A Practical Guide for the Teaching of Literacy to Adults With Learning Difficulties

Part VII

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Québec

A Practical Guide for the Teaching of Literacy to Adults With Learning Difficulties

Diagnosis and Intervention Strategies

VII — Remedial Field
Module: Arithmetic (Writing)

MAY 2002

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INTRODUCTION

The interventions suggested in Part VII address learning problems related to arithmetic. They were informed by reflection on how mathematics is learned and taught as well as on the needs of adults participating in training activities. A number of principles that emerged from this process of reflection underpin these intervention strategies.

The importance of associating the learning of arithmetic with everyday activities cannot be overemphasized. Adult learners must understand in what ways arithmetic can be useful and how mathematical concepts can be applied in concrete ways. Every opportunity should be seized to apply what has been learned (either during group activities or in the learners' everyday activities). This will contribute to demystifying arithmetic and helping adult learners overcome a phobia of numbers that can be paralyzing.

To do so, real-life, concrete material is used as much as possible, as are situations that correspond to the learners' everyday reality. Learning by manipulation is emphasized. Problems proposed by adult learners are used as a basis for learning, and calculating sums of money is stressed, as this is the most common mathematical operation carried out on a daily basis. Always remember, the ultimate goal is the adult's autonomy.

To effectively intervene among adults with learning problems, it is necessary to clearly identify their difficulties by means of ongoing observation. It is also very important to regularly review the material; to repeat, while varying the examples; to schedule daily exercise periods; to present difficult concepts in different ways; and to break up the learning units. Adult learners do, however, require assistance in relating the various basic concepts being learned. For instance, numeration cannot be dissociated from place value. Similarly, the four basic operations cannot to be learned independently of place value and problem-solving.

Adult students should progressively learn how to explain their reasoning, using words to describe their mental exercises. This expectation of them should be clearly communicated with simple instructions that are reformulated as necessary. This approach provides valuable indications of what learners have acquired and where they are having difficulties with regard to specific concepts. Pooling the strategies employed by the adult learners in the group should also be encouraged.

In addition, it is important to foster the learner's ability to estimate, that is, to determine the order of magnitude of an answer in order, for example, to assess the plausibility of a solution to a problem.

Furthermore, there are a number of "tricks" that can be employed when learning arithmetic. Always show adult learners when to use these tricks, for honesty's sake and to prevent their misuse in later learning.

Role-playing is another excellent intervention strategy. There are numerous activities, sometimes involving friendly competition, that can be very effective.

REMEDIAL FIELD

ARITHMETIC

WRITING

1.	Can the adult learner write, without guidance:
1.1.	the numbers 0 to 9?

YES:	The adult learner can write the numbers 0 to 9, without any guidance or visual support.	**NO:**	The adult learner cannot write the numbers 0 to 9. **It is therefore necessary to verify if he or she already learned** how to write the numbers 0 to 9:
		• **If so:**	Investigate and try to determine why the adult learner cannot write the numbers 0 to 9. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner how to write the numbers 0 to 9.

SUGGESTED INTERVENTIONS

- First verify if the adult learner can count and read the numbers 0 to 9. If not, see the interventions suggested in sections 2.1 and 3.1 of the "Arithmetic (Reading)" module.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Supply visual supports, such as illustrations of numbers or plastic numbers on a magnetic board, to help the adult learner acquire the "movement" necessary to reproduce the symbols.

- Vary the copying exercises. For example, have the adult learner:

  ◊ trace the dotted outline of a number
  ◊ copy important telephone numbers, street numbers, etc.
  ◊ with visual support, write the number date or days of the month on a calendar page made in class
  ◊ use material available on the market that is designed to assist learners in writing numbers

- Identify the numbers that the adult learner is unable to write. If the difficulties are due to the graphic complexity of the number, guide the learner in imitating the movement necessary to properly form the number in question, working at first on a large surface such as a blackboard or large sheet of paper. If the difficulties are due to confusion between symbols, compare the symbols that are similar in appearance and the movements required to form them.

- Then guide the adult learner in writing the numbers without a model:

  ◊ If the learner can read words, ask him or her to write, in numerals, numbers represented in letters.
  ◊ Ask the learner to write the numerals representing the number of objects in a set.
  ◊ Ask the learner to identify and write the numerals missing in an incomplete number table from 0 to 9.

- Take advantage of everyday situations to have the adult learners write numbers and verify their accuracy. For example, have them:

  ◊ write quantities on a grocery list
  ◊ use numbers to put the answers to an English exercise in order

1.	Can the adult learner write, without guidance:
1.2.	the numbers 10 to 99?

YES:	The adult learner can write the numbers 10 to 99, without any guidance or visual support.	**NO:**	The adult learner cannot write the numbers 10 to 99. **It is therefore necessary to verify if he or she already learned** how to write the numbers 10 to 99:
		• **If so:**	Investigate and try to determine why the adult learner cannot write the numbers 10 to 99. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner the numbers 10 to 99.

SUGGESTED INTERVENTIONS

- First verify if the adult learner can count and read the numbers 10 to 99. If not, see the interventions suggested in sections 2.2 and 3.2 of the "Arithmetic (Reading)" module.

- Approach the writing of the numbers 10 to 99 in groups of 10, that is, from 10 to 19, 20 to 29, etc., only presenting a new group of 10 once the previous ones have been acquired.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Work with the adult learners to break down numbers. However, this requires prior knowledge of the principle of addition and the concept of place value. For example:

      sixty-eight = sixty + eight

$$
\begin{array}{r}
60 \\
+\ 8 \\
\hline
68
\end{array}
$$

  The number is broken down into the number that indicates the beginning of a group of 10 and the number of ones.

- Work with the adult learners to put together a number table for the numbers 0 to 99.

- Use the concept of place value so that the adult learners become aware of the value of digits based on their place in a number. See the interventions on place value suggested in sections 5.1, 5.2 and 5.3 of the "Arithmetic (Reading)" module.

- Use various exercises to teach the adult learners to write numbers without visual support. For example, have them:

  ◊ write, in numerals, numbers represented in letters, provided they can read words
  ◊ write the numeral representing the number of objects in a set
  ◊ identify and write the numbers missing in a number table
  ◊ complete sequences of numbers

- Take advantage of everyday situations to encourage the adult learners to write numbers and verify their accuracy. For example, ask them to:

  ◊ write number dates
  ◊ write sums of money when preparing a budget or a cheque, or write quantities, lottery numbers, etc.

1.	Can the adult learner write, without guidance:
1.3.	the numbers 100 to 1000?

YES:	The adult learner can write the numbers 100 to 1000, without any guidance or visual support.	**NO:**	The adult learner cannot write the numbers 100 to 1000. **It is therefore necessary to verify if he or she already learned** how to write the numbers 100 to 1000:
		• **If so:**	Investigate and try to determine why the adult learner cannot write the numbers 100 to 1000. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner the numbers 100 to 1000.

SUGGESTED INTERVENTIONS

- First verify if the adult learner can read the numbers 100 to 1000. If not, see the interventions suggested in section 3.3 of the "Arithmetic (Reading)" module.

- Approach the writing of the numbers 100 to 1000 in groups of 100, that is, from 100 to 199, 200 to 299, etc., only presenting a new group of 100 once the previous ones have been acquired.

- **Avoid using the following rule: to write numbers, simply record what you hear, for example: one hundred twenty-five, is one hundred and twenty-five. The adult learners may write 10025.**

SUGGESTED INTERVENTIONS *(*cont.*)*

- Instead, work with the adult learners to break down numbers. However, this requires prior knowledge of the principle of addition and the concept of place value. For example:

234 = two hundred + thirty + four

$$
\begin{array}{r}
200 \\
30 \\
+ \quad 4 \\
\hline
234
\end{array}
$$

- Work with the adult learners to put together a number table for the numbers 100 to 199.

