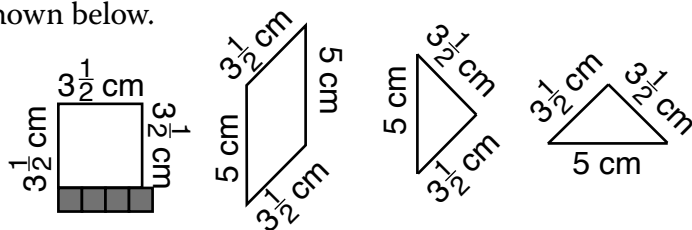


The lengths of the sides of the first 3 tangram pieces.

Tell the children their worksheets show all the tangram pieces. Tell them to measure the sides using the centimeter cubes and write the lengths for the first three triangles on their worksheets. See figures above.

Measuring the square. Tell the children to measure a side of the square. Ask: Does it measure 3 cm? [too little] Does it measure 4 cm? [too much] Tell them: The side measures 3 and a part of a another centimeter. What part is it? [one half] Tell them: We say it is 3 and one half centimeters. Show them how to write $3\frac{1}{2}$ cm.

Do the same thing with the last three pieces. Answers are shown below.



The lengths of the sides of the last 4 tangram pieces.

Worksheet Question 2. Explain to the children that they have a lot of information, called *data*; now they can organize it in the chart. First, they are to count the number of sides having 10 cm and write it below the box saying 10 cm. Next they are to find the number of sides that are 7 cm long and write it below the 7 cm. Do the same thing with the last two lengths. The solutions are:

10	7	5	$3\frac{1}{2}$
2	5	6	10

Worksheet Question 3. Here they are to tell what they learned about the lengths.

In conclusion. Ask: Are you surprised there are only four different lengths?

EXPLANATIONS:

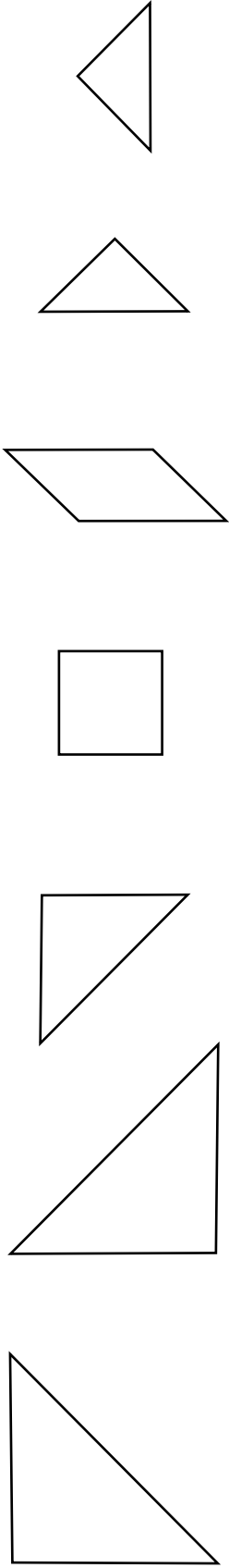
Measurements of the physical tangrams are recorded on the worksheets. The drawings are not to be measured.

Some children will realize that shapes may be identical and measuring them again is unnecessary. Other children will want to measure everything, which is necessary for them.

Although fractions are not common within the metric system, they are permissible.

Name: _____ Date: _____

1. Measure the side of each tangram piece in centimeters and write it along the edge.



2. Write the total number of sides with each measurement.

10 cm	7 cm	5 cm	$3\frac{1}{2}$ cm

3. Write about your findings.
