CSMP Mathematics for the Upper Primary Grades Part III

Teacher's Guide

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UPG-III **PREFACE**

CSMP Mathematics for the Upper Primary Grades (UPG) owes its existence to the vision and leadership of *CSMP*'s first director, Burt Kaufman, and a special group of people concerned not only about the kind of mathematics being taught to children but also the manner in which it is taught. This distinction is crucial to a child's early exposure to and future relationship with mathematics.

The *CSMP* third grade curriculum is in large part the outgrowth of a great deal of active involvement with students in ordinary classroom settings. Its current form has been strongly influenced by information gathered from field test classes in Fort Collins and Eaton, Colorado, as well as from earlier extended pilot test sites nationally. But its underlying manner of presentation and many of the pedagogical ideas and tools, which make *CSMP* unique among other curricula, are based on the pioneering works of Georges and Frédérique Papy. We acknowledge them here with deep gratitude. We also acknowledge the work of mathematician and psychologist Caleb Gattegno for the fundamental idea of presenting mathematics to students via pedagogical situations.

Earlier versions of *CSMP Mathematics for the Upper Primary Grades* dating back to 1973 were due to the efforts of former *CSMP* staff members José Agusti, Phyllis Klein, Edward Martin, Pamela Pedersen, Janis Schweitzer, and Christiane Vandeputte.

This revised edition of the program—*CSMP/21*—is a result of new information gleaned thanks to the interest and concern of *CSMP* teachers nationwide. During the 1991–92 school year, the lessons in this edition were tested by third grade teachers Kim Brown, Cynthia Burr, Kathy Disler, Marilyn Ehni, Karmen Fairbourn, Mary Joyce Fink, Tina Hamilton, Marcy Lockhart, Nancy McGinnis, Linda Moore, Diana Nicholson, Helen Stuart, Barb Vowles, and Shirley Wilson in schools of the Poudre R-1 School District, Fort Collins, Colorado.

In addition, we acknowledge the following individuals for their work in producing the *CSMP/21* edition of the third grade program.

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Section One

Notes to the Teacher

UPG-III **WELCOME**

Welcome! You are about to teach *CSMP Mathematics for the Upper Primary Grades,* perhaps for the first time. We wish you success and hope both you and your students enjoy the activities suggested in this teacher's guide. The purpose of this section is to help you use this book effectively, to describe the *CSMP* materials, and to give suggestions for organizing the program. In Section Two, you'll find answers to some frequently asked questions; in Section Three, a suggested schedule of lessons; and in Section Four, a suggested teaching guide organized in strands.

As you and your students take part in these activities during the year, you will discover a definite *CSMP* viewpoint about elementary school mathematics, one we hope you will come to understand and share. Part of that viewpoint is that learning takes place when students react to interesting real-life or fantasy situations (sometimes called a *pedagogy of situations),* such as those in stories or games. You'll find that *CSMP* presents situations that involve students personally and allow arithmetic to take the form of adventures in the world of numbers.

We believe that every child can and does learn something from each situation encountered in the program, sometimes suddenly and dramatically, sometimes latently. For this reason, *CSMP* teachers do not stick to one topic until it is mastered. Indeed, our experience indicates that learning often stops when the purpose of a lesson is merely the mastery of a skill. Instead, we view learning as more of a spiral rather than a linear process in which intuitive leaps play as big a role as the acquisition of small successive pieces of information, and that a variety of situations can provide the interrelated experiences through which we learn.

Further explanation of what we mean by a pedagogy of situations and spiral development can be found in the question and answer section, but you will learn their meanings primarily by experiencing them for yourself as you teach the curriculum. Meanwhile, we assure you that a large number of *CSMP* teachers across the country have come to understand and embrace the *CSMP* style of teaching and learning and are very pleased with the results.

UPG-III **PROGRAM DESCRIPTION**

CSMP Mathematics for the Upper Primary Grades (UPG) is designed as a program for students in second and third grades. There are four parts to the curriculum, each corresponding to one semester's work. This is Part III of the four. It follows *CSMP Mathematics for the Upper Primary Grades, Part II.*

Since the learning process occurs through many interrelated experiences, we have developed this curriculum so that no single lesson is an end in itself. It is neither intended nor expected that every student will meet the full challenge of a particular situation in any given lesson. Furthermore, we have found that it is most effective to vary the situations from day to day rather than to continue one type of situation or topic until so-called mastery has occurred. This spiral development is reflected in the materials and scheduling of various topics in the curriculum. It is consistent with *CSMP*'s pedagogy of situations since with such an approach, a child experiences each of several ideas a little at a time and then proceeds through increasing levels of sophistication as the situations become more challenging. We hope you will keep in mind the spiral approach as you teach the *CSMP* curriculum.

Description of Materials

Teacher's Guide

This 3-ring binder is known as the *CSMP Mathematics for the Upper Primary Grades, Part III* Teacher's Guide. It contains lessons grouped by topic areas or *strands*. The four strands (with abbreviations given in parentheses) are:

- World of Numbers - (N)
- Languages of Strings and Arrows - (L)
- Geometry and Measurement - (G)
- Workbooks - (W)

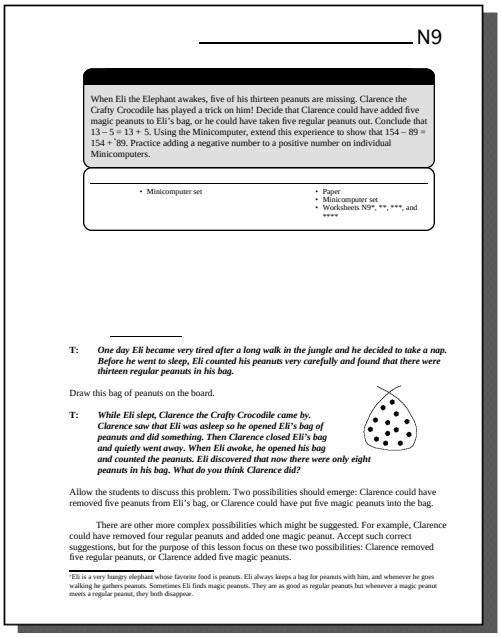
Each strand is separated and identified by a colored tab. Each strand has its own table of contents and is paginated individually.

Within a strand you will find the following arrangement of material:

- **A table of contents.** This enables you to locate whatever you need in a particular strand.
- **An introduction to the strand.** This provides you with information explaining why certain material finds its place in the strand, the overall goals of study in the strand, and how this material fits in with that which is described in other strands.
- **A series of lesson plans.** These plans include *capsule lesson summaries*, lists of needed materials for both teacher and students, and lesson descriptions which suggest possible classroom dialogue and indicate the use of worksheets and manipulative materials. The lesson descriptions also provide illustrations of diagrams the teacher puts on the board or otherwise displays for the class, and answer keys for worksheets or other independent work during the lessons.

In each of the strands, N, L, G, and W, the lessons are numbered consecutively. Each lesson is designed to be used during one full class period. For example, Lesson N8 is the eighth lesson in the N (World of Numbers) strand. Since the N lessons are interspersed among lessons from other strands, N8 might be taught on, say, Wednesday of the fourth week of the term and the next N lesson (N9) might be taught on Monday of the fifth week.

Each lesson is presented in a form that includes its strand and number, title, summary, materials, and description. For example, here is the first page from the ninth lesson in the N (World of Numbers) strand.



N9

When Eli the Elephant awakes, five of his thirteen peanuts are missing. Clarence the Crafty Crocodile has played a trick on him! Decide that Clarence could have added five magic peanuts to Eli's bag, or he could have taken five regular peanuts out. Conclude that 13 – 5 = 13 + 5. Using the Minicomputer, extend this experience to show that 154 – 89 = 154 + [-]89. Practice adding a negative number to a positive number on individual Minicomputers.

