# RIGHTSTART™ MATHEMATICS

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

## LEVEL C LESSONS

Second Edition

Activities for Learning, Inc.

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

Note: Rather than use the designations, Kindergarten, First Grade, ect., to indicate a grade, levels are used. Level A is kindergarten, Level B is first grade, and so forth.



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# RightStart™ Mathematics Objectives for Level C

Name ______________________________ Year __________

| | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|
| **Numeration** | | | | |
| Can skip count by 2s, by 5s, by 10s, and by 100s to 1000 | | | | |
| Can compare numbers up to 1000 using <, =, and > | | | | |
| Can read and construct Roman numerals to 1000 | | | | |
| Understands place value and can write numbers to 9999 with numerals, words, and expanded form | | | | |
| **Addition** | | | | |
| Knows addition facts | | | | |
| Can add 2-digit numbers mentally | | | | |
| Can add 4-digit numbers | | | | |
| **Subtraction** | | | | |
| Understands subtraction | N/A | | | |
| Knows subtraction facts | N/A | | | |
| Can subtract 2-digit numbers mentally | N/A | | | |
| Can subtract 4-digit numbers | N/A | | | |
| **Multiplication** | | | | |
| Understands multiplication as arrays | N/A | | | |
| Knows multiplication facts to 5 × 5 | N/A | N/A | | |
| **Problem Solving** | | | | |
| Solves problems in more than one way | | | | |
| Persists in solving problems | | | | |
| Can solve addition and subtraction problems | N/A | | | |
| Can solve compare problems | N/A | N/A | | |
| **Time and Money** | | | | |
| Can tell time to the minute | N/A | N/A | | |
| Can find the value of up to five coins and make change | N/A | N/A | N/A | |
| **Measurement** | | | | |
| Can measure in inches, feet, centimeters, and meters | N/A | N/A | N/A | |
| Can find perimeter and area in customary and metric | N/A | N/A | N/A | |
| Can read a ruler to halves | N/A | N/A | N/A | |
| **Geometry** | | | | |
| Can identify basic 2D and 3D shapes | N/A | N/A | N/A | |
| Can determine number of angles, sides, and faces in shapes | N/A | N/A | | |
| **Fractions** | | | | |
| Understands fractions as a type of division | N/A | N/A | N/A | |
| Knows unit fractions up to 1/10 | N/A | N/A | N/A | |
| **Data** | | | | |
| Gathers and shows data with line plots and interprets results | N/A | N/A | N/A | |
| **Calculator** | | | | |
| Can add, subtract, and multiply whole numbers | N/A | N/A | N/A | |
| Can solve two-step problems | N/A | N/A | N/A | |

# How This Program Was Developed

We have been hearing for years that students in Japan do better than U.S. students in math. The Asian students are ahead by the middle of first grade. And the gap widens every year thereafter.

Many explanations have been given, including less diversity and a longer school year. Japanese students attend school 240 days a year.

A third explanation given is that the Asian public values and supports education more than we do. A first grade teacher has the same status as a university professor. If a student falls behind, the family, not the school, helps the child or hires a tutor. Students often attend after-school classes.

A fourth explanation involves the philosophy of learning. Asians and Europeans believe anyone can learn mathematics or even play the violin. It is not a matter of talent, but of good teaching and hard work.

Although these explanations are valid, I decided to take a careful look at how mathematics is taught in Japanese first grades. Japan has a national curriculum, so there is little variation among teachers.

I found some important differences. One of these is the way the Asians name their numbers. In English we count ten, eleven, twelve, thirteen, and so on, which doesn't give the child a clue about tens and ones. But in Asian languages, one counts by saying ten-1, ten-2, ten-3 for the teens, and 2-ten 1, 2-ten 2, and 2-ten 3 for the twenties.

Still another difference is their criteria for manipulatives. Americans think the more the better. Asians prefer very few, but insist that they be imaginable, that is, visualizable. That is one reason they do not use colored rods. You can imagine the one and the three, but try imagining a brown eight–the quantity eight, not the color. It cannot be done without grouping.

Another important difference is the emphasis on non-counting strategies for computation. Japanese children are discouraged from counting; rather they are taught to see quantities in groups of fives and tens.

For example, when an American child wants to know 9 + 4, most likely the child will start with 9 and count up 4. In contrast, the Asian child will think that if he takes 1 from the 4 and puts it with the 9, then he will have 10 and 3, or 13. Unfortunately, very few American first-graders at the end of the year even know that 10 + 3 is 13.

I decided to conduct research using some of these ideas in two similar first grade classrooms. The control group studied math in the traditional workbook-based manner. The other class used the lesson plans I developed. The children used that special number naming for three months.

They also used a special abacus I designed, based on fives and tens. I asked 5-year-old Stan how much is 11 + 6. Then I asked him how he knew. He replied, "I have the abacus in my mind."

The children were working with thousands by the sixth week. They figured out how to add 4-digit numbers on paper after learning how on the abacus.