- Use the concept of place value so that the adult learners become aware of the value of digits based on their place in a number. See the interventions on place value suggested in sections 5.1, 5.2 and 5.3 of the "Arithmetic (Reading)" module.

- Pay particular attention to numbers with a "0" in the tens digit.

- Use various exercises to teach the adult learners to write numbers without visual support. For example, have them:

  ◊ write, in numerals, numbers represented in letters, provided the learner can read words
  ◊ write the numeral representing the number of objects in a set
  ◊ write the numbers missing in a number table
  ◊ complete sequences of numbers
  ◊ complete statements with a number, such as:

    ⇒ there are _____ days in a year
    ⇒ my rent is $_____ per month

- Take advantage of everyday situations to encourage the adult learners to write numbers and verify their accuracy. For example, ask them to write sums of money when preparing a cheque, a budget, etc.

1.	Can the adult learner write, without guidance:
1.4.	numbers consecutively from one group of 10 to the next without difficulty?

YES:	The adult learner has no difficulty writing numbers consecutively from one group of 10 to the next without guidance.	**NO:**	The adult learner has difficulty writing numbers consecutively from one group of 10 to the next. **It is therefore necessary to verify if he or she has already learned** how to write numbers consecutively from one group of 10 to the next:
		• **If so:**	Investigate and try to determine why the adult learner cannot write numbers consecutively from one group of 10 to the next. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner how to write numbers consecutively from one group of 10 to the next.

SUGGESTED INTERVENTIONS

- First verify if the adult learner can count and read numbers consecutively from one group of 10 to the next without difficulty. If not, see the interventions suggested in sections 2.3 and 3.4 of the "Arithmetic (Reading)" module.

- Work on successive groups of 10, from 0 to 99: use dimes to guide the adult learner in counting in intervals of 10 (0, 10, 20, 30, etc.) and writing these numbers. Use the same principle to teach numbers higher than 100.

- Use a number table in which numbers ending in 9, 0 and 1 are missing. Have the learner complete the table, focusing exclusively on the transition from one group of 10 to the next.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Use the principle of adding ones to facilitate the transition from one group of 10 to the next. For example:

$$
\begin{array}{r}
60 \\
+ \quad 8 \\
\hline
68
\end{array}
$$

  For this type of intervention to be effective, the adult learner must have prior knowledge of the principle of addition and the concept of place value.

- Place value and manipulation (grouping objects by 10s) can be helpful at this stage. See the interventions suggested in sections 5.1, 5.2 and 5.3 of the "Arithmetic (Reading)" module.

- Draw the learner's attention to the fact that numbers ending in 9 indicate the end of one group of 10 and are followed by a number ending in 0, indicating the beginning of a new group of 10.

- Present various exercises requiring the learners to change from one group of 10 to the next or to write numbers that begin a group of ten. For example, have them:

  ◊ complete the following number sequences:
  > 37, 38, ___, ___, ___, 42, 43
  > 40, 50, ___, ___, 80
  > 53, 52, 51, ___, ___, 48, 47

  ◊ write, in numerals, the numbers represented in letters

- Identify where the adult learner has difficulties proceeding from one group of 10 to the next and include these problem areas in learning activities such as:

  ◊ "I have to pay my telephone bill one day before November 30.
    What date do I have to pay the bill?"
  ◊ "In a waiting room, the person with the number 79 is called. What will be the next number called?"

1.	Can the adult learner write, without guidance:
1.5.	numbers consecutively from one group of 100 to the next without difficulty?

YES:	The adult learner has no difficulty writing numbers consecutively from one group of 100 to the next without guidance.	**NO:**	The adult learner has difficulty writing numbers consecutively from one group of 100 to the next. **It is therefore necessary to verify if he or she has already learned** how to write numbers consecutively from one group of 100 to the next:
		• **If so:**	Investigate and try to determine why the adult learner cannot write numbers consecutively from one group of 100 to the next. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner how to write numbers consecutively from one group of 100 to the next.

SUGGESTED INTERVENTIONS

- First verify if the adult learner can count and read numbers consecutively from one group of 100 hundred to the next. If not, see the interventions suggested in sections 2.4 and 3.5 of the "Arithmetic (Reading)" module.

- Work on successive groups of 100, from 100 to 1000, to guide the adult learner in counting in intervals of 100 (0, 100, 200, 300, etc.) and writing these numbers. Useful material includes measuring instruments, containers calibrated by 100 ml and reproductions of $100 bills. Have the learners write down measurements or sums of money.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Use the principle of adding ones to facilitate the transition from one group of 100 to the next. For example:

$$
\begin{array}{r}
199 \\
+\ 1 \\
\hline
234
\end{array}
$$

  For this type of intervention to be effective, the adult learner must have prior knowledge of the principle of addition and the concept of place value.

- Place value and manipulation (grouping objects by 10s and 100s) can be helpful at this stage. See the interventions suggested in sections 5.1, 5.2 and 5.3 of the "Arithmetic (Reading)" module.

- Draw the learner's attention to the fact that numbers ending in 99 indicate the end of one group of 100 and are followed by a number ending in 00, indicating the beginning of a new group of 100. Useful examples include prices like $1.99 and $2.99 to which a penny can be added to round off the figures to $2 and $3 respectively.

- Present various exercises requiring the learners to change from one group of 100 to the next or to write numbers that begin a group of 100. For example, have them:

  ◊ complete the following number sequences:

    197, 198, ____, ____, ____, 202
    100, 200, ____, ____, ____, 600
    303, 302, ____, ____, ____, 298

  ◊ write, in numerals, the numbers represented in letters

- Identify where the adult learner has difficulties proceeding from one group of 100 to the next and include these problem areas in the learning activities. For example, use flyers advertising various products priced at $199, $299, etc. Have the learners round off the numbers, while observing the corresponding numbers on a number table.

2.	When dictated, can the adult learner write the numbers:
2.1.	0 to 9?

YES:	When dictated, the adult learner can write the numbers 0 to 9.	**NO:**	When dictated, the adult learner cannot write the numbers 0 to 9. **It is therefore necessary to verify if he or she has already learned** how to write the numbers 0 to 9:
		• **If so:**	Investigate and try to determine why the adult learner cannot write the numbers 0 to 9. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner how to write the numbers 0 to 9.

SUGGESTED INTERVENTIONS

- Proceed in stages:

  ◊ First guide the adult learners in recognizing numbers, that is, in reading them and associating them with a value. See the interventions suggested in section 3.1 of the "Arithmetic (Reading)" module.

  ◊ Then have them associate a symbol with each number and reproduce it. See the intervention strategies suggested in section 1.1 above.

SUGGESTED INTERVENTIONS *(*cont.*)*

◊ Lastly, guide the adult learners in writing numbers that are dictated to them, without visual support. Vary the dictation, relying as much as possible on meaningful situations. For example:

⇒ Have the adult learners write down numerical information: telephone numbers, addresses, etc.
⇒ Use simple forms on which the adult learner records dictated numbers (social insurance number, medicare number, etc.).
⇒ Take advantage of everyday situations that require the adult learners to write down numbers they hear, for example, winning lottery numbers announced on the radio or the pagination of a short document.

● Encourage the adult learners to develop the habit of checking the accuracy of what they have written by reading their notes.

● Use drill-and-practice exercises:

◊ Have the adult learners write numbers dictated to them by other members of the group.
◊ Organize games based on friendly competition in which the speed of execution (writing the dictated number as quickly as possible) and the quality of the writing are the criteria for winning.
◊ If the adult learners can read, ask them to write, in numerals, numbers represented in letters.

● Pay particular attention to numbers that cause problems:

◊ Have the adult learners compare symbols that they confuse: point out their similarities and differences.
◊ Have them imitate the movements required to form the more complicated aspects of certain symbols, working first on a large surface: blackboard, large sheet of paper.
◊ On a regular basis, have the learners do brief writing exercises.