- Minicomputer set

- Paper
- Minicomputer set
- Worksheets N9*, **, ***, and ****

T: ***One day Eli became very tired after a long walk in the jungle and he decided to take a nap. Before he went to sleep, Eli counted his peanuts very carefully and found that there were thirteen regular peanuts in his bag.***

Draw this bag of peanuts on the board.

T: ***While Eli slept, Clarence the Crafty Crocodile came by. Clarence saw that Eli was asleep so he opened Eli's bag of peanuts and did something. Then Clarence closed Eli's bag and quietly went away. When Eli awoke, he opened his bag and counted the peanuts. Eli discovered that now there were only eight peanuts in his bag. What do you think Clarence did?***

Allow the students to discuss this problem. Two possibilities should emerge: Clarence could have removed five peanuts from Eli's bag, or Clarence could have put five magic peanuts into the bag.

There are other more complex possibilities which might be suggested. For example, Clarence could have removed four regular peanuts and added one magic peanut. Accept such correct suggestions, but for the purpose of this lesson focus on these two possibilities: Clarence removed five regular peanuts, or Clarence added five magic peanuts.

[1]Eli is a very hungry elephant whose favorite food is peanuts. Eli always keeps a bag for peanuts with him, and whenever he goes walking he gathers peanuts. Sometimes Eli finds magic peanuts. They are as good as regular peanuts but whenever a magic peanut meets a regular peanut, they both disappear.

Unlike the sequential, day-by-day presentation of lessons in the *CSMP* kindergarten or first grade teacher's guides, the lessons in the upper primary grades (UPG) teacher's guides are organized strand-to-strand. This means that on one day of the week a lesson is taught from a certain strand; and then on the next day of the week a lesson is taught from another strand; and so on. In this way the same spiraling effect as in the kindergarten and first grade programs is achieved, but an important advantage is gained, namely, the organization of lessons according to strands. For example, suppose you are interested in the way a topic in geometry is developed in the third grade. With a day-by-day format you would need to search through the entire guide for geometry lessons, but with a strand-to-strand format all these lessons are found, in sequence, in one part of the guide, the G-strand. You can then read the lessons in their natural order to gain an overview of the Geometry strand for this semester. At the same time, the strand-to-strand arrangement allows you to anticipate what is coming on the next topic within the spiral development simply by reading ahead in the strand in which that topic is developed.

Teacher Materials

In addition to the teacher's guide, there are some demonstration manipulative materials you will need. The following materials are contained in the *CSMP* Classroom Set.

- **Demonstration Minicomputer Set**
  (4 magnetic Minicomputer boards; 1 set of magnetic checkers)
- **A-Block String Game Kit**
  (2 sets of A-Blocks; 2 attribute posters; 2 sets of string game cards; magnetic material)
- **Number Line**
- **UPG-III Poster Set**
  (0–109 numeral chart, posters to accompany specified lessons)
- **Poster Grid Sheets**
- **Two Colored Cubes (one blue, one red)**

- **One Set of -Checkers**
- **Marble Set**
- **Blacklines**

Other materials needed for individual lessons are listed at the beginning of each lesson. Materials not in your classroom set are generally readily available or can be easily prepared from usual classroom supplies.

Student Materials

There are some individual materials that each student (or pair of students) will need. The following materials are contained in the *CSMP* Classroom Set.

- **UPG-III Worksheet Booklet**
- ***Which Road, Festival of Problems #1*** **and** ***#2, Road Map, 20? 100?,*** **and** ***Fishing for Numbers, Part III*** **Workbooks**
- ***Rollerskating 37*** **Story-Workbook**
- ***The Little Donkey*** **and** ***Singing Friends*** **Storybooks**
- **Individual Minicomputer Set**
  (2 sheets of Minicomputer boards; 1 sheet of punch-out checkers)
- **Centimeter Tape Measure**

These and/or other materials needed are listed at the beginning of each lesson. Often, commercially available manipulatives are suggested (such as Unifix® cubes, geoboards, counters, base-10 blocks, and so on) along with several alternatives. Many lessons call for the students to have calculators (see page 1-8 on the role and use of calculators).

Some teachers find it convenient to provide each student with a sturdy cardboard box for storing manipulative materials. Others find it more convenient to store all the materials of one kind together in a container of appropriate size and to distribute these materials to the students as they are needed. In any case, you should probably keep the worksheet booklets, workbooks, and storybooks in your storage area and distribute them as called for in the lessons.

Two copies of the storybook *Two by Two* from the *Stories By Frédérique* collection are provided in your classroom set of materials although they are not used in any *UPG-III* lessons. This storybook is a fun introduction to the Papy Minicomputer for new students or students who need a reminder. We suggest that these copies be available in a reading corner for students to read whenever they wish.

Lesson materials frequently call for the student to have paper available for writing problems and answers or for copying from the board. You may want students to keep such papers in a folder or spiral notebook. It may also be appropriate for students to have a “think pad” or other scratchpad handy for these responses, or to use a small slate chalkboard which can be displayed and erased for continued use. Devise whatever method for written responses that seems effective and efficient in your classroom.

Role and Use of Worksheets, Workbooks, and Storybooks

Worksheets

Some lessons include worksheets for class, group, or independent work. Worksheets are designated with numbers corresponding to the lessons with which they are used, and with stars or letters indicating the order in which they are to be completed. The stars also suggest an increasing level of difficulty which provides for various abilities of students. It is important that you do not insist that every student finish every worksheet before going on to the next lesson. Though some students will finish more worksheets than others during the allotted time, don't worry. The same ideas will emerge in new settings in later lessons so that students will have other opportunities to work independently on the same topics.

Workbooks

CSMP for the Upper Primary Grades, Part III (UPG-III) includes six workbooks titled *Which Road, Festival of Problems #1, Road Map, Festival of Problems #2, 20?-100?* and *Fishing for Numbers, Part III*. Each is a 32-page booklet that reviews problems which have been encountered up to that point in the curriculum. Two lessons are scheduled for each workbook, and we suggest that all students be directed to start at the beginning of the workbook and work independently through as many pages as they can during the two scheduled periods.

Ordinarily the first ten pages of a workbook are easy enough to guarantee some success for all the students; the next ten to twelve pages are average level difficulty; and the remaining pages are more difficult, often challenging even to your best students. We estimate that about two-thirds of your students should correctly finish the first ten pages during the two scheduled lessons, one-third should finish the first twenty pages, and a few might finish all or most of the pages. Of course, these proportions will vary from class to class.

Two full class periods are devoted to each workbook. At the end of the first period, you should collect the workbooks and check some or all the pages completed. Then when you return the workbooks at the beginning of the next workbook period, the students can correct their mistakes before going on with new problems.

Notice that the cover page of each workbook includes spaces for marking your evaluation of the work on each page. One way to do this is to use these symbols:

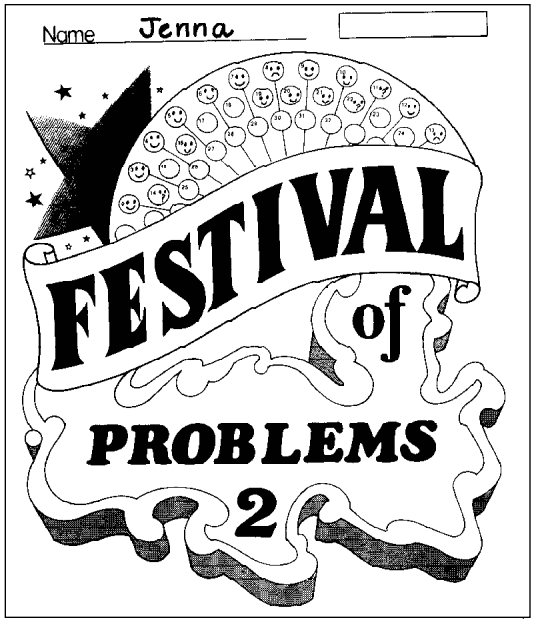
well done
or
correct

something wrong
try again

did you forget this problem?
or
do you need a hint?