Every child in the experimental class, including those enrolled in special education classes, could add numbers like 9 + 4, by changing it to 10 + 3.

I asked the children to explain what the 6 and 2 mean in the number 26. Ninety-three percent of the children in the experimental group explained it correctly while only 50% of third graders did so in another study.

I gave the children some base ten rods (none of them had seen them before) that looked like ones and tens and asked them to make 48. Then I asked them to subtract 14. The children in the control group counted 14 ones, while the experimental class removed 1 ten and 4 ones. This indicated that they saw 14 as 1 ten and 4 ones and not as 14 ones. This view of numbers is vital to understanding algorithms, or procedures, for doing arithmetic.

I asked the experimental class to mentally add 64 + 20, which only 52% of nine-year-olds on the 1986 National test did correctly; 56% of those in the experimental class could do it.

Since children often confuse columns when taught traditionally, I wrote 2304 + 86 = horizontally and asked them to find the sum any way they liked. Fifty-six percent did so correctly, including one child who did it in his head.

The following year I revised the lesson plans and both first grade classes used these methods. I am delighted to report that on a national standardized test, both classes scored at the 98th percentile.

*Joan A. Cotter, Ph.D.*

# Some General Thoughts on Teaching Mathematics

1. Only five percent of mathematics should be learned by rote; 95 percent should be understood.
2. Real learning builds on what the child already knows. Rote teaching ignores it.
3. Contrary to the common myth, "young children can think both concretely and abstractly. Development is not a kind of inevitable unfolding in which one simply waits until a child is cognitively 'ready.'" —*Foundations for Success* NMAP
4. What is developmentally appropriate is not a simple function of age or grade, but rather is largely contingent on prior opportunities to learn." —Duschl & others
5. Understanding a new model is easier if you have made one yourself. So, a child needs to construct a graph before attempting to read a ready-made graph.
6. Good manipulatives cause confusion at first. If a new manipulative makes perfect sense at first sight, it is not needed. Trying to understand and relate it to previous knowledge is what leads to greater learning. —Richard Behr & others.
7. According to Arthur Baroody, "Teaching mathematics is essentially a process of translating mathematics into a form children can comprehend, providing experiences that enable children to discover relationships and construct meanings, and creating opportunities to develop and exercise mathematical reasoning."
8. Lauren Resnick says, "Good mathematics learners expect to be able to make sense out of rules they are taught, and they apply some energy and time to the task of making sense. By contrast, those less adept in mathematics try to memorize and apply the rules that are taught, but do not attempt to relate these rules to what they know about mathematics at a more intuitive level."
9. Mindy Holte puts learning the facts in proper perspective when she says, "In our concern about the memorization of math facts or solving problems, we must not forget that the root of mathematical study is the creation of mental pictures in the imagination and manipulating those images and relationships using the power of reason and logic." She also emphasizes the ability to imagine or visualize, an important skill in mathematics and other areas.
10. The only students who like flash cards are those who do not need them.
11. Mathematics is not a solitary pursuit. According to Richard Skemp, solitary math on paper is like reading music, rather than listening to it: "Mathematics, like music, needs to be expressed in physical actions and human interactions before its symbols can evoke the silent patterns of mathematical ideas (like musical notes), simultaneous relationships (like harmonies) and expositions or proofs (like melodies)."
12. "More than most other school subjects, mathematics offers special opportunities for children to learn the power of thought as distinct from the power of authority. This is a very important lesson to learn, an essential step in the emergence of independent thinking." —*Everybody Counts*

13. The role of the teacher is to encourage thinking by asking questions, not giving answers. Once you give an answer, thinking usually stops.
14. Putting thoughts into words helps the learning process.
15. Help the children realize that it is their responsibility to ask questions when they do not understand. Do not settle for "I don't get it."
16. The difference between a novice and an expert is that an expert catches errors much more quickly. A violinist adjusts pitch so quickly that the audience does not hear it.
17. Europeans and Asians believe learning occurs not because of ability, but primarily because of effort. In the ability model of learning, errors are a sign of failure. In the effort model, errors are natural. In Japanese classrooms, the teachers discuss errors with the whole class.
18. For teaching vocabulary, be sure either the word or the concept is known. For example, if a child is familiar with six-sided figures, we can give him the word, hexagon. Or, if he has heard the word, multiply, we can tell him what it means. It is difficult to learn a new concept and the term simultaneously.
19. Introduce new concepts globally before details. This lets the children know where they are headed.
20. Informal mathematics should precede paper and pencil work. Long before a child learns how to add fractions with unlike denominators, she should be able to add one half and one fourth mentally.
21. Some pairs of concepts are easier to remember if one of them is thought of as dominant. Then the non-dominant concept is simply the other one. For example, if even is dominant over odd, an odd number is one that is not even.
22. Worksheets should also make the child think. Therefore, they should not be a large collection of similar exercises, but should present a variety. In RightStart™ Mathematics, they are designed to be done independently.
23. Keep math time enjoyable. Our emotional state at the time we learn something is attached to that information. A person who dislikes math will avoid it and a child under stress stops learning. If a lesson is too hard, stop and play a game. Try the lesson again later.
24. In Japan students spend more time on fewer problems. Teachers do not concern themselves with attention spans as is done in the U.S.
25. In Japan the goal of the math lesson is that the student has understood a concept, not necessarily has done something (a worksheet).
26. The calendar must show the entire month, so the children can plan ahead. The days passed can be crossed out or the current day circled.
27. A real mathematical problem is one in which the procedures to find the answer are not obvious. It is like a puzzle, needing trial and error. Emphasize the satisfaction of solving problems and like puzzles, of not giving away the solution to others.