2.	When dictated, can the adult learner write the numbers:
2.2.	10 to 99?

YES:	When dictated, the adult learner can write the numbers 10 to 99.	**NO:**	The adult learner cannot write the numbers 10 to 99. **It is therefore necessary to verify if he or she has already learned** how to write the numbers 10 to 99:
		• **If so:**	Investigate and try to determine why the adult learner cannot write the numbers 10 to 99. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner how to write the numbers 10 to 99.

SUGGESTED INTERVENTIONS

- Proceed in stages:

    ◊ First guide the adult learners in recognizing numbers, that is, in reading them and associating them with a value. See the interventions suggested in section 3.2 of the "Arithmetic (Reading)" module.

    ◊ Then have them associate a symbol with each number and reproduce it. See the intervention strategies suggested in section 1.2 above.

SUGGESTED INTERVENTIONS *(*cont.*)*

◊ Lastly, guide the adult learners in writing numbers that are dictated to them, without visual support. Vary the dictation, relying as much as possible on meaningful situations. For example:

⇒ Have them write down numerical information: sums of money, number dates, quantities, etc.
⇒ Use simple forms on which the adult learner records dictated numbers (social insurance number, medicare number, etc.).
⇒ Take advantage of everyday situations that require the adult learners to write down numbers they hear, for example, winning lottery numbers or the pagination of a short document.

● Encourage the adult learners to develop the habit of checking the accuracy of what they have written by reading their notes.

● Use drill-and-practice exercises:

◊ Have the adult learners write numbers dictated to them by other members of the group.
◊ Organize games based on friendly competition in which the speed of execution (writing the dictated number as quickly as possible) and the quality of the writing are the criteria of success.
◊ Associate the dictation of numbers to the concept of place value.
◊ Have the learners write the number composed of two groups of 10 and 5 ones.
◊ If the adult learners can read, ask them to write, in numerals, numbers represented in letters.

● Pay particular attention to numbers that cause problems:

◊ Have the adult learners compare numbers composed of the same numerals, for example, 13 and 31, by breaking them down, manipulating objects, etc.
◊ Ensure that the learners are able to distinguish between numbers that sound the same, for example: 14 and 40.
◊ Frequently use numbers that cause problems during dictation.

2.	When dictated, can the adult learner write the numbers:
2.3.	100 to 1000?

YES:	When dictated, the adult learner can write the numbers 100 to 1000.	**NO:**	The adult learner cannot write the numbers 100 to 1000. **It is therefore necessary to verify if he or she already learned** how to write the numbers 100 to 1000:
		• **If so:**	Investigate and try to determine why the adult learner cannot write the numbers 100 to 1000. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner how to write the numbers 100 to 1000.

SUGGESTED INTERVENTIONS

- Proceed in stages:

  ◊ First guide the adult learners in recognizing numbers, that is, in reading them and associating them with a value. See the interventions suggested in section 3.3 of the "Arithmetic (Reading)" module.

  ◊ Then have them associate a symbol with each number and reproduce it. See the intervention strategies suggested in section 1.3 above.

SUGGESTED INTERVENTIONS *(*cont.*)*

◊ Lastly, guide the adult learners in writing numbers that are dictated to them, without visual support. Vary the dictation, relying as much as possible on meaningful situations. For example:

⇒ Have them write down numerical information: sums of money, quantities, social insurance number, etc.
⇒ Take advantage of everyday situations that require the adult learners to write down numbers they hear: writing a cheque, preparing a budget, carrying out a transaction at an automated teller, etc.
⇒ Combine the dictation of numbers and words. For example:

"There are **365 days** in a **year**."
"I pay **$400** per **month** for my apartment."

● Encourage the adult learners to develop the habit of checking the accuracy of what they have written by reading their notes.

● Use drill-and-practice exercises:

◊ Have the adult learners write numbers dictated to them by other members of the group.
◊ Organize games based on friendly competition in which the speed of execution (writing the dictated number as quickly as possible) and the quality of the writing are the criteria for winning.
◊ Associate the dictation of numbers to the concept of place value. For example, have the learners write the number composed of two groups of 100, four groups of 10 and seven ones.
◊ Ask the learners to write, in numerals, numbers represented in letters.

● Pay particular attention to numbers that cause problems:

◊ Have the adult learners compare numbers composed of the same numerals, for example, 134 and 341, by breaking them down, manipulating objects, etc.
◊ Ensure that the learners are able to distinguish between numbers that sound the same, for example, 108 and 118.
◊ Have the learners do numerous writing exercises for numbers with 0 in the tens digit.
◊ Frequently use numbers that cause problems during dictation.

3.	When writing numbers, does the adult learner:
3.1.	hesitate?

YES:	When the adult learner writes numbers, he or she is uncertain as to their correctness and sometimes makes errors. **It is therefore necessary to verify if the learner made this type of error during his or her childhood or adolescence and determine if he or she already received** remedial help or other assistance:	**NO:**	The adult learner does not have this problem.
● **If so:**	Investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning problem.		
● **If not:**	Propose corrective exercises.		

3.	When writing numbers, does the adult learner:
3.2.	confuse different numbers?

YES:	The adult learner writes numbers, but they are not always the ones expected (for example, 47 for 57). **It is therefore necessary to verify if the learner made this type of error during his or her childhood or adolescence and determine if he or she already received** remedial help or any other assistance:	**NO:**	The adult learner does not have this problem.
● **If so:**	Investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.		
● **If not:**	Propose corrective exercises.		

3.	When writing numbers, does the adult learner:	
3.3.	make inversions?	

YES:	The adult learner writes numbers, but inverts some of them (for example, 13 for 31, 57 for 75). Sometimes the learner also writes numbers backwards: a "3" resembles a "B" without the vertical bar, a "5" in mirror image, a "9" like a "p," etc. **It is therefore necessary to verify if the learner made this type of error during his or her childhood or adolescence and determine if he or she already received** remedial help or any other assistance:	**NO:**	The adult learner does not have this problem.
● **If so:**	Investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.		
● **If not:**	Propose corrective exercises.		

SUGGESTED INTERVENTIONS

- First verify if the adult learner can **read** the numbers without hesitating, or confusing or inverting different numbers. If not, see the interventions suggested in sections 4.1, 4.2 and 4.3 of the "Arithmetic (Reading)" module.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Clearly identify the problem areas:

  ◊ What numbers does the adult learner have difficulty writing:

  ⇒ numbers composed of the same symbols?
  ⇒ numbers with 0 in the tens digit?
  ⇒ numbers composed of symbols confused with other symbols?
  ⇒ numbers that sound similar?

  ◊ In what situations does the adult learner have difficulty writing numbers (in writing and dictation)?

  ◊ Does the adult learner consistently make the same errors when writing numbers?

- Have the learners do numerous exercises with numbers that cause difficulty:

  ◊ Use a number table in which the numbers causing difficulty are missing. Have the adult learner write in the missing numbers, paying careful attention to the numbers preceding and following the missing numbers.

  ◊ Have the learners complete number sequences. For example:

     68, 69, ____, ____, ____, 73
     103, 102, 101, ____, ____, ____, 97

SUGGESTED INTERVENTIONS *(*cont*.)*

- Take advantage of everyday situations to encourage the adult learners to:

  ◊ write numbers, such as sums of money, telephone numbers and addresses
  ◊ assess the plausibility of their answers when writing numbers. For example, the learner writes 18 instead of 108 to indicate that 108 people are attending the training centre; knowing that the number "hundred" is written "100" and that 108 > 100, he or she can re-evaluate the answer

- Systematically address the writing of numbers in intervals of ten: present a sequence to be completed, for example:

  10, 20, 30, ___, ___, ___, 70
  160, 170, ___, ___, ___, 210

- Encourage the adult learner to employ various strategies when having difficulties. For example, have the learner:

  ◊ use the number table to identify numbers that he or she is having problems writing
  ◊ identify the two groups of ten that the number causing difficulty is between, for instance, the number 275 is between 270 and 280
  ◊ break down a number that is difficult to write (the adult learner must have prior knowledge of the principle of addition and the concept of place value); for example:

  $$\text{two hundred and forty-eight} \quad = \quad \begin{array}{r} 200 \\ 40 \\ +\quad 8 \\ \hline 248 \end{array}$$

  ◊ use the counting board to represent numbers that are composed of the same numerals
  ◊ do manipulation exercises, if necessary

SUGGESTED INTERVENTIONS *(*cont.*)*

- Have the adult learner compare and observe numbers that are frequently confused:

  ◊ How are they similar?
  ◊ How do they differ?
  ◊ Where are they located on the number table?
  ◊ What sequence of numbers (or group of 10) does each one belong to?