The next page shows the front cover of one student's *Festival of Problems #2* workbook after checking.

Note: This is the way Jenna's workbook was returned to her at the beginning of the second *Festival of Problems #2* lesson. The empty bubbles numbered 15, 17, 18, 23–32 indicate that she has not yet worked on these pages. Before Jenna begins on these pages during the second lesson, she should correct her mistakes on pages 8 and 13 and finish her work on pages 11, 14, and 22.



Important: Again we ask you not to require or even encourage every student to finish every problem in a workbook. If at the end of the two allotted lessons, some students have not completed as much of the workbook as you expect they are capable of, you might suggest they spend some extra time on it. It is not useful to demand completion or mastery before permitting work to begin on the next workbook series.

After the second workbook period, and after you have checked the results, you might want to send the workbooks home with students. This can be one way to keep parents informed of their child's progress. A letter to parents/guardians concerning workbooks might accompany the first workbook sent home (see Lesson W5 and Blackline W5[b]). You may want to record student performance on workbooks using the recording tools provided in the Blackline section and keep them for use at parent conferences and/or in student progress reports.

Storybooks

There are twenty-four storybooks for young readers in the *Stories by Frédérique* collection. Each story is presented in a colorful newsprint booklet and can be used for individual or collective reading at school or at home. The stories are independent of each other and for the most part need no teacher explanation. The storybook titles and their intended age range are as follows:

Ages 5 to 8

The Playful Numbers
The Baby is Born
81 Roses
One Out of Seven
The Old Shoemaker
I Am a Very Happy Boy
The Little Dreamer
Two by Two
The Weird Story of 24
Where's My Nose?
The Happy Puppet
The Magic Box
Summer School in the Old Days

Ages 8 to 12

The Little Donkey
Singing Friends
Dancing Friends
I Am Not My Name
The Living Lines
The Square Trap
Nabu Wins an Award

Ages 10 to 14

A Hidden Treasure
A Valentine Mystery
Election in the Number World
A Very Strange Neighborhood

Among the seven storybooks intended for children ages 8 to 12, four are used as the basis of lessons in the third grade. Young people can become personally involved in these stories; there are questions to answer, pictures to relate to the story, information to be found in the pictures, and new adventures to invent for the characters in the stories. They find that in the world of numbers there are emotions to be expressed and aesthetic senses to be developed just as in the world of people. Your students will probably want to reread (or just look at) the storybooks many times after they have used them for lessons. Other storybooks (from the *Stories by Frédérique* collection or from the Appendix) can be made available for individual reading during free time. Many lessons suggest reading activities using other books as extensions or enhancements. See Appendix A for a list of all the books suggested in lessons and many others you might consider.

Role and Use of Calculators

Calculators, if used creatively, can have a remarkably beneficial effect on students' interest in and understanding of arithmetic, and can contribute to their developing capabilities. The reasons for this are many and varied, but the following are certainly among them:

- Students enjoy using calculators and respond with enthusiasm to most calculator activities.
- As a pedagogical tool, the calculator contributes to the development of mental arithmetic skills, number sense, and mathematical concepts.
- By removing the burden of mechanical computation, calculators free students to focus on the thinking that is a necessary part of the solution to any meaningful problem.
- The instant feedback provided by the calculator enables students to explore patterns and make and test conjectures, both important areas that might otherwise be overwhelming.

Calculators are recommended for many lessons in *CSMP Mathematics for the Upper Primary Grades*. Ideally your class should have access to at least one calculator for every two students and an overhead calculator that matches the students' calculators. If this is not possible, you may want to encourage students to bring calculators from home. Check that your classroom calculators or any calculators brought by students have the following features:

- **Chain operations:** This means that the calculator responds to instructions given in the order in which they are entered. To check that this is the case, press 4 + 1 × 2 =. If you have 10 on the display, then all is well.

- **Constant mode:** Some calculators have a switch so that the calculator can be set in constant mode. If your calculator lacks a switch, it is quite likely that the calculator has an *automatic constant*. For most calculators with an automatic constant, the first number entered during multiplication is the constant, while for addition, subtraction, or division, the second number entered is the constant.

  To check your calculator for the constant mode operation of +, press 0 + 2 = = = and so on. If the number on the display increases by two at each depression of =, then + is operating in a constant mode. Check the constant mode operation of − in a similar fashion.

  To check the constant mode operation of × (in which the first number entered will be the constant), press 2 × 1 = = = and so on. If the number on the display doubles at each depression of =, then × is operating in a constant mode. A few calculator models use the second number entered during multiplication as the constant. In this case, check the constant mode operation of × just as +.

While it is possible to use calculators without these characteristics, the adjustments required in some lessons make such calculators unsuitable.

UPG-III SUGGESTIONS FOR ORGANIZING THE PROGRAM

Schedule of Lessons

The design and schedule of the lessons in this guide should be regarded as suggestions. We cannot predict which topics will be easy for your particular class and which lessons will require more or less time. Only you will be able to judge that as you teach the lessons. The program is not meant to be rigid or followed exactly; the schedule is a suggested guide.

The master schedule in Section Three is constructed as a one semester course for a third grade class. It illustrates some important ideas about organizing the program. You will notice that lessons from several different strands are scheduled each week, and that even within a strand the topics are interspersed. This carries out the idea of a spiral curriculum. If you organize your own schedule, it is best to follow a similar pattern rather than to spend two or three full weeks "covering" one particular topic such as composition of functions or negative numbers. In a usual five day week, two days should be devoted to the World of Numbers strand, one day to the Language of Strings and Arrows strand, one day to the Geometry and Measurement strand, and one day to the Workbooks strand.

In the master schedule, a block represents one full period of approximately 40–50 minutes. It may be, however, that your class will spend more than one period or, possibly, less than one period on some lessons. Exercise your own professional judgement in deciding when to stop a particular lesson and when or whether to take it up again. Just be sure you do not insist that every single child understands every single aspect of a lesson before you go on. It is better to stop a lesson at a point when student interest is high and a problem remains unsolved than to teach so methodically that everyone in the class understands everything, but is completely bored.

In each block of the master schedule, the lesson of the day is designated first by strand letter and number. For example, N5 indicates that the day's lesson is the fifth lesson in the N (World of Numbers) strand. This identifying letter/number combination also appears in the upper outside corner of each page of the lesson, so you can find a lesson simply by flipping through the pages of a strand. The master schedule also gives you the lesson title and the page number on which it begins.

Please bear in mind that the model schedule was designed for a hypothetical class with the usual range of abilities. In order to use the program successfully, you should adjust the schedule to the ability, maturity, and interests of your class. For example, you may wish to extend a lesson or a workbook for an additional period.

Adjustment Days

The *UPG-III* curriculum is designed for a "typical" school semester of 18 weeks and the schedule accordingly indicates 18 weeks of lessons. However, from time to time an adjustment day appears in the schedule. These days are included to help you account for the days when no mathematics lesson is taught due to parent-teacher conferences, field trips, snow days, and so on. They give you opportunities to do many kinds of things. For example, you can use an adjustment day to review a lesson you feel needs review, to complete an unfinished lesson, or to extend some interesting ideas from completed lessons. You can also use an adjustment day to give your students time to become more familiar with the manipulative materials in the program.

If your students especially enjoy playing games such as The Number Line Game or The String Game, an adjustment day can give them another opportunity to play these games. You may wish to

use an adjustment day to do some mental arithmetic exercises or to teach a topic in mathematics you think would be especially interesting or useful to your class. For suggestions on ways to engage in mental arithmetic with your class, see page 1-11 and Appendix C.

Home Activities/Parent Communication

Parent involvement is built into *CSMP Mathematics for the Upper Primary Grades* in several ways. Included in the *CSMP* Blacklines you will find a number of parent/guardian letters designed to make parents more aware of the *CSMP* languages, tools, and methods. These letters can advise parents about some types of mathematical activities their children are involved in. They can be photocopied and sent home at various points throughout the year.