## RightStart™ Mathematics

Ten major characteristics make this research-based program effective:

1. Refers to quantities of up to 5 as a group; discourages counting individually. Uses fingers and tally sticks to show quantities up to 10; teaches quantities 6 to 10 as 5 plus a quantity, for example 6 = 5 + 1.
2. Avoids counting procedures for finding sums and differences. Teaches five- and ten-based strategies for the facts that are both visual and visualizable.
3. Employs games, not flash cards, for practice.
4. Once quantities 1 to 10 are known, proceeds to 10 as a unit. Temporarily uses the "math way" of naming numbers; for example, "1 ten-1" (or "ten-1") for eleven, "1-ten 2" for twelve, "2-ten" for twenty, and "2-ten 5" for twenty-five.
5. Uses expanded notation (overlapping) place-value cards for recording tens and ones; the ones card is placed on the zero of the tens card. Encourages a child to read numbers starting at the left and not backward by starting at the ones.
6. Proceeds rapidly to hundreds and thousands using manipulatives and place-value cards. Provides opportunities for trading between ones and tens, tens and hundreds, and hundreds and thousands with manipulatives.
7. Teaches mental computation. Investigates informal solutions, often through story problems, before learning procedures.
8. Teaches four-digit addition on the abacus, letting the child discover the paper and pencil algorithm.
9. Introduces fractions with a linear visual model, including all fractions from 1⁄2 to 1⁄10. "Pies" are not used initially because they cannot show fractions greater than 1. Later, the tenths will become the basis for decimals.
10. Teaches short division (where only the answer is written down) for single-digit divisors, before long division.

## Second Edition

Many changes have occurred since the first RightStart™ lessons were begun in 1994. First, mathematics is used more widely in many fields, for example, architecture, science, technology, and medicine. Today, many careers require math beyond basic arithmetic. Second, research has given us new insights into how children learn mathematics. Third, kindergarten has become much more academic, and fourth, most children are tested to ensure their preparedness for the next step.

This second edition is updated to reflect new research and applications. Topics within each level are always taught with the most appropriate method using the best approach with the child and teacher in mind.

# Daily Lessons

## Objectives

The objectives outline the purpose and goal of the lesson. Consider the words; "to introduce" is not the same as "to review." When a topic is introduced, it is not expected to be mastered during that lesson. When a topic is reviewed, proficiency should be close.

## Materials

The manipulatives needed for the lessons are specially chosen items needed to teach the lessons. Occasionally, common objects, such as scissors, will be needed and will be listed in bold type.

## Warm-up

The warm-up provides review, memory work, or an introduction of the day's topics. It can be reduced, modified, or expanded to meet a child's needs.

## Activities

Activities are the heart of the lesson. These are the instructions for teaching the lesson. When guided to ask a question, the expected answer from the child is given in square brackets.

## Explanations

Special background notes and supporting information for the teacher are provided here.

There are Overview Videos to guide and support you weekly. The provided QR code will direct you to the appropriate video.

## Games

Games, not worksheets or flash cards, provide practice. The games, found in the *Math Card Games* book, should be played as many times as necessary until proficiency or memorization takes place. Games are important to learning math, just as books are important to learning reading.

The *Math Card Games* book includes extra games for the child needing more help and more challenging games for the advanced child.

Instructional videos for all the games used in the RightStart™ Mathematics curriculum are available on Vimeo for a small subscription fee.

**Instructional game videos**

## Worksheets

The worksheets are designed to be completed independently in order to demonstrate understanding of the day's lesson. Some lessons, especially in the early levels, have no worksheet.

## In conclusion

Each lesson ends with a short summary based on the day's learning.

## Timeline

Each RightStart Math level is designed for one school year. This level should be completed in full before beginning the next level.

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# Lesson 26: Comparing Numbers

**OBJECTIVE:**

1. To compare numbers using =, <, and > symbols

**MATERIALS:**

1. Dry erase board
2. Worksheet 9, Comparing Numbers

**ACTIVITIES FOR TEACHING:**

***Warm-up.*** Ask the child: What is 34 plus 10? [44] What is 36 plus 10? [46] What is 72 plus 10? [82] What is 89 plus 10? [99]

Write 1000 + 800 + 30 + 1. Ask the child to write her answer on the dry erase board. [1831] Repeat for 8000 + 100 + 40 + 5. [8145]

Ask: Which is more, ten hundreds or one thousand? [same] Which is more, one hundred or one thousand? [one thousand]

***Comparing numbers.*** Write:

$$9 \_\_\_ 6 + 3$$

Ask: Is 9 equal to 6 plus 3? [yes] What do we write on the line? [an equal sign] Tell the child to write an equal sign.