- Have the adult learner regularly write down numbers that contain one or more of the same numerals (for example, 13, 30, 130, 300), or that contain numerals which resemble each other (for example, 130 and 180, 69 and 99):

  ◊ Have the learner read these numbers.
  ◊ Point out their graphic similarities and differences.
  ◊ Explore how the numbers differ in terms of value, through manipulation or representation on a counting board.
  ◊ Teach the adult learner to write the numbers in the sequence being studied by presenting each of the numbers one at a time in random order.
  ◊ Have the adult learner associate numbers with their written form, that is, their letter form, contingent, of course, on the learner's ability to decode these words.

- When the learner inverts numbers:

  ◊ Show the adult learner that numbers read like words, that is, from left to right, and just as different combinations of letters produce different words, different combinations of numerals will produce different numbers.
  ◊ Verify if the learner is able:

    ⇒ to read from left to right
    ⇒ to identify each digit in a number
    ⇒ to identify the number that is different from among a group of numbers that are composed of the same numerals, for example: 137, 137, 137, 173, 137

SUGGESTED INTERVENTIONS *(*cont.*)*

- Use manipulation activities, a number table and a counting board to provide the adult learner a concrete or illustrated representation of the numbers that he or she is inverting. See the above-mentioned interventions on this topic.

- Encourage the learners to develop the habit of rereading the numbers they write, and assessing if the symbols used and their position are correct.

- Do not dissociate number writing from number reading and the concept of place value, as these are all closely related.

4.	Can the adult learner perform the four basic operations:
4.1.	addition:
4.1.1.	without carryover?

YES:	The adult learner has no difficulty performing addition without carryover.	**NO:**	The adult learner cannot perform addition without carryover. **It is therefore necessary to verify if he or she already learned** how to perform this operation. If the learner makes errors, **it is also necessary to verify if he or she made this type of error during his or her childhood or adolescence and determine if he or she already** received remedial help or any other assistance:
		• **If so:**	investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	proceed to teach the adult learner addition without carryover or propose corrective exercises.

4.	Can the adult learner perform the four basic operations:
4.1.	addition:
4.1.2.	with carryover?

YES: The adult learner has no difficulty performing addition with carryover.	**NO:** The adult learner cannot perform addition with carryover. **It is therefore necessary to verify if he or she already learned** how to perform this operation. If the learner makes errors, **it is also necessary to verify if he or she made this type of error during his or her childhood or adolescence and determine if he or she already received** remedial help or other assistance:
	• **If so:** Investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.
	• **If not:** Proceed to teach the adult learner addition with carryover or propose corrective exercises.

SUGGESTED INTERVENTIONS

Objective: To give the adult learner the means to develop the skills necessary to perform the four basic operations. While problem-solving is not the goal at this stage, and is only addressed in the next point, it cannot be dissociated from the learning of the four basic operations. In fact, it is not uncommon to encounter adult learners who have mastered the techniques of the four basic operations but have great difficulty solving problems.

SUGGESTED INTERVENTIONS *(*cont.*)*

Prior to assessing the techniques related to each of the four basic operations, it is important to fully understand how calculation techniques are developed. *SOS Math* (p. 78) (see bibliography) suggests four steps to developing a calculation technique:

1. problem-solving using concrete material, without symbolization
2. codifying the concrete work, which produces a first written algorithm
3. transforming the symbolic technique into an equivalent codification, taking into account the advantages and disadvantages of symbolism (this step is not always necessary)
4. memorizing calculation tables

Clearly, the learners must understand the concept of an operation to be able to acquire techniques related to the operation. And understanding these concepts necessarily entails problem-solving and manipulation, without using symbols at this stage.

This constitutes the basic premise behind the interventions suggested in sections 7.1, 7.2, 7.3 and 7.4 of the "Arithmetic (Reading)" module, which are designed to foster an understanding of the concepts of addition, subtraction, multiplication and division. It is therefore necessary to ensure that the learners understand these concepts before proceeding to calculation techniques. While this will not prevent adult learners from making mistakes when performing calculations, they will have a better grasp of when and how to use their acquired skills.

Addition (without carryover, with carryover)

- Have the adult learner identify situations in which it would be useful to know how to add. Use the simplest of these situations to begin the intervention.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Gradually increase the difficulty of the objectives:

  ◊ Use one-digit numbers, for example: 4 + 3; then two-digit numbers, for example: 42 + 26; then three-digit numbers, for example: 301 + 463
  ◊ Use numbers containing 1, 2 and 3 digits in the same equation, for example:
    406 + 32   837 + 1   432 + 63 + 4

- Introduce the technique of addition by using sets of objects that can be manipulated, attached or grouped. For example:

  "I have 3 pencils and I add 2 pencils, giving me a set of 5 pencils."

  Represent on paper each of the situations in which objects are manipulated. For example:

  111 + 11 = 11111

  Then symbolically represent the situations illustrated on paper. For example:

  3 + 2 = 5

  Repeat the three preceding steps a few times to help the adult learner understand that the written symbols (digits and signs) represent what he or she did.

- Present simple equations, made up of one-digit numbers. For example:

  3   +   4   =   ___
  5   +   8   =   ___

- At this stage, encourage the adult learner to use quick and effective means to carry out the calculations, for example: their fingers (why not?) or sets of objects represented on paper (11111). You can also supply the learner with addition tables.

SUGGESTED INTERVENTIONS (cont.**)**

- Present the adult learners with equations such as 3 + ___ = 5, to help them clearly understand the meaning of addition. Return to manipulation activities and representation of sets of objects on paper to help them perform this operation.

- Approach addition of two-digit numbers, without carryover, using a counting board and tokens. Ask the adult learner to represent the number 34 on the counting board. He or she should place 4 tokens in the "ones" position and 3 tokens in the "tens" position.

hundreds	tens	ones
	• • •	• • • •

Then ask the learner to represent the number 15 on the same counting board while leaving the tokens that express the number 34 in place. He or she should add 5 tokens to the "ones" position and 1 token to the "tens" position.

| hundreds	tens	ones
	• • • •	• • • • • • • • •

Represent the addition symbolically, as
$$\begin{array}{r} 34 \\ + \ \underline{15} \end{array}$$
, and explain to the learner what he or she did.

Then have the learner count the number of tokens in the "ones" position and the "tens" position. Ask him or her to write the corresponding number, that is, 49.

SUGGESTED INTERVENTIONS (cont.)

- Use the same process later to teach the learner how to add three-digit numbers without carryover.

- Addition with carryover can be approached the same way. In this case, however, the adult learner must exchange 10 "ones" tokens for 1 "tens" token, the carryover, and later, 10 "tens" tokens for 1 "hundreds" token. For example:

$$\begin{array}{r} 36 \\ + \ 27 \\ \hline \end{array}$$

hundreds	tens	ones
	• • • • • •	• • • • • • • • • • • • •
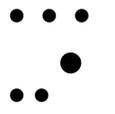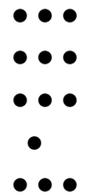
$$\begin{array}{r} 36 \\ + \ 27 \\ \hline \end{array} \quad \text{becomes} \quad \begin{array}{r} 36 \\ + \ 27 \\ \hline 3 \end{array} \quad \text{and} \quad \begin{array}{r} 36 \\ + \ 27 \\ \hline 63 \end{array}$$

- Use the same process later to teach the learner how to add three-digit numbers with carryover.