In addition, suggestions for home activities frequently follow lessons. Home activities are opportunities for parents to work with their children in doing mathematics. Some are follow-up or practice for a lesson; others are for enrichment or extension. Reproducible blackline descriptions of the home activities, specifically written to parents, are also included in the Blacklines.

Cooperative Groups

Students can be placed in pairs or groups of three or four, depending on the situation. A cooperative group gives students a chance to talk through what they are learning with other students. They get immediate help and support, and learn to care about the progress of every other member of the class. Cooperative groups give an opportunity for peer teaching. Students enjoy having a peer to discuss their ideas with and to give them assistance when something is difficult.

Many lessons give suggestions for using partners or groups in activities. Feel free to use these suggestions in your classroom. You may also want to use cooperative or other group activities in lessons where no such suggestions are given.

Centers

Many classrooms are organized with centers or stations where students work on activities without the direct assistance of the teacher. We offer these suggestions as possible ways that you might incorporate math centers into the regular classroom set-up, or might enhance and extend the math curriculum into center activities.

Exploration Center: Place materials introduced in previous lessons here and allow students to explore them without direction. Counters, C-rods, base-10 blocks, the Minicomputer, A-blocks, Tangrams, and so on might each take a turn in the center. You might also add other types of manipulatives, purchased or handmade, to support a lesson or concept.

Reading and Writing Mathematics Center: Activities here might include practice in writing numerals with different media (yarn, glitter, paint), reading the *CSMP* Storybooks after they have been introduced, reading other books and stories about number concepts, and creative writing activities built around *CSMP* lessons.

Relating to Lessons Center: This center can include changing task cards and worksheet suggestions that follow a particular lesson and reinforce the ideas presented there. You will find suggestions for this type of center at the end of some lessons and you may wish to add others as the need arises in your particular class.

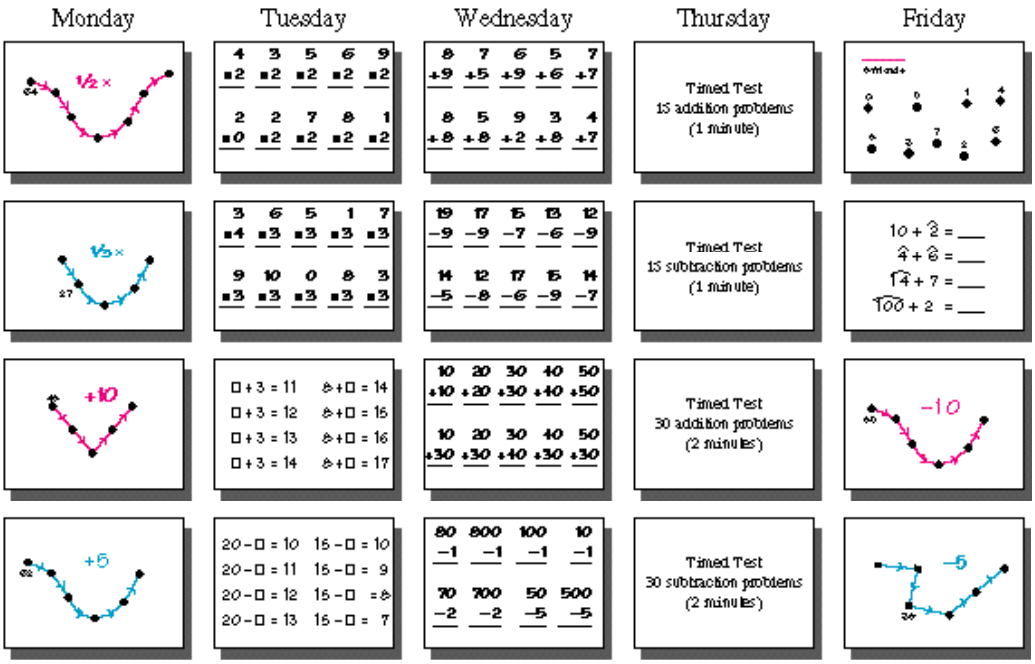
Centers may be set up so that students work alone or in groups. Many of the activities lend themselves to small groups of students working on their own but in close proximity to each other, sharing results or giving help to others as needed.

Mental Arithmetic and Supplementary Activities

Throughout the lessons there are many activities that children enjoy doing over and over in a variety of forms. For example, The String Game and The Number Line Game (to mention only two such activities) can be played whenever an extra time period is available. Of particular importance and enjoyment are the activities dealing with mental arithmetic; fully one-third of the lessons involve such activities. Other general suggestions about mental arithmetic are given in Appendix C. Teachers can invent clever variations of these mental arithmetic activities to be used often during a school day as adjuncts to the natural school routines. Some of the most obvious are checking class attendance (How many present? How many should be here? How many absent?); the opening exercises (What day of the month is it? How many days in this month? How many days left?); distributing materials (How many students? Two pencils for each. How many pencils?).

You might want to do some supplementary drill work on writing numerals or on basic number facts. If so, try to keep such drill work to a minimum so as not to suggest to children that arithmetic is a chore. The following are suggestions for additional arithmetic practice that you may like to use regularly in your classroom.

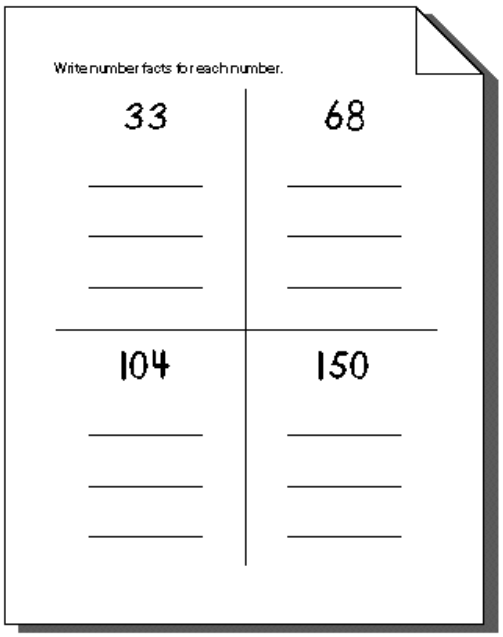
1. Use a warm-up activity every day as on this sample calendar.



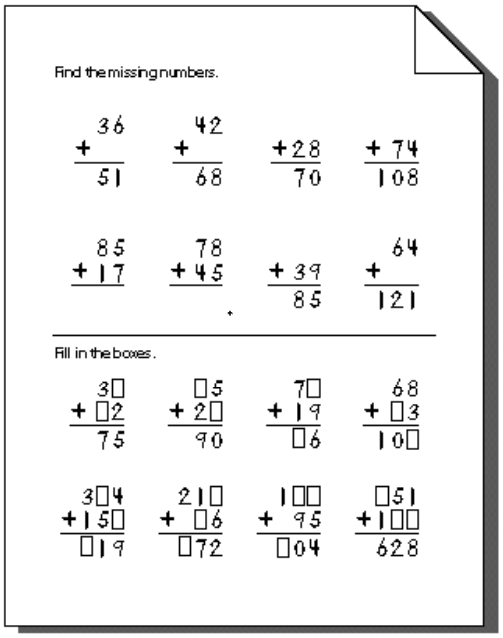
2. Practice addition/subtraction facts using

    - games
    - mental arithmetic (see Appendix C)
    - calculator “concentration” or other activities (see Appendix C)
    - computer programs
    - parent help

3. After completing workbooks, create pages similar to computation pages for additional practice (possible homework). For example, the following page is similar to *Festival of Problems #1* page 11 or *Festival of Problems* #2 page 10, and could be used after lesson *UPG-III* W5 or W14.



4. After lessons with computation, make additional worksheets with similar problems and include problems in traditional format. For example, the following page might be used after lesson *UPG-III* N19 or N33.