Below the first equation, write:

$$10 \_\_\_ 6 + 3$$

Ask: Is 10 equal to 6 plus 3? [no] Is 10 greater than or less than 6 + 3? [greater]

***The > symbol.*** Show her how to write the greater than symbol by starting at the top of the larger number, draw a line to the middle of the smaller number, and finish by drawing to the bottom of the larger number. See below.

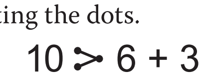
***The < symbol.*** Tell the child suppose the equation changed and written as:

$$6 + 3 \_\_\_ 10$$

Write the equation below the first two equations. Ask: What symbol do we need now? [less than] Tell her we can write it the same way by starting at the larger number. See below.

**EXPLANATIONS:**

The > and < symbols were taught in Level B by drawing two dots at the greater number and one dot at the lesser number, and then connecting the dots.



**ACTIVITIES FOR TEACHING:**

***Reading the > and < symbols.*** Show the child how to tell the difference when reading the greater than and less than symbols. Write >, cover it, and slowly uncover it from left to right as shown below on the left. Ask: How many points do you see? [2] Say: Two points mean greater than. Repeat for the < symbol, uncovering it from left to right as shown below on the right. Ask: How many points do you see? [1] Say: One point means less than.

**Reading the > symbol.** **Reading the < symbol.**

Write the three equations and ask the child to read them.

9 = 6 + 3 [Nine equals six plus three.]
10 > 6 + 3 [Ten is greater than six plus three.]
6 + 3 < 10 [Six plus three is less than ten.]

***More comparisons.*** Write the following:

48 ___ 40 + 7

Ask: Which symbol do we need? [>] Ask the child to explain her answer. [48 is 40 plus 8, which is more than 40 plus 7.]

Write another example:

201 + 10 ___ 211

Ask: Which symbol do we need? [=] Ask the child to explain her answer. [1 plus 10 = 11; 200 plus 11 does equal 211.]

Write a third example:

863 + 1 ___ 861 + 10

Ask: Which symbol do we need? [<] Ask the child to explain her answer. [863 plus 1 equals 864; 861 plus 10 equals 871, which is more than 864.]

***Worksheet 9.*** Give the child the worksheet and have her complete the equations. The solutions are below.

| | |
|---|---|
| 38 + 6 **>** 30 + 6 | 99 + 64 **<** 100 + 64 |
| 506 **<** 560 | 211 **>** 200 + 10 |
| 99 + 10 **=** 109 | 99 + 100 **>** 190 |
| 250 + 10 **=** 251 + 9 | 89 + 63 **<** 100 + 73 |
| 700 + 80 **>** 708 | 38 **=** 30 + 8 |
| 1000 **=** 300 + 700 | 461 **>** 400 + 60 |
| 611 + 100 **>** 611 + 10 | |
| 95 + 10 + 5 **=** 110 | |
| 455 + 10 + 1 **>** 100 + 365 | |

***In conclusion.*** Ask: What is the mathematical word for more? [greater] What is the opposite of greater? [less] Name all numbers greater than 5 and less than 9. [6, 7, and 8]

**EXPLANATIONS:**

Name: ____________________

Date: ____________________

Write >, <, or = on the lines to make the equations true.

38 + 6 _____ 30 + 6

506 _____ 560

99 + 10 _____ 109

250 + 10 _____ 251 + 9

700 + 80 _____ 708

1000 _____ 300 + 700

99 + 64 _____ 100 + 64

211 _____ 200 + 10

99 + 100 _____ 190

89 + 63 _____ 100 + 73

38 _____ 30 + 8

461 _____ 400 + 60

Write >, <, or = and explain your answer.

611 + 100 _____ 611 + 10

95 + 10 + 5 _____ 110

455 + 10 + 1 _____ 100 + 365

# Lesson 38: Area and Perimeter

**OBJECTIVES:**
1. To introduce the term *perimeter*
2. To learn about square inches
3. To learn about square cm

**MATERIALS:**
1. Cotter Abacus
2. Tiles
3. Centimeter cubes
4. Worksheet 17, Area and Perimeter

**ACTIVITIES FOR TEACHING:**

***Warm-up.*** Ask: What is area? [the space that something takes up]

Ask the child to say the multiples of 4 as she moves over groups of 4s on the abacus to 40. [4, 8, 12, . . . , 40] Ask her to say the multiples of 3 to 30. [3, 6, 9, . . . , 30]

Play the Comes Before game for counting by 2s. Ask: What comes before 8, [6] 12, [10] 40, [38] 20, [18] and 38? [36] Repeat using 5s.