  N.B.: To fully understand the process, the adult learner must know the base 10 number system, be able to read and write numbers without difficulty, and understand the concept of place value.

During each manipulation session, ask the learners to explain, in their own words, what they are doing with the tokens.

SUGGESTED INTERVENTIONS *(cont.)*

- Once the adult learners understand the principle behind the technique of addition, teach them how to resolve equations without using a counting board. If necessary, use graph paper to show them how to properly arrange the numbers to be added, one box corresponding to the "ones" position, the one beside it to the "tens" position, and so on. For example:

		t	o	
		¹1	5	
	+	3	7	
		5	2	

Regular lined paper can also be used, positioning it so that the lines are vertical. Each space between two lines corresponds to the digit positions "ones," "tens," etc. Ask the adult learners to close their eyes and visualize the lines. Once the technique is acquired, return the paper to its original position. Use a blank sheet to test their learning.

					t	o	
					3	3	
				+	2	2	
					5	5	

SUGGESTED INTERVENTIONS *(*cont.*)*

- Vary the presentation of equations:

  ◊ Present equations vertically and horizontally.
  ◊ Present one-, two- and three-digit numbers in the same equation, vertically and horizontally.

- Relate the teaching of addition, with or without carryover, to everyday situations that can be presented verbally, for instance, calculating a small grocery order.

- At this stage, when adding sums of money, round off the numbers to the closest dollar. The learner can start to calculate cents once he or she has mastered the technique of addition.

- Teach the adult learners to verify the plausibility of their answers by questioning themselves (is the answer plausible given the numbers to be added?), providing proof, performing the inverse operation, or redoing the calculation using the same technique. It may also be useful to teach the learner to estimate the answer before carrying out the calculation, for example, by rounding off the numbers.

- Teach the adult learners to use a calculator only if they fully understand the concept and technique of addition, or if they are having difficulties and require a calculator to master the technique.

  Students may already know a different addition technique. If it is effective, let them continue to use it.

4.	Can the adult learner perform the four basic operations:
4.2.	subtraction:
4.2.1.	without borrowing?

YES: The adult learner has no difficulty performing subtraction without borrowing.

NO: The adult learner cannot perform subtraction without borrowing. **It is therefore necessary to verify if he or she already learned** how to perform this operation. If the learner makes errors, **it is also necessary to verify if the learner made this type of error during his or her childhood or adolescence and determine if he or she already** received remedial help or other assistance:

- **If so:** investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.

- **If not:** proceed to teach the adult learner subtraction without borrowing or propose corrective exercises.

4.	Can the adult learner perform the four basic operations:
4.2.	subtraction:
4.2.2.	with borrowing?

YES:	The adult learner can successfully perform subtraction with borrowing.	**NO:**	The adult learner cannot perform subtraction with borrowing. **It is therefore necessary to verify if he or she already learned** how to perform this type of operation. In case of errors, **it is also necessary to verify if the learner made this type of error** during his or her childhood or adolescence and determine if he or she **already received remedial help or other assistance**:
		● **If so:**	Investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.
		● **If not:**	Proceed to teach the adult learner subtraction with borrowing or propose corrective exercises.

SUGGESTED INTERVENTIONS

Subtraction (with borrowing, without borrowing)

● Have the adult learner identify situations in which it would be useful to know how to subtract. Use the simplest of these situations to begin the intervention.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Gradually increase the difficulty of the objectives:

  ◊ Begin with one-digit numbers, for example: 6 - 2; then two-digit numbers, for example: 47 - 31; then three-digit numbers, for example: 367 – 243.
  ◊ Use numbers containing one, two or three digits in the same equation, for example: 333 - 1, 463 - 21.

- Introduce the technique of subtraction by using sets of objects that can be manipulated, attached or grouped. For example:

  "I have 5 pencils and I remove 2 pencils, leaving me with a set of three pencils."

- Represent on paper each of the situations in which objects are manipulated. For example:

  11111   -   11   =   111

- Then symbolically represent the situations illustrated on paper. For example:

  5   -   2   =   3

- Repeat the three preceding steps a few times to help the adult learner understand that the written symbols (digits and signs) represent what he or she did.

- Present simple equations, made up of one-digit numbers. For example:

  9   -   2   =   ___
  7   -   4   =   ___

- At this stage, encourage the learner to use quick and effective means to carry out the calculations, for example: their fingers (why not?) or sets of objects represented on paper (11111). You can also supply the learner with subtraction tables.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Present the adult learners with equations such as 7 - ___ = 2, to help them clearly understand the meaning of subtraction. Return to manipulation activities and representation of sets of objects on paper to help them perform this operation.

- Approach subtraction of two-digit numbers, without borrowing, using a counting board and tokens. Ask the adult learner to represent the number 25 on the counting board. He or she should place 5 tokens in the "ones" position and 2 tokens in the "tens" position.

hundreds	tens	ones
	• •	• • • • •

Then ask the learner to remove the number 12 from what is represented on the counting board. To do so, the learner needs to know that 12 = 2 "ones" tokens and 1 "tens" token.

There remains:

hundreds	tens	ones
	•	• • •

Represent the subtraction symbolically, as $\begin{array}{r} 25 \\ - \underline{12} \end{array}$, and explain to the learner what he or she did.

Then have the learner count the number of tokens remaining in the "ones" position and the "tens" position. Ask him or her to write the corresponding number.

SUGGESTED INTERVENTIONS *(*cont.*)*

Represent the subtraction once again using symbols:

$$\begin{array}{r} 25 \\ - \ 12 \\ \hline 13 \end{array}$$

- Use the same process later to teach the learner how to subtract three-digit numbers without borrowing.

- Subtraction with borrowing can be approached the same way. In this case, however, the adult learner must exchange 1 "tens" token for 10 "ones" tokens (the borrowing), and later 1 "hundreds" token for 10 "tens" tokens. For example:

$$\begin{array}{r} 31 \\ - \ 17 \end{array}$$

hundreds	tens	ones
	● ● ●	●

A "tens" token becomes 10 "ones" tokens.

hundreds	tens	ones
	● ● ●→	● / ● ● ● ● / ● ● / ● ● ● ●

There are therefore 11 ones and 2 tens.

$$\begin{array}{r} 31 \\ - \ 17 \end{array} \text{ becomes }\quad \begin{array}{r} \overset{2}{\cancel{3}}1 \ (10+1) \\ - \ 17 \end{array} \quad \text{and} \quad \begin{array}{r} \overset{2}{\cancel{3}}1 \ (11) \\ - \ 17 \\ \hline 14 \end{array}$$

SUGGESTED INTERVENTIONS *(*cont.*)*

Use the same process to teach the learner how to subtract three-digit numbers with borrowing.

N.B.:   **To fully understand the process, the adult learner must know the base 10 number system, be able to read and write numbers without difficulty, and understand the concept of place value.**

During each manipulation session, ask the learners to explain, in their own words, what they are doing with the tokens.

- Once the adult learners understand the principle behind the technique of subtraction, teach them to resolve equations without using a counting board. If necessary, use graph paper to show them how to properly arrange the numbers to be subtracted, one box corresponding to the "ones" position, the one beside it to the "tens" position, and so on. For example:

		t	o	
		$^2\!\!\cancel{3}$	5	
	-	1	7	
		1	8	

SUGGESTED INTERVENTIONS *(*cont.*)*

Regular lined paper can also be used, positioning it so that the lines are vertical. Each space between two lines corresponds to the digit positions "ones," "tens," etc. Ask the adult learners to close their eyes and visualize the lines. Once the technique is acquired, return the paper to its original position. Use a blank sheet to test their learning.

					t	o	
					3	3	
				-	2	2	
					1	1	
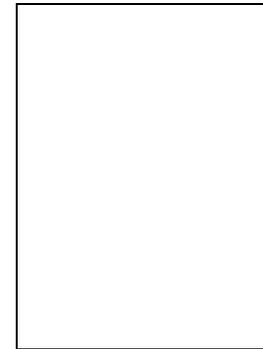
- Vary the presentation of equations:

  ◊ Present equations vertically and horizontally.
  ◊ Present one-, two- and three-digit numbers in the same equation, vertically and horizontally.