Integration with Other Curriculum Areas

There are many opportunities in the daily classroom schedule to introduce and reinforce mathematics concepts with students. Some of these may be specifically planned by the teacher and some may arise incidentally in conversations and activities. Number recognition and counting will occur regularly, as will activities requiring looking at patterns, sorting, and using the vocabulary and concepts of mathematics. Literature that is read and shared in the class will suggest mathematical ideas that can be explored further. Books and stories can be found to support and reinforce mathematics topics. Looking for ways to integrate mathematics topics with other subject areas, and using concepts introduced through math to explore other topics will help students to see the relevance and applications of mathematics to their lives.

Mathematics activities do not just occur during the time designated for math in the daily schedule. They are a part of the total school day and occur at every turn in the curriculum. You may plan them, but they will also arise spontaneously as students work with each other. Taking attendance and lunch count, collecting money and book orders, going over the daily schedule and ordering the tasks of the day, playing games at recess, and getting to the next class on time are just a few of the math-related activities in which students participate every day. It is not necessary to always stop and point out the mathematics in a situation, but its presence provides the groundwork for concept understanding and problem solving in formal mathematics lessons.

Throughout the *CSMP* lessons we have tried to integrate other curriculum areas and to suggest ways you might do more within your own classroom. The content of mathematics is not something that students should see and use during an isolated period, but rather throughout the day. In the same way, mathematics classes should not deal only with numbers, but should incorporate elements of reading, writing, social studies, science, and so on. *CSMP* strives not only to involve all students in the learning of mathematical concepts, but to be part of an integrated school day in which students see the application of each subject to other subjects and to their own lives. Integration allows all students to participate and contribute to the total work of the class.

Section Two

Questions and Answers about CSMP

UPG-III **QUESTIONS AND ANSWERS ABOUT CSMP**

As you teach the *CSMP* curriculum or even as you prepare to teach it, some basic questions will come to mind. They are, very likely, the same kinds of questions that parents and supervisors will ask about a curriculum that appears to be different from the traditional program. Perhaps some of the questions that concern you are answered here.

Q: What is the spiral approach? How does it work?

A: We learn through many interrelated experiences. But no experience, particularly a third grade math lesson, is an end in itself. With this in mind, *CSMP* introduces an idea in one lesson, then another in the next lesson, then another. Later, the first idea reappears in a slightly new setting or in a slightly expanded version, perhaps with connections to other concepts; then a second topic reappears; and so on. Each of the many times a particular idea or area of study reappears, it is treated in a different manner and at a slightly higher level than the last time. This is called *spiral development.*

Students learn at different times and at different rates. Only part of the learning of a given topic actually takes place during the classroom lesson. In between the times the topic occurs on the learning spiral, the student is mentally digesting the idea, sometimes consciously, usually unconsciously. In this way the spiral development gives each student a new chance to catch on at each stage.

We find it highly effective to follow this kind of development rather than continuing on and on with a topic until so-called mastery has occurred.

Sticking with the spiral approach requires an act of faith on your part, particularly if you are used to teaching a given topic until you are satisfied that all (or at least most) of the class knows it cold. The spiral approach implies that some lessons may be stopped before some (or even a majority of) students appear to have caught on, or before everyone has successfully completed all the worksheet or workbook pages. It involves knowing that the topic will reappear again and again, and that varying degrees of understanding will come at varying rates and times. It includes the belief that an idea planted now may not sprout until much later, and that it is best not to force its development.

Q: I understand how spiral development works, but how can I assess my students' progress using such an approach?

A: We don't believe it is desirable or reasonable to try to evaluate student mastery of skills from day to day or even from week to week. On the other hand, teachers, parents, and the students themselves benefit by some monitoring of the students' progress and involvement with the activities. Most teachers have their own methods for monitoring with which they are comfortable, and we suggest that you continue to use these methods. You will find that group interactions during the lessons, individual responses on worksheets and workbooks, and center and writing activities provide much valuable information. A spiral approach, in fact, may help rather than hinder your long-term assessment of students' progress.

Q: Are there goals for each lesson?

A: At the beginning of each lesson plan there is a *capsule lesson summary* that briefly describes the activities and experiences included in the lesson. Because the goals of the curriculum spread over a whole series of lessons, specific goals for individual lessons are stated only indirectly. We expect you will easily see the direction and intent of the lessons, however, we decline to predict what will happen in terms of student learning for any one lesson.

Q: Should I supplement the program with more practice in number facts?

A: There is a surprising amount of such practice throughout the program. Most is implicit in the activities and is not in the form of practice for its own sake. If you still feel it necessary to give supplementary practice, we suggest you keep repetitive drill to a minimum so as not to endanger the students' interest in numerical situations. Suggestions for additional fact practice can be found in Section One pages 1-11 and 1-12

Q: How do I handle students who have an extended absence or students, new to *CSMP*, who transfer into my class during the year?

A: The spiral approach allows a student to miss one or two weeks of school without needing much catch-up work. When the student returns, either you or classmates can help with any important material that was missed.

Use your best judgement in sending worksheets and/or workbooks home to absent students. Without participating in the collective lessons that introduce the worksheets and workbooks, it may be difficult for the student to proceed.

If several months of classes have been missed, you might need to treat the student as you would a transfer student new to *CSMP*. Give the student a little extra attention during a lesson, especially when the questions are review for most of the class.

In most cases, the differences between new and veteran students tend to fade quickly. However, if the absence or transfer occurs later in the year, lessons involving the Minicomputer might be an exception. Veteran students who are adept with the Minicomputer are often good tutors for these students.

Q: What provisions are made for the variety of abilities in a typical class?

A: Every lesson includes something that allows every student to participate in a meaningful way, regardless of differing abilities. Even your brightest students will have challenges. This means that you should not exclude any students from a full group lesson, but at the same time, you should not expect every student to fully understand everything in a lesson either. You will find that the spiral development leaves many situations open-ended, allowing students to experience them at different levels.

Evaluation has shown that students traditionally labeled "below grade level" do better in *CSMP* classes than in non-*CSMP* classes. We believe this is due to several things: the spiral development, group work on mathematical activities, and the presence of a wide variety of both numerical and non-numerical activities in the *CSMP* curriculum.

Additionally, *CSMP* provides for a range of ability levels in the student materials. Worksheets and workbooks offer problems from very easy to quite challenging. Indeed, some of the multi-starred worksheets and pages toward the end of a workbook may be accessible only to your most advanced students.

In an extreme case, you might consider the possibility of arranging for exceptionally bright students to take their math course with a *CSMP* fourth grade class.

Q: How are telling time, money, and the metric system treated?

A: Telling time is not a major topic in the *CSMP* program. It is our belief that telling time is more naturally a part of a language program than of a mathematics program, although it is frequently included in the mathematics curriculum. Since there are many excellent materials available to

help you teach telling time, we urge you to teach this topic using those methods and materials you particularly like or that have proved successful to you in the past.

The topic of money is first introduced in the *CSMP* curriculum in situations involving combinations of coins. It is treated again in the upper primary grades and the intermediate grades as a support for the teaching of the decimal numbers. Although money is not treated as a separate topic, these situations provide experience with our monetary system. Should the students need more exposure to this topic, teachers should feel free to develop supplementary materials in order to provide extra practice.

Metric units are used whenever there is cause to measure in standard units. We recommend that you do not ask the students to convert from the English to the metric system or vice versa (inches to centimeters, yards to meters, Celsius to Fahrenheit, grams to ounces, and so on). It can be confusing for children to deal with two systems simultaneously, especially at this early stage. Since the United States has not yet "gone metric," your students will still need to be familiar with the English system. We suggest that you use whatever materials and methods you have found successful in the past for teaching this topic, but we repeat our recommendation that you not ask the students to convert from one system to the other.

Q: I prefer teaching small groups, but many of the lessons seem to be aimed at the whole group. What do you suggest?