Ask the child to say the months of the year. Then play the Comes After game. Ask: What month comes after March? [April] After August? [September] After October? [November]

***Inches.*** Give the tiles and centimeter cubes to the child. Tell her to look at one tile. See the left figure below. Remind her that the distance along one edge is 1 inch. Ask: What is the distance around the whole square? [4 inches]

**1 tile** **2 tiles** **3 by 2 array**

Tell her the math word for distance around a shape is *perimeter*. Ask: What is the perimeter of one tile? [4 inches] Show her how to write it:

4 inches

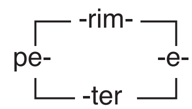
Tell her to place another tile next to the first tile as shown above in the second figure. Ask: What is the perimeter now? [6 inches] Ask the child to write it.

6 inches

***Worksheet 17, problems 1 and 2.*** Give the child the worksheet. Tell her to solve the first two problems. Remind her to write the word inches. See the figures on the next page.

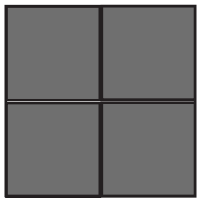
**EXPLANATIONS:**

To remember the basic meaning of the word *perimeter*, some children might find it helpful to point to each side of a rectangle while saying "pe-rim-e-ter" as shown below:

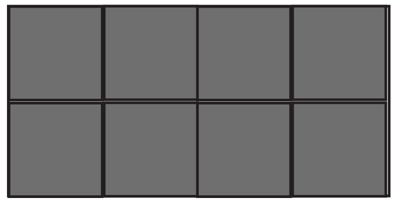


**ACTIVITIES FOR TEACHING:**

**EXPLANATIONS:**



**Rectangle F.**



**Rectangle G.**

1. **2 + 2 + 2 + 2 = 8 inches**
2. **4 + 2 + 4 + 2 = 12 inches**

Ask for explanations on how to solve the problems.

***Square inches.*** Tell her to look again at one tile. Say: We can measure area with these tiles. The area of one tile is 1 square inch. Ask: What is the area of 2 tiles? [2 square inches]

***Problems 3 and 4.*** Tell the child to solve problems 3 and 4. Remind her to write the words *square inches*. See the same figures above.

Ask for an explanation. The areas are:

3. **2 by 2 = 4 square inches**
4. **4 by 2 = 8 square inches**

Ask: Do you think rectangle G is twice as large as rectangle F? [Yes, rectangle F is 4 square inches and rectangle G is 8 square inches, which is twice as much.]

Ask: Is the perimeter twice as much? [no] Ask the child to explain.

***Square centimeters.*** Tell the child to look at one centimeter cube. Say: We measured area with these cubes in the last lesson. Ask: What do you think we call the area of one cube? [square centimeter]

The term *sq cm* is used only temporarily. The standard $cm^2$ will be introduced later.

***Problems 5–8.*** Ask the child to finish the worksheet. Tell her that she does not have to fill in the whole rectangles with the cubes if she can figure out the answers without all of them. The solutions are below.

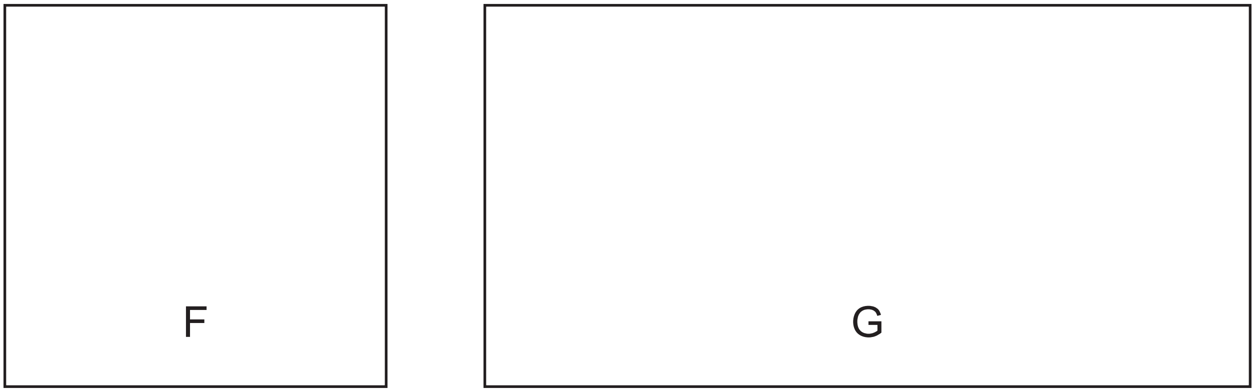
5. **5 + 5 + 5 + 5 = 20 cm**
6. **10 + 5 + 10 + 5 = 30 cm**
7. **5 by 5 = 25 sq cm**
8. **10 by 5 = 50 sq cm**

***In conclusion.*** Ask: What is perimeter? [the distance around] What is area? [the amount of space something takes up]

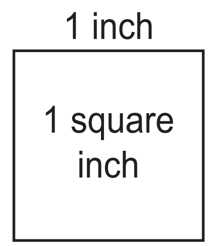
*Worksheet 17, Area and Perimeter*

Name: ______________________________

Date: ______________________________




1. Find the perimeter of rectangle F with tiles.




______________________________

2. Find the perimeter of rectangle G with tiles.

______________________________

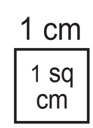
3. Find the area of rectangle F with tiles.