- Pay particular attention to subtraction, with borrowing, of numbers containing 0. For example: 200 - 58.

Use a counting board and tokens to help the adult learner understand what happens in such cases: 1 "hundreds" token is exchanged for 10 "tens" tokens and one "tens" token is exchanged for 10 "ones" tokens. Therefore, 1 "hundreds" token and 9 "tens" tokens remain. For example:

$$
\begin{array}{ccc}
& & ^{1} & & ^{19} \\
200 & & 200 & & 200 \\
-\ \underline{58} & \text{becomes} & -\ \underline{58} & \text{and} & \underline{58} \\
& & & & 142
\end{array}
$$

SUGGESTED INTERVENTIONS *(*cont.*)*

- Relate the teaching of subtraction, with or without borrowing, to everyday situations that can be presented verbally, for instance, calculating the remainder after a bill is paid.

- At this stage, when subtracting sums of money, round off the numbers to the closest dollar. The learner can start to calculate cents once he or she has mastered the technique of subtraction.

- Teach the adult learners to verify the plausibility of their answers by questioning themselves (is the answer plausible given the numbers to be subtracted?), providing proof, performing the inverse operation, or redoing the calculation using the same technique. It may also be useful to teach the learner to estimate the answer before carrying out the calculation, for example, by rounding off the numbers.

- Teach the adult learners to use a calculator only if they fully understand the concept and technique of subtraction, or if they are having difficulties and require a calculator to master the technique.

Students may already know a different subtraction technique. If it is effective, let them continue to use it.

Here are a few of the subtraction techniques, drawn from *SOS Math* (p. 79) (see bibliography), that the learners may already be familiar with:

◊ English technique: borrowing a group of ten increases the value of the ones digit and enables the subtraction:

$$
\begin{array}{r}
\scriptstyle 1\ \ 14\ \ 1\\
4253\\
-\ \ 1074\\
\hline
3179
\end{array}
\qquad
\begin{array}{rccccc}
13 & - & 4 & = & 9\\
14 & - & 7 & = & 7\\
1 & - & 0 & = & 1\\
4 & - & 1 & = & 3
\end{array}
$$

SUGGESTED INTERVENTIONS *(*cont.*)*

◊ French technique: the addition of 10 "ones" to the higher number is cancelled out by the addition of 1 "ten" to the lower number:

42^15^13 13   -   4   =   9

-    1^10^174 15   -   7   -   1   =   7

3 1 7 9   2   -   0   -   1   =   1

                        4   -   1   =   3

◊ dash technique: proceeding from left to right, the dash indicates that a "ten" has been borrowed, which is taken into account when rewriting the result.

4253   4   -   1   =   3

-    1074   2   -   0   =   2

3289   15   -   7   =   8

- -   (dash under the 2 allowing
                        for the addition of one "ten")

                        13   -   4   =   9
                        (dash under the 8 allowing for the
                        addition of one "ten")

              and

                        2   -   1   =   1
                        8   -   1   =   7

3179

4.	Can the adult learner perform the four basic operations:
4.3.	multiplication:
4.3.1.	with single-digit multipliers and multiplicands?

YES:	The adult learner has no difficulty performing multiplication with single-digit multipliers and multiplicands.	**NO:**	The adult learner cannot perform single-digit multiplication. **It is therefore necessary to verify if he or she already learned** how to perform this operation. If the learner makes errors, **it is also necessary to verify if he or she made this type of error during his or her childhood or adolescence and determine if he or she already received** remedial help or other assistance:
		• **If so:**	investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	proceed to teach the adult learner multiplication with single-digit multipliers and multiplicands or propose corrective exercises.

4.	Can the adult learner perform the four basic operations:
4.3.	multiplication:
4.3.2.	with multi-digit multipliers and multiplicands?

YES:	The adult learner has no difficulty performing multiplication with multi-digit multipliers and multiplicands. For example: 37 x 29, 108 x 43, 567 x 247.	**NO:**	The adult learner cannot perform multi-digit multiplication. **It is therefore necessary to verify if he or she already learned** how to perform this operation. If the learner makes errors, **it is also necessary to verify if he or she made this type of error during his or her childhood or adolescence and determine if he or she already received** remedial help or other assistance:
		● **If so:**	Investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.
		● **If not:**	Proceed to teach the adult learner multiplication with multi-digit multipliers and multiplicands or propose corrective exercises.

SUGGESTED INTERVENTIONS

Multiplication

● Have the adult learner identify situations in which it would be useful to know how to multiply. Use the simplest of these situations to begin the intervention.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Gradually increase the difficulty of the objectives:

  ◊ single-digit multiplication
  ◊ multi-digit multiplication

- If necessary, review the concept of multiplication, presenting the adult learner with situations in which the same quantity must be added several times, or a "floor" is constructed using a given number of "tiles." See the interventions suggested in section 7.3 of the "Arithmetic (Reading)" module.

- Introduce the technique of multiplication by using sets of objects that can be manipulated, attached or grouped. For example:

  "If 3 students have 2 books each, there is a total of 6 books."

- Represent on paper each of the situations in which objects are manipulated. For example:

  11   +   11   +   11   =   111111

- Then symbolically represent the situations illustrated on paper. For example:

  2   +   2   +   2   =   6
           3   x   2   =   6

- Repeat the three preceding steps a few times to help the adult learner understand that the written symbols (digits and signs) represent what he or she did.

SUGGESTED INTERVENTIONS *(*cont.*)*

- To help the adult learners fully integrate the concept of multiplication, have them transform repeated additions into multiplications, and vice versa, pointing out to them that the result obtained is the same in both cases:

$$2 \quad + \quad 2 \quad + \quad 2 \quad = \quad 6$$
$$3 \quad \text{x} \quad 2 \quad = \quad 6$$

Tell the learners that this technique applies to the multiplication of whole numbers and that a different technique is employed for the multiplication of fractions.

- At this stage, encourage the adult learner to use quick and effective means to carry out the calculations, for example: their fingers (why not?) or sets of objects represented on paper. For instance:

$$(1\ 1 \quad 1\ 1 \quad 1\ 1)$$

- Present the adult learners with equations such as 3 x ___ = 6, to help them clearly understand the meaning of multiplication. Return to manipulation activities and representation of sets of objects on paper to help them perform this operation.

- Teach the adult learner to use multiplication tables. Memorization of these tables will come later.

- Along with the adult learner, put together multiplication tables.

- Only introduce multi-digit multiplication once single-digit multiplication has been acquired. Gradually increase the difficulty of the objectives here as well:

  ◊ multiplication of a multi-digit multiplicand with a single-digit multiplier, for example:
    23 x 3
  ◊ multiplication of a multi-digit multiplicand with a multi-digit multiplier, for example:
   23 x 12

SUGGESTED INTERVENTIONS *(*cont.*)*

- The following activity from *SOS Math* (p. 99) (see bibliography) can be used to help the adult learner visualize the technique of multi-digit multiplication.

  Present the learner with the following figures, drawn in three different colours (one colour for squares, one colour for triangles and one colour for digits):

  △   △   △

       ☐   ☐
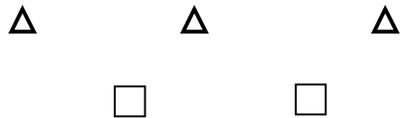
  The three triangles represent three shirts, while the two squares represent two pairs of pants. Ask the learner to find all of the possible ways of dressing using these clothing items.

  Guide the learner in finding the six possible combinations, by associating each "pair of pants" with each of the three "shirts."