A: If your school routine allows, you might try teaching a lesson twice, once to each half of your class. But if you do this, it might be wise to vary the composition of the groups each day so that you are not tempted to group students according to your perception of their ability. Always grouping by ability may guarantee that half your students have less experience than the other half, through no fault of their own. The purpose of the full group experiences is to allow interaction among all students in every situation posed in the lessons. Students learn quite a bit from each other's reactions. You will be surprised to find that in some situations the key responses come from students you least expect.

Our answer might give the impression that *CSMP* teaching takes place only in full group settings. This is not the case. There are many opportunities to group students in a variety of ways—partners, small cooperative groups, teams, and so on. In addition, there is time allotted for individual work on worksheets and workbooks. We also encourage you to arrange small group sessions whenever you have time, particularly for students who need extra practice. Such small group activities may supplement the full group lessons, but should not replace them.

Q: What provision is made for individualization in the *CSMP* program?

A: Many of the third grade lessons contain worksheets to be completed individually by students. Sometimes the worksheets are done during the course of a lesson with a full group discussion of them. At other times a topic is first developed in a group setting, followed by individual student work on related worksheets. This allows students to work at their individual rates and levels. A series of worksheets for a given lesson offers a spectrum of problems from very simple to quite challenging. All students start with the one-star worksheet and proceed at their own pace as far as they are capable. The spiral approach accommodates individual work in the same way as full group work; that is, no single worksheet is a prerequisite for the content of any succeeding lesson.

During the school year, 20 lessons are based on the eleven third grade workbooks. Like the worksheets, each workbook moves through a range of levels of difficulty. We believe that the worksheets and workbooks realize the best sense of individualization.

Q: Why are the lesson plans presented as a dialogue?

A: Most of the lessons are written in considerable detail; step-by-step descriptions are frequently given, together with a possible dialogue between teacher and students. These details are given only as suggestions of how a lesson might develop. You should never feel obligated to follow a lesson word for word as it is written in the guide. By the same token, you should never insist that your students give the same responses as those given in the imaginary dialogue. Use your own creativity to draw out student responses as the situations suggest. Read the lesson plans carefully beforehand to get an idea how the lessons are expected to proceed.

Q: How often and for how long should I teach mathematics in third grade?

A: The *CSMP* schedule suggests that you teach mathematics five days a week for 40 to 50 minutes each day.

Q: Is it necessary to follow the suggested schedule exactly?

A: This program is not meant to be a static sequence. The schedule of lessons is only a suggestion based on the teaching experiences of many teachers and *CSMP* staff. If this is your first time teaching the program, you may like specific suggestions for organizing the lessons, so we offer you the suggested schedule as a guideline. You may wish to follow it at the beginning of the school year and then deviate from it as the needs of your students dictate.

Exercise your own professional judgment in deciding when to stop a particular lesson. It is better to stop a lesson when student interest is high than to teach so methodically that everyone in the class understands everything, but is completely bored. In order to be successful with this curriculum, you should adjust the schedule to the ability, maturity, and interests of your class.

Q: What is the role of storybooks in the curriculum?

A: The storybooks are part of a 24-storybook collection called *Stories by Frédérique*. Each is presented in a colorful newsprint booklet designed for young students. Four storybooks are used with lessons in *CSMP Mathematics for the Upper Primary Grades, Parts III and IV* (15 copies of each storybook are provided in a classroom set of materials). Each story is illustrated using the mathematical languages of dots, arrows, and strings to reinforce the story idea. Young readers can become personally involved in the stories; there are questions to answer, pictures to relate to the story, and new adventures to invent for the characters. They find that emotions and aesthetics are part of the world of mathematics just as in the world of people.

Many other lessons include suggestions for reading activities using children's literature as an extension or enhancement.

Q: For what sort of student is the *CSMP* elementary curriculum designed?

A: It is designed for *all* students. Students engage with each learning situation at their own level so that they succeed in dealing with some aspects of the situation that challenge them. The pedagogy of situations (see the next question) is particularly effective with all types of learners.

Q: How does *CSMP* differ from a traditional mathematics curriculum?

A: The core content of *CSMP* is not revolutionary. The program aims to integrate ideas and facts that have always been considered important in mathematics. The major differences are in method. Traditional teaching generally focuses on the mastery of paper-and-pencil algorithms.

CSMP students, on the other hand, become involved with real mathematical activities from which they develop mathematical understanding.

With a pedagogy of situations, they participate in the learning process which leads to the development of skills—not by rote memorization but by constructing their own understanding. Faced with challenging situations, the students are led by their reactions to important ideas in mathematics—they begin to mathematize situations. This process is fundamental whenever mathematics is applied.

CSMP also makes use of a spiral approach rather than the mastery approach found in most traditional mathematics curricula (see page 2-1).

Q: Are all the topics in the *CSMP* curriculum really mathematics?

A: Yes. Mathematics is much more than calculation with numbers, and its methods include more than paper-and-pencil algorithms. The *CSMP* curriculum is filled with experiences that directly and indirectly relate to a wide world of numbers, their interrelationships, and the kinds of logical reasoning about these relationships that make mathematics an activity of interest and concern.

Q: Why use the languages of strings and arrows?

A: It is surprising that the language of strings was not used earlier and more extensively to teach mathematics. Mathematicians have used strings for a very long time; they support classification notions so fundamental and natural that they go back to Aristotle. The scope of the string diagrams is broader than mathematics; it is a marvelous instrument for logical thinking. String diagrams permit the understanding of a situation at a glance; they generate math concepts and ideas through related discussion.

Arrow diagrams are probably the most important teaching aid in the *CSMP* curriculum. They are used everywhere in our daily lives: signals, advertisements, directions, and so on. Why not use them to teach mathematics? Arrows are a pictorial way to represent relations. Relations have always been important in mathematics, but in the past seemed to be something rather abstract, elusive, and mysterious. With arrows they become vivid, concrete, and easy to understand.

Q: Why use the Papy Minicomputer and calculators?

A: The Minicomputer allows very young students to become familiar with numbers and numerical operations (especially large numbers and more difficult calculations) before they are able to work with them on paper. Later, the Minicomputer is used as a vehicle for posing situations involving mental arithmetic and for examining the workings of arithmetic operations. It provides the necessary experience so that, rather than memorizing an algorithm and applying it to situations, the situations give rise to the algorithm.

The calculator can have a remarkably beneficial effect on students' interest in and understanding of arithmetic. In *CSMP*, the calculator is used as an instructional tool, not as a crutch. That is, with the calculator students develop mental arithmetic skills and number sense as well as the ability to construct their understandings of a variety of mathematical concepts. By removing the need to do messy calculations, the calculator frees students to think about problem solving and possibly tackle even more difficult problems.

Q: If the students use the Minicomputer and a calculator, will they be able to calculate without them?

A: This question suggests that the only purpose of the Minicomputer and the calculator in the *CSMP* curriculum is to perform calculations. To be sure, the Minicomputer and the calculator do enable very young students to deal with large numbers and perform relatively difficult calculations long before they know the paper-and-pencil algorithms. But very soon these experiences suggest how the paper-and-pencil algorithms come about, and from that moment the Minicomputer is no longer regarded as a calculating device. Later, usually by the second grade and for the remainder of the K-6 curriculum, the Minicomputer assumes its primary roles: a source of very interesting problems and games, an effective vehicle for stimulating mental arithmetic, a teaching device for introducing more advanced topics such as the negative numbers and the decimal numbers, and, in general, an alternative to the usual representation of numbers.

Q: Why is there a lack of drill and little emphasis on skills training?

A: The purpose of drill in arithmetic is to acquire the skills of calculation. And while certain numerical skills *are* essential, the usual drill techniques are, unfortunately, dull, stultifying and sometimes even counterproductive. The *CSMP* curriculum *appears* to place little emphasis on skills because it does not resort to drill. But in fact, the essential skills of both mental and written calculation are learned in the many situations where the ability to calculate is needed in order to respond to the situation: to win a number game, to identify the secret number of the detective story, or to build a number road. In *CSMP*, calculation is always considered a tool for doing interesting things, rather than a chore done for its own sake.