______________________________

4. Find the area of rectangle G with tiles.

______________________________

5. Find the perimeter of rectangle F with centimeter cubes.




______________________________

6. Find the perimeter of rectangle G with centimeter cubes.

______________________________

7. Find the area of rectangle F with centimeter cubes.

______________________________

8. Find the area of rectangle G with centimeter cubes.

______________________________

# Lesson 86: Comparison Problems with More

## OBJECTIVE:

1. To solve word problems that compare using the word more

## MATERIALS:

1. Base-10 picture cards
2. Place-value cards
3. Worksheet 54, Comparison Problems with More
4. Cotter Abacus

## ACTIVITIES FOR TEACHING:

***Warm-up.*** Show a 10 from the base-10 cards and say: Suppose I had 80 of these cards. Ask: How much would it show? [800] Have the child explain it. [Each group of ten cards is 100, so 8 groups of ten would be 800.] Show the 800 place-value card and ask: Is it the same? [yes] Why? [it shows 80-ten or 8 hundred]

Ask: Which is more, 2 thousand or 6 hundred? [2 thousand] Which is greater, 1 thousand or 10 hundred? [same] Which is less, 1 hundred or 11? [11]

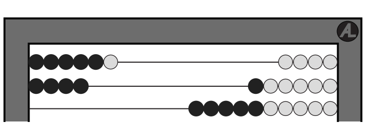
Ask: How much is 1000 plus 5000? [6000] How much is 6000 plus 2000? [8000] How much is 2000 plus 5000? [7000]

***Worksheet 54.*** Give the child the worksheet and abacus. Explain to him that we have done story problems where things were put together or partitioned. The problems for today and in the next lesson are compare problems. This means we will compare two things and think about which is longer, shorter, taller, more, less, fewer, and so on.

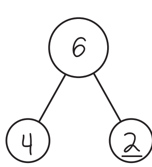
***Problem 1.*** Tell the child to read the first problem.

> Mr. Black is 6 feet tall. His son is 4 feet tall. How much taller is the father?

Tell him to show it on his abacus. See the left figure below. Ask: What is the larger amount? [6] Tell the child write the larger amount in the whole-circle on the worksheet. Ask: What is the smaller amount being compared? [4] Tell the child to write it in the left part-circle. Ask: What is the difference? [2] Tell the child to write the difference in the right part-circle. See below. Tell him to write the equation. [6 – 4 = <u>2 feet</u>]



**Showing the difference of 2.**




6 – 4 = <u>2 feet</u>

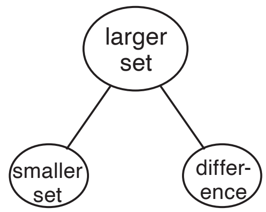
## EXPLANATIONS:

This lesson is a mixture of compare problems to discourage the child from memorizing a particular procedure.

The answer is underlined so that the missing portion of the equation is quickly identified.

**ACTIVITIES FOR TEACHING:**

***Model checking.*** Draw a part-whole circle set as shown on the right. Tell him it is a math model for solving compare problems.




**Part-whole circle set model for compare problems.**

***Problem 2.*** Ask the child to read and solve problem 2.

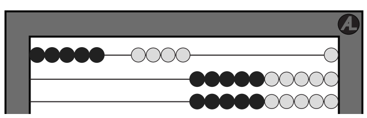
> Mrs. Jackson is 170 cm tall. Her daughter is 119 cm tall. How much taller is the mother? [170 – 119 = 51 cm]

Ask him if the answer makes sense.

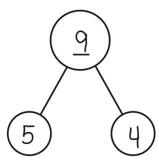
***Problem 3.*** Tell the child to read problem 3.

> Jasmine has five pillows. Oliver has four more pillows than Jasmine. How many pillows does Oliver have?

Ask: Who has more pillows, Jasmine or Oliver? [Oliver] How do you know? [Oliver has four more than Jasmine.] Tell him to show it on the abacus. Then ask: Are the five pillows the larger or smaller set? [smaller] Ask: What is the four? [difference] Tell him to solve the problem on his worksheet. See below. Discuss the solutions.



**5 pillows and 4 more for Oliver.**

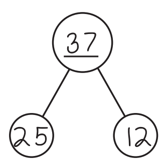



$5 + 4 = \underline{9}$

Ask: Does the answer make sense? [Jasmine has 5. Oliver has 9, which is 4 more than Jasmine.]