  △   △   △

       ☐   ☐
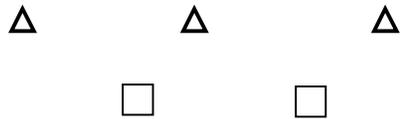
  Numbers can then be added to the representation to demonstrate that the same principle applies to multi-digit multiplication.
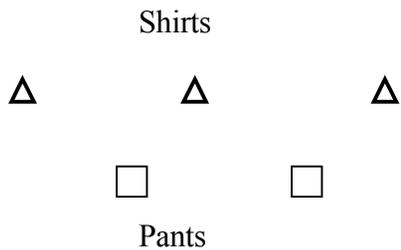
                    Shirts

  △   △   △

       ☐   ☐

                    Pants

SUGGESTED INTERVENTIONS *(cont.)*

- Once the adult learners understand the principle behind the technique of multi-digit multiplication, teach them how to resolve equations. If necessary, use graph paper to show them how to properly arrange the numbers in the calculation, one box corresponding to the "ones" position, the box beside it to the "tens" position, and so on. For example:

h	t	o
	3	5
x	1	4
1	4	0
+ 3	5	
4	9	0

- If the alignment of numbers based on their place value causes difficulty, begin by having the adult break down the numbers and the operation. For example:

14 = 10 + 4   therefore 35 x 14 = (35 x 4) + (35 x 10)

35 x 4 = 140
              +
35 x 10 = $\frac{350}{490}$

- Vary the presentation of equations:

  ◊ Present equations vertically and horizontally.
  ◊ Present one-, two- and three-digit numbers in the same equation.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Pay particular attention to the multiplication of numbers with one or more zeros.

- Help the learners develop a "work method" for multiplying. For example, have them:

  ◊ write down the carryovers for each number multiplied
  ◊ cross out each digit in the multiplier once it has been used
  ◊ write all of the results of the different steps in a multi-digit multiplication, including the zeros

- Relate the teaching of multiplication with single- or multi-digit multipliers and multiplicands to everyday situations that can be presented verbally, for instance, calculating one's daily salary based on an hourly rate, or an annual salary based on weekly paycheques.

- At this stage, when multiplying sums of money, round off the numbers to the closest dollar. The learner can start to calculate cents once he or she has mastered the technique of multiplication.

- Teach the adult learners to verify the plausibility of their answers by questioning themselves (is the answer plausible given the numbers to be multiplied?), providing proof, performing the inverse operation, or redoing the calculation using the same technique. It may also be useful to teach the learner to estimate the answer before carrying out the calculation, for example, by rounding off the numbers.

- Teach the adult learners to use a calculator only if they have understand the concept and technique of multiplication, or if they are having difficulties and require a calculator to master the technique.

  Students may already know a different multiplication technique. If it is effective, let them continue to use it.

4.	Can the adult learner perform the four basic operations:
4.4.	division:
4.4.1.	with single-digit dividends and divisors?

YES: The adult learner has no difficulty performing division with single-digit dividends and divisors.

NO: The adult cannot perform single-digit division. **It is therefore necessary to verify if he or she already learned** how to perform this operation. If the learner makes errors, **it is also necessary to verify if he or she made this type of error during his or her childhood or adolescence and determine if he or she already received** remedial help or other assistance:

- **If so:** Investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.

- **If not:** Proceed to teach the adult learner single-digit division or propose corrective exercises.

4.	Can the adult learner perform the four basic operations:
4.4.	division:
4.4.2.	with multi-digit dividends and divisors?

YES:	The adult learner has no difficulty performing division with multi-digit dividends and divisors. For example: $42 \div 21$, $132 \div 22$.	**NO:**	The adult learner cannot perform multi-digit division. **It is therefore necessary to verify if he or she already learned** how to perform this operation. If the learner makes errors, **it is also necessary to verify if he or she made this type of error during his or her childhood or adolescence and determine if he or she already received** remedial help or any other assistance:
		• **If so:**	Investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner multi-digit division or suggest corrective exercises.

SUGGESTED INTERVENTIONS

Division

- Identify with the adult learner situations in which it would be useful to know how to divide. Use the simplest of these situations to begin the intervention.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Gradually increase the difficulty of the objectives:

  ◊ single-digit division
  ◊ multi-digit division

- If necessary, review the concept of division, presenting the adult learner with situations where a quantity of objects must be separated into equal parts. See the interventions suggested in section 7.4 of the "Arithmetic (Reading)" module.

  Ensure that the learner masters the three other basic operations which are prerequisites to division.

- Introduce the technique of division by using sets of objects that can be manipulated, attached or grouped. For example:

  "I have 6 books that must be equally distributed among 3 students. Each student will therefore receive 2 books."

- Represent on paper each of the situations in which objects are manipulated. For example:

  11   11   11

- Then symbolically represent the situations illustrated on paper. For example:

  6   ÷   3   =   2

- Repeat the three preceding steps a few times to help the adult learner understand that the written symbols (digits and signs) represent what he or she did.

SUGGESTED INTERVENTIONS *(*cont.*)*

- To help the adult learners fully integrate the concept of division, have them transform multiplications into division. Point out to them that multiplication is the inverse of division and vice versa. For example:
  3   x   2   =   6   →   6   ÷   3   =   2   or   6   ÷   2   =   3

- Teach the adult learner to use multiplication tables to perform division. Memorization of these tables will come later.

- Present simple equations in which the divisor is less than 10 and the dividend appears in the multiplication tables. For example:

  56   ÷   7   =   ___
  45   ÷   5   =   ___

- Present the learners with equations such as 32 ÷ ___ = 8, to help them fully understand the meaning of division. Return to manipulation activities and representation of sets of objects on paper to help them carry out this operation.

- Only introduce multi-digit division once single-digit division has been acquired. Gradually increase the difficulty of the objectives here as well:

  ◊   division of a multi-digit dividend by a single-digit divisor, for example: 36 ÷ 3
  ◊   division of a multi-digit dividend by a multi-digit divisor, for example: 96 ÷ 12

SUGGESTED INTERVENTIONS *(*cont.*)*

- Once the adult learners understand the principle behind the technique of single- and multi-digit division, teach them to solve problems:

  ◊ Use graph paper to enable them to properly arrange the numbers in the calculation, such as the numbers to "bring down" or "carry", subtract, etc. For example:

1	2	4		2	
1	2			6	2
	0	4			
	-	4			
		0			

  ◊ Serve as a role model, carrying out operations in the learner's presence and explaining the process.
  ◊ Pay particular attention to the estimation stage necessary to division. Explain to the learner the inevitable process of trial and error when dividing large numbers.
  ◊ Provide the learners with guide posts to verify the accuracy of their estimates. For example, if the remainder, at the various stages of division, is greater than the divisor, then the estimation is incorrect and must therefore be revised upward.
  ◊ Ask the learners to describe orally the various stages of the operation they are carrying out on paper. This will make it easier for them to identify areas of difficulty.
  ◊ Teach the adult learners to verify the plausibility of their answers by questioning themselves (is the answer plausible given the numbers to be divided?), providing proof, performing the inverse operation, or redoing the calculation using the same technique. It may also be useful to teach the learner to estimate the answer before carrying out the calculation, for example, by rounding off the numbers.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Pay particular attention to division involving numbers with one or more zeros.

- Relate the teaching of division to everyday situations that can be presented verbally, for instance, calculating monthly electricity costs on the basis of the annual total.

- At this stage, when dividing sums of money, round off the numbers to the closest dollar. The learner can start to calculate cents once he or she has mastered the technique of division.

- Teach the adult learners to use a calculator only if they fully understand the concept and technique of division, or if they are having difficulties and require a calculator to master the technique.

- Students may already know a different division technique. If it is effective, let them continue to use it.