Q: How do students learn to use mathematics in practical situations?

A: For elementary school students, a situation that intrigues them, catches their imagination, or piques their curiosity will motivate them to learn whatever is necessary in order to deal with the situation. But situations that adults consider “practical” very often are outside the realm of interest of young students and do not provide motivation for learning. *CSMP* has found that students will indeed learn to use mathematics in situations they consider worthy of their attention. As they approach adulthood, they will begin to consider practical situations worthy of their attention, but in the meantime they are more interested in games, fantasy, puzzles, stories, and so on.

Q: How do *CSMP* students do on standardized tests?

A: While the *CSMP* philosophy differs from the philosophy underlying standardized testing, test results are available to us from several sources. The results indicate that *CSMP* classes generally do as well or better on standardized tests than non-*CSMP* classes. It should be pointed out that standardized testing and traditional programs are correlated, and that *CSMP* students are exposed to a great deal of mathematics that is not taught in more traditional programs or that is not considered in the construction of the tests. There are also many immeasurable or unmeasured areas such as enjoyment of mathematics, strategic thinking, organizational ability, and depth of understanding of the methods and uses of mathematics in which we feel *CSMP* students have a definite advantage. Evaluation Reports 1-A-3, 2-A-1, and 4-B-1 in the *CSMP Evaluation Report Series* give a more detailed answer to this question. Copies are available upon request.

Q: What problems will *CSMP* students have if they return to a more traditional program?

A: There should be no problems for *CSMP* students who return to a traditional program. Test results indicate that *CSMP* students are at or above the level of non-*CSMP* students in terms of material covered in traditional courses. In addition, *CSMP* students will have encountered many situations that are not introduced in traditional programs nor tested for on standardized tests. In particular, their reasoning ability should be much sharper than their non-*CSMP* counterparts.

Q: What are some ways to organize materials and manage my class?

A: It is very important to organize your *CSMP* materials before school begins and to decide where you will store them. File drawers, shelves, boxes, or closets are all satisfactory as long as you can easily get to the materials. Take them all out of their shipping boxes and spread them on several tables and/or desktops in your classroom so they can be organized into the order you will be using them.

Worksheets: You should have a worksheet booklet for each student. Decide whether you will store these booklets and pass them out when a particular lesson calls for worksheets or let the students be responsible for their own worksheet booklets.

Worksheets can be removed from the booklet or left in depending on how you wish to manage them. Once a worksheet is removed, however, it cannot be replaced easily, so make sure students are careful about tearing out the correct sheet.

Manipulatives: Storing all the manipulatives of a certain type in separate marked containers is one way to make them accessible, especially for use in lessons and centers. Another way is to provide each student with a sturdy box (for example, a shoe box) in which they keep their individual manipulative materials. Properly label each box with the student's name.

Additional Materials: Be sure that you have plenty of high-quality colored chalk and large sheets of unlined white paper. Your students should have colored pencils, pens, or crayons. Plan well ahead to be sure you have any needed materials that are not supplied by *CSMP*. Capsule lesson summaries give notice about such materials. Keep all teacher materials where they are easily accessible. The demonstration Minicomputer boards, the number line, and the 0–109 numeral chart should always be on display in the room.

Q: Some of the *CSMP* materials are new to me. How do I learn enough to teach a class?

A: *CSMP* training is recommended for every teacher new to the program. This training may be conducted by a local *CSMP* coordinator or a certified *CSMP* trainer. Kindergarten and first grade teachers should receive a minimum of 12 hours training; teachers of the upper primary grades, a minimum of 24 hours training; and teachers of the intermediate grades, a minimum of 30 hours training. During the training, the *CSMP* content is taught to new teachers and suggestions are given for organization of the materials.

The *CSMP* trainer will present a variety of lessons taken from the *CSMP* curriculum and use an integrated spiral approach during the training itself. In this way teachers not only learn how to teach *CSMP* mathematics, but they become familiar with the spirit and pedagogy of the program.

Q: What should be done when there is a substitute teacher?

A: Some school systems have included individuals who frequently substitute in their *CSMP* training. When this has not been done, it may be difficult for the untrained substitute to teach from *CSMP* materials. One solution is to arrange for another *CSMP* teacher to teach your math class while the substitute teaches another subject to the *CSMP* teacher's class. If you will only miss one or two days, you may find the substitute can manage certain *CSMP* material quite well, for example, workbooks. Otherwise, let the substitute use your math period to cover material not included in the *CSMP* curriculum, such as telling time. If your absence will be an extended one, arrangements should be made with your coordinator to train a substitute, rearrange schedules to put a *CSMP* teacher in your class, or otherwise provide for your students.

Q: The program makes use of the students' creative freedom. How much room is there for the teacher's ingenuity?

A: *CSMP* not only allows for your ingenuity but depends on it. While the lessons may appear to be rigid by presenting a dialogue for teachers and students, remember that these are only suggested questions, answers, and comments based on our experience with development classes. Even if you follow your part of the script, your students are likely to offer responses which differ from those we have listed. It is the students' responses that will determine the content and direction of a lesson.

In a traditional program your creativity is called upon the first time you develop a particular lesson, and to a lesser extent as you revise lessons in succeeding years. There is little room for spur-of-the-moment creativity once a lesson begins. The *CSMP* curriculum, by creating a free and open situation emphasizing the students' creative freedom, continually presents you with unanticipated student responses and calls on your ingenuity at all times.

Q: How do I handle whole classes who are new to *CSMP*?

A: *CSMP* does not assume that kindergarten and first grade students have any prior experience with *CSMP*. The kindergarten and first grade programs will need no adaptation for classes who are new to *CSMP*.

Second grade classes that are new to *CSMP* may initially progress more slowly than veteran classes. The lessons at the beginning of the second grade program are designed to serve either as an introduction to *CSMP* languages for new classes or as a quick review for veteran classes.

Third grade classes new to *CSMP* will need to become familiar with the *CSMP* languages and tools before beginning the lessons in *UPG-III*. A special guide which consists of prerequisite lessons from *UPG-I* and *II* followed by a modified *UPG-III* and *IV* program is available for these classes. This guide, *CSMP Third Grade Entry Supplement*, is available through McREL.

Q: What should I do with my class if they did not finish the previous year's schedule?

A: No special measures are required. Each level of the *CSMP* curriculum begins with introductory lessons. In addition, the spiral approach in the lessons permits students to participate at their own level of understanding, even if that level is not quite as high as it might have been if the previous year's schedule had been completed.

Q: How can I explain *CSMP* to parents?

A: The best way is for you or your *CSMP* coordinator to organize a workshop for interested parents. Parents can then see the languages of the program in use and have some of the same experiences their children are having. Workshops can be of almost any length, but anything short of two hours does not allow participants to gain much familiarity with the material.

In such a workshop, we suggest you explain the language of the Minicomputer with particular emphasis on its use in presenting situations in which mental arithmetic is called upon and in developing algorithms. (For example, physically carry a checker from the ones to the tens board in the 8 + 2 = 10 trade to parallel "carrying" in the paper-and-pencil operation).

A non-numerical example, such as the A-Block String Game, provides a good example of the power of the language of strings. A numerical example, such as building a road from 2 to 23 using +5 and –2 arrows, provides a nice introduction to the language of arrows. Favorite lessons of your students' are excellent choices to present to parents as well.

Throughout the year there are opportunities to communicate with and involve parents in the math program. The curriculum materials include numerous letters to parents that can provide more introduction to the *CSMP* languages, tools, and methods. Home activities accompany many lessons and are opportunities for parents to become involved with their children in learning mathematics. Sometimes they suggest follow-up or practice, and other times enrichment or extension of a class lesson.