***Problem 4.*** Tell him to solve problem 4.

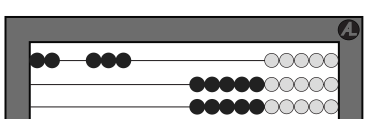
> Logan has 12 more cherries than Matt. Matt has 25 cherries. How many cherries does Logan have? [25 + 12 = <u>37</u>]



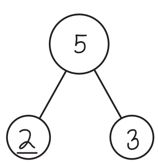

***Problem 5.*** Tell the child to read problem 5.

> Shauna has 3 more flowers than Jacob. Shauna has 5 flowers. How many flowers does Jacob have?

Ask: Are the three flowers a difference or the number of flowers somebody has? [difference] Ask him to solve it on his abacus and on his worksheet. See below.



**5 flowers; Jacob has 3 less.**




$5 - 3 = \underline{2}$

***Problem 6.*** The equation for this problem is 20 – 11 = <u>9</u>.

***In conclusion.*** Ask: Is the difference a part or a whole? [part]

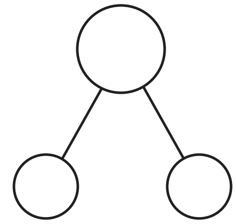
**EXPLANATIONS:**

Name: ______________________________

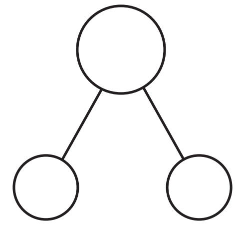
Date: ______________________________

Write the equations and solve the problems.

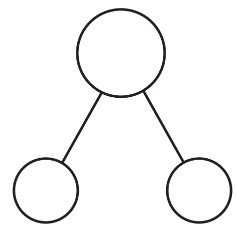
1. Mr. Black is 6 feet tall. His son is 4 feet tall. How much taller is the father?



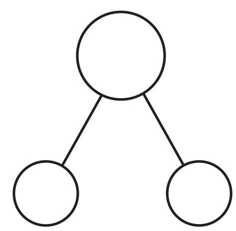
2. Mrs. Jackson is 170 cm tall. Her daughter is 119 cm tall. How much taller is the mother?



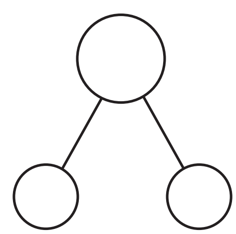
3. Jasmine has five pillows. Oliver has four more pillows than Jasmine. How many pillows does Oliver have?



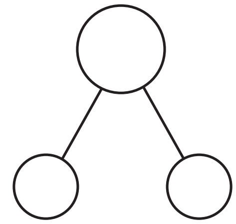
4. Logan has 12 more cherries than Matt. Matt has 25 cherries. How many cherries does Logan have?



5. Shauna has 3 more flowers than Jacob. Shauna has 5 flowers. How many flowers does Jacob have?



6. James has 20 grapes. James has 11 more grapes than Lily. How many grapes does Lily have?



# Lesson 126: Two Fractions Equaling One

**OBJECTIVE:**

1. To find pairs of fractions equaling one

**MATERIALS:**

1. Warm-up Practice 7
2. Fraction pieces
3. Fraction cards*
4. *Math Card Games* book, F3
5. Worksheet 86, Non-Unit Fractions

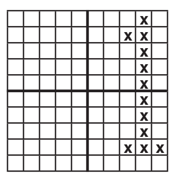
**ACTIVITIES FOR TEACHING:**

**EXPLANATIONS:**

***Warm-up.*** Ask the child to do section 3 on Warm-up Practice 7. The questions and hundred chart are shown below.

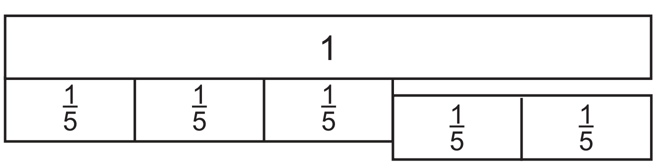
*Remove the percentage cards before giving them to the child.

| | |
|---|---|
| 102 – 14 = **88** | $\frac{1}{2}$ of 18 = **9** |
| $1.00 – 41¢ = **59¢** | 8 dimes + 2 nickels = **90¢** |
| 31 less than 50 = **19** | Half hour – 1 minute = **29** |
| Eighty-two – three = **79** | Nine plus nine is **18** |
| 10 × 5 + 19 = **69** | 150 – 100 – 1 = **49** |
| 40 – 2 halves = **39** | Ten tens minus eleven = **89** |



***Fractions equaling 1.*** Give the child the fraction pieces and ask him to assemble the chart. When the fraction chart is complete, ask: How many thirds are needed to equal one? [three] If you have two thirds, how much more do you need to equal one? [one third]

Next ask him to separate the one and to lay the fraction pieces for three fifths under the one. Ask: How many more fifths are needed to make one? [two fifths] See the figure below.




**Three fifths and two fifths make one.**

Repeat for other fractions, such as one sixth, [five sixths] seven tenths, [three tenths] and one half. [one half]

To focus the students' attention on fractions, not arithmetic, avoid teaching the algorithm that the sum of the two numerators equals the denominator.

Write:

$$\frac{3}{8}$$

Ask what is needed to make one. [five eighths] Repeat for one tenth [nine tenths] and two thirds. [one third]

| ACTIVITIES FOR TEACHING: | EXPLANATIONS: |
| --- | --- |

***Finding pairs to equal one.*** Give the child the fraction cards. Tell him to spread his cards out face up. Next he is to pick up a card and find the match so the two cards equals one. Tell him to find ten different pairs.

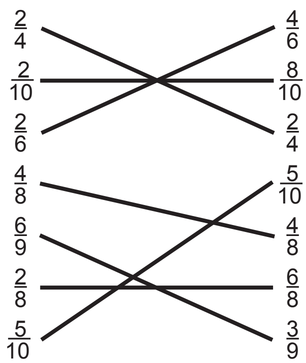
By finding these matches, the child is sorting the cards they will need to play the Concentrating on One game.

***Concentrating on One game.*** Have the child play the Concentrating on One game, found in the *Math Card Games* book, F3, with the pairs of cards that he found.

If the child has duplicate pairs, he can still play the game, although it may take a bit longer.

***Worksheet 86.*** Give the child the worksheet from a prior lesson and tell him to complete it. The solutions are shown below.

The pairs on the worksheet are fractions not found on the cards, which have only simplified fractions.

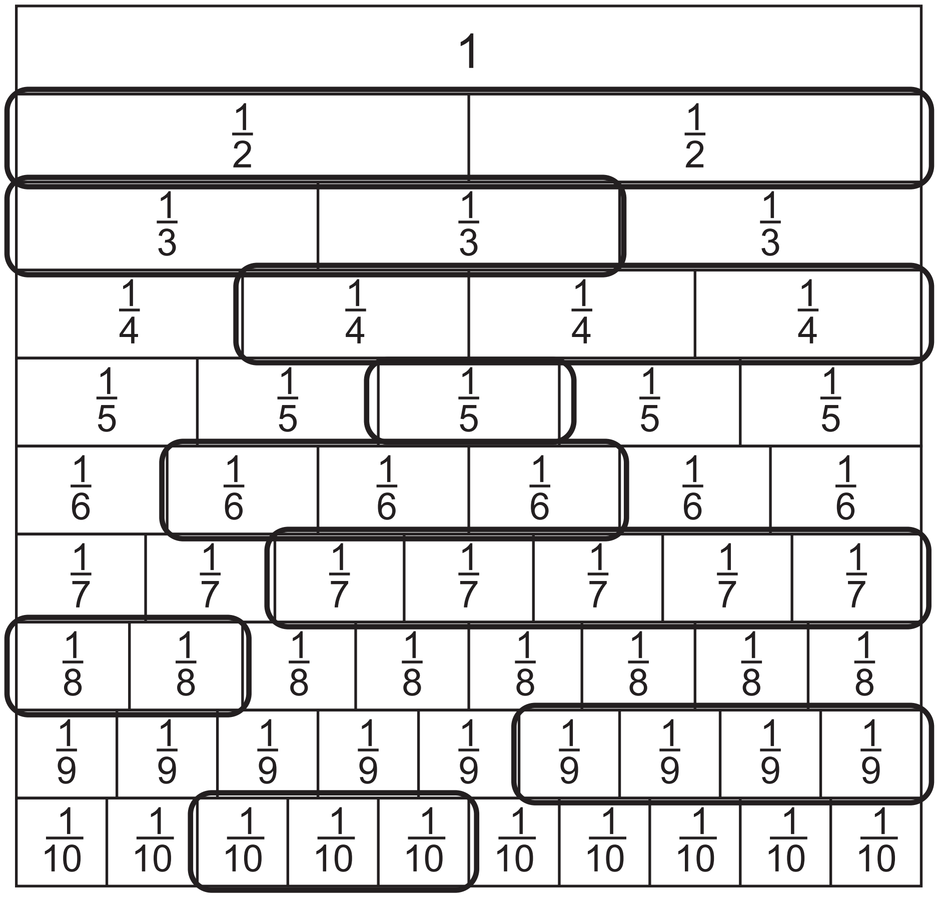



***In conclusion.*** Ask: Why does it take 10 tenths to make 1, but only 3 thirds to make 1? [tenths are smaller] How many twelfths do you need to make a whole? [twelve]

Name: ______________________

Date: ______________________

Write the fractions that are circled in each row.




_______

_______

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_______

Match the fractions that will be equal to one.

| | |
|---|---|
| $\frac{2}{4}$ | $\frac{4}{6}$ |
| $\frac{2}{10}$ | $\frac{8}{10}$ |
| $\frac{2}{6}$ | $\frac{2}{4}$ |
| $\frac{4}{8}$ | $\frac{5}{10}$ |
| $\frac{6}{9}$ | $\frac{4}{8}$ |
| $\frac{2}{8}$ | $\frac{6}{8}$ |
| $\frac{5}{10}$ | $\frac{3}{9}$ |