You might also extend an invitation to parents to visit your class during the math period. Many times such an invitation leads to a closer parent-teacher relationship or to the parent volunteering as an aide.

If you believe some parents would appreciate a more detailed and sophisticated discussion of *CSMP*, the following letter may serve that purpose. It can be reproduced and sent home with the students.

Dear Parent/Guardian:

Your child is participating in the *Comprehensive School Mathematics Program (CSMP)*. While the program cannot be fully explained in a brief note, we hope this letter will give you some feeling for the substance of your child's mathematics education.

The goals of the *CSMP* K-6 program include the development of the standard number systems and their operations (including an early introduction to integers, rational numbers, and decimal numbers) interwoven with the development of geometry and measurement. The *CSMP* program also includes a strong component of probability, statistics, and combinatorics. Powerful pedagogical devices are used, such as several nonverbal languages and instructional tools. These make the unifying ideas of the program accessible to very young children.

The Language of Strings: This language mimics the basic methods of collecting and classifying data. It deals with the fundamentally useful and important mathematical notion of sets.

The Language of Arrows: This language models the process of comparing and analyzing sets and performing operations on them. That is, it deals with the mathematical notions of relations and functions including, but not restricted to, ordering relations and the numerical processes of adding to, subtracting from, multiplying by, and sharing equally among.

The Papy Minicomputer: The Papy Minicomputer, an extremely effective abacus invented by Georges Papy, models the positional structure of our number system and lends itself to a multitude of numerical algorithms, including the standard algorithms for the basic numerical operations.

The Calculator: The calculator serves as an instructional tool to help students develop mental arithmetic skills and number sense as well as to focus their attention on understanding and problem solving.

Among other things, these languages and tools allow students to develop an understanding of the basic operations on numbers in a natural way based on previous experiences. They also provide a context in which situations arise that call for the repeated use of arithmetic operations without resorting to drill exercises, which most students find boring.

The content is learned in an atmosphere of constant application using a variety of situations. These vary from simple stories in the early primary grades to challenging applications and nontrivial simulations of real world problems in the upper grades.

One of the tenets of the *CSMP* philosophy is that mathematics is a unified whole and should be learned as such. The *CSMP* content is completely sequenced in spiral form so that students come into contact with each area of mathematics continuously throughout the program. This avoids atomizing the content and requiring mastery of each bit before continuing to the next. Rather, students have repeated exposures to the content, building interlocking experiences of increasing sophistication.

Another tenet of the *CSMP* philosophy, based on years of experimentation in the classroom, is that no single method of classroom management meets the needs of every student. Hence, the program is constructed to allow numerous opportunities for whole class participation, small group cooperative interactions, and independent experiences. Individualization is achieved through independent work on workbooks and worksheets of varying levels of difficulty. Due to the spiral nature of the curriculum, students can work in their workbooks without losing touch with the progress of the class.

CSMP does not prescribe a rigid system of student assessment and progress reporting. It allows the teacher to use classroom interactions, observations of individual and group work, writing activities, and workbooks and worksheets to best advantage for evaluating and reporting student progress. While standardized tests indicate that *CSMP* students develop the basic skills as early or earlier than non-*CSMP* students, we hope you will not be obsessed with your child's development of these skills. Each child is an individual and should not be judged against norms but rather on what he or she can and does accomplish. Many extremely important areas—developing self-confidence, learning to think and reason, being able to pose and solve non-routine problems—are difficult to measure and grade. If you have any questions concerning your child's progress, the classroom teacher is in the best position to answer those questions.

THE *CSMP* STAFF

Section Three

Suggested Schedule of Lessons

Master Schedule for *CSMP Mathematics for UPG-III*

Week	World of Numbers	Languages of Strings & Arrows	World of Numbers	Workbooks	Geometry and Measurement
1	**N1** Minicomputer Introduction #1 N-3	**L1** String Games #1 L-3	**N2** Introductory Arrow Problems #1 N-11	**W1** Detective Story #1 W-3	**Adjustment Day**
2	**N3** Minicomputer Introduction #2 N-17	**L2** Composition Games #1 L-9	**N4** Roads #1 N-21	**W2** Which Road? W-7	**G1** Fractional Parts of Shapes #1 G-3
3	**N5** Subtraction and Addition Problems N-25	**L3** Two Lists L-15	**N6** The Function +10 and Composition N-29	**W3** The Empire State Building W-13	**G2** Taxi-Distance G-9
4	**N7** Multiplication Problems #1 N-33	**L4** Multiples of 3 and 4 L-21	**N8** Roads #2 N-37	**W4** Festival of Problems #1 (Lesson One) W-19	**G3** Rectangles G-13
5	**N9** Eli the Elephant N-43	**Adjustment Day**	**N10** Introductory Arrow Problems #2 N-49	**W5** Festival of Problems #1 (Lesson Two) W-23	**G4** Length #1 G-15
6	**N11** Multiplication Table N-55	**L5** Exchanging Names L-27	**N12** The Number Line Game N-59	**W6** Fishing for Numbers, Part III (Lesson One) W-33	**G5** Fractional Parts of Shapes #2 G-19
7	**N13** Multiplication Problems #2 N-67	**L6** String Games #2 L-31	**N14** Roads #3 N-71	**W7** Fishing for Numbers, Part III (Lesson Two) W-35	**G6** Nine-Square and Sixteen-Square G-23
8	**N15** Doubling and Halving on the Minicomputer N-75	**L7** Composition Games #2 L-35	**N16** Road Map of Nevada N-79	**W8** A Spinner Game #1 W-45	**G7** Where Shall We Meet? #1 G-29
9	**N17** Subtraction on the Minicomputer N-85	**L8** Marble Game L-39	**N18** The Functions 2x and ½x N-89	**W9** A Spinner Game #2 W-49	**Adjustment Day**

Week	World of Numbers	Languages of Strings & Arrows	World of Numbers	Workbooks	Geometry and Measurement
10	**N19** Addition Puzzles N-95	**L9** Three Strings L-45	**N20** +4 Arrow Roads N-99	**W10** Road Map W-55	**G8** Length #2 G-38
11	**N21** 3x and $\frac{1}{3}$x on the Minicomputer N-105	**L10** A Detective Story L-51	**N22** Subtraction and Composition #1 N-109	**W11** Rollerskating 37 (Lesson One) W-59	**G9** Where Shall We Meet? #2 G-37
12	**N23** Subtraction Problems N-115	**L11** The Little Donkey L-55	**N24** The Functions 3x and $\frac{1}{3}$x N-119	**W12** Rollerskating 37 (Lesson Two) W-65	**G10** Fractional Parts of Shapes #3 G-41
13	**N25** Multiplication Problems N-125	**L12** A Game with Two Cubes L-59	**N26** Subtraction and Composition #2 N-131	**W13** Festival of Problems #2 (Lesson One) W-71	**Adjustment Day**
14	**N27** Introduction to Decimal Numbers #1 N-135	**L13** String Games #3 L-65	**N28** The Function 10x N-141	**W14** Festival of Problems #2 (Lesson Two) W-75	**G11** Geoboard Problems G-47
15	**N29** Introduction to Decimal Numbers #2 N-147	**L14** Time Problems L-67	**N30** Assorted Shopping Problems N-155	**W15** Detective Story #2 W-85	**G12** Maps of a Cube G-51
16	**N31** 10x on the Minicomputer N-155	**L15** Changing Seats L-71	**N32** Subtraction and Composition #3 N-159	**W16** 20?-100? (Lesson One) W-91	**G13** Square Puzzles G-55
17	**N33** Multiplication and Addition Problems N-165	**L16** Counting Problems L-77	**N34** Road Map of Virginia N-167	**W17** 20?-100? (Lesson Two) W-95	**Adjustment Day**
18	**N35** Multiplication and Composition N-171	**L17** Singing Friends L-85	**N36** Subtraction Roads N-177	**W18** Who are Tic and Tac? W-105	**G14** How Much is a Pound? G-59

Section Four

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