  Here are a few of the division techniques presented in *SOS Math* (p. 80-81) (see bibliography), that the learners may already be familiar with:

  ◊ French technique:

$$
\begin{array}{r|l}
1904 & 56 \\
-\ 168 & 34 \\
\hline
0224 & \\
-\ \ 224 & \\
\hline
000 & \\
\end{array}
$$

  ◊ English technique:

$$
\begin{array}{r}
34 \\
56\ \overline{)\ 1904} \\
-\ \ 168 \\
\hline
0224 \\
-\ \ 224 \\
\hline
000 \\
\end{array}
$$

SUGGESTED INTERVENTIONS *(*cont.*)*

Another method of division, division by **simplification,** can also be proposed to the adult learner:

$$\frac{1904}{56}$$

1904 ÷ 56 becomes
  952 ÷ 28 (simplification by 2)
  476 ÷ 14 (simplification by 2) and
  238 ÷ 7 (simplification by 2)

At this stage, the learner can proceed to carry out the division with the numbers 238 and 7, or continue the simplification. The numbers obtained through simplification are smaller and therefore easier to divide.

5.	Can the adult learner solve mathematical problems related to everyday activities?

YES: The adult learner can read a problem, determine the important elements to work out the solution and use basic operations to solve the problem.

NO: The adult learner cannot solve problems involving mathematical reasoning. First ensure that his or her reading level is sufficient to understand the words and that he or she knows the mathematical operations required to solve the problems. Very often, the learner is able to read the problem, and knows the mechanics of the basic operations, but cannot extract the information in the problem required to solve it. He or she does not seem able to logically link the elements to find the answer. **It is therefore necessary to verify if the learner already learned** how to solve problems involving mathematical reasoning. If the learner makes errors, **it is also necessary to verify if he or she made this type of error during his or her childhood or adolescence and determine if he or she already received** remedial help or other assistance:

- **If so:** Investigate and try to determine if the intervention was effective. Based on your findings, you may **suspect** a learning difficulty.

- **If not:** Proceed to teach the adult learner how to solve problems involving mathematical reasoning.

SUGGESTED INTERVENTIONS

- Present problems that are simple to solve at the same time that the student is learning the concepts and techniques of the four basic operations. The learner must clearly understand the situations in which each operation is applicable.

- On a regular basis, orally present various problems to be solved. Ask the learner to determine which operation should be used, without necessarily carrying out the calculation.

- Relate problem-solving activities to themes addressed in workshops and to everyday situations.

- Gradually increase the difficulty of the objectives:

  ◊ problems that require a single operation and that can be concretely represented
  ◊ problems requiring several operations

- If the adult learner is experiencing reading difficulties:

  ◊ present problems orally
  ◊ present problems orally or on a cassette, with visual support, that is, with the written text in front of the learner
  ◊ present problems accompanied by illustrations

- Serve as a role model. Solve problems in the learner's presence and express out loud the internal dialogue that goes on when one is attempting to find a solution to a problem.

- Promote group work and the pooling of the various strategies that can be used to solve problems.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Present activities such as manipulation, classification, association and sequencing to help the learner develop logical reasoning. For example:

  "What rule was used in the following number sequence: 5 - 10 - 7 - 12, etc.?"

- Help the learners understand concepts such as increase, decrease, profit, loss, reduction, savings, expense, etc.

- Focus on the reasoning involved in solving problems:

  ◊ selecting relevant information
  ◊ choosing the operations to be carried out
  ◊ concentrating on the order in which the operations must be carried out, rather than on the calculations themselves

- Have the learners do various exercises to help them:

  ◊ organize themselves to solve a problem:

    ⇒ underline, circle or colour in the important elements in a problem: key words (total, remainder, etc.), numbers, final question
    ⇒ identify and eliminate elements in the problem that are not important
    ⇒ reformulate what is being asked in the problem

SUGGESTED INTERVENTIONS *(*cont.*)*

◊ acquire a work method for solving problems:

⇒ present the learners with a description of the steps involved in problem-solving; ask them   to choose the operation necessary at each step and to carry out the corresponding calculations

⇒ describe each of the steps involved in the resolution of a problem, in random order; ask the learners to organize the steps in correct order

⇒ have them write or state the steps involved in solving problems, or use the "solution-calculation" formula, for example:

<u>Solution</u>	<u>Calculation</u>
price of 2 kg of meat at $4.59 per kg	2 x $4.59 = $9.18
price of 2 litres of milk at $0.95 per litre	2 x $0.95 = $1.90
total of purchases	$9.18 + $1.90 = $11.08

- Use games and puzzles to help the learners develop the ability to make connections, make deductions and draw conclusions. *Reading, Writing, and Rummy* (see bibliography) suggests some useful activities.

- Use problems proposed by the adult learners and, where possible, use authentic material such as bills, restaurant menus and pay slips.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Present an equation, for example: 55 x 3 = 165. Ask the adult learner to think of a problem that corresponds to this equation.

  The following is a four-step method for solving problems:

  ◊ identify the data
  ◊ choose the operation
  ◊ carry out the calculations
  ◊ find the answer

  A range of activities or exercises may be presented to the learner for each of these steps. The instructor must therefore determine the step or steps that are causing the learner problems and guide the learner in acquiring the skills required for each step. Here are a few ways to do so:

  Identify the data

- Present problems that contain superfluous data and ask the adult learner to identify it.

- Present activities that involve searching for data: supply numerical data and ask questions about it. At this point, the learner does not have to carry out any calculations.

- Teach the adult learner:

  ◊ to reformulate a problem in a simpler way
  ◊ to separate the various statements in a problem
  ◊ to process the data:
    ⇒ arrange the data in a table
    ⇒ arrange the data in an ordered list
    ⇒ round off the numbers, etc.

SUGGESTED INTERVENTIONS (cont.*)*

Choose the operation

- Encourage the adult learner to use manipulation and illustration to represent the problem in a more concrete way.

- Show the learner that the problem can be solved by trial and error, by formulating hypotheses and then testing them.

- Present problems that require several operations. Guide the adult learner in formulating a question that corresponds to each operation.

- Using the same problem, ask several questions so that the adult learner can observe the various elements and choose the data and operation relevant to each question.

- Teach the learner to draw up a plan of the different steps entailed in the resolution of a problem.

Carry out the calculations

- Emphasize the need to use great care when recopying the data in a problem. Point out to the learner that an error in copying will definitely lead to an incorrect answer.

- Teach the adult learners:

  ◊ to carry out calculations based on their personal plan developed in the previous step
  ◊ to use mathematical language to describe their solution to a problem
  ◊ to use a calculator

SUGGESTED INTERVENTIONS *(*cont.*)*

Find the answer

- Teach the adult learners to estimate the result of an operation and come up with an approximate answer, for example, by rounding off numbers. This will enable them to assess the plausibility of an answer.

- Present a series of answers of different magnitudes to a given question. Ask the learner to identify the most plausible answer, not by means of calculation, but on the basis of the data provided in the problem.

- Pay particular attention to the written representation of the answer. For example, the total cost must be expressed in dollars, age in years, and time in minutes, hours or days.

- Promote self-verification and self-correction by encouraging the learners to develop the habit of rereading the question and verifying if it corresponds to their answer.

6.	Can the adult learner perform mental calculations?

YES:	The adult learner can perform mental calculations involving the basic operations, that is, calculate in his or her head, without the use of pencil and paper.	**NO:**	The adult learner cannot perform mental calculations involving the basic operations. The effort seems to be laborious or even impossible. **It is therefore necessary to verify if he or she already learned** how to perform mental calculations. If the learner makes errors, **it is also necessary to determine if he or she made this type of error during his or her childhood or adolescence and if he or she already received** remedial help or other assistance:
		• **If so:**	Investigate and try to determine if the intervention was effective. Based on your findings, you may suspect a learning difficulty.
		• **If not:**	Proceed to teach the adult learner how to perform mental calculations.

SUGGESTED INTERVENTIONS

- Identify with the adult learners situations in which it would be useful to know how to perform mental calculations, for example, verifying if they have enough money to pay for the articles in their shopping cart before arriving at the cash.

- Call on the learners to use this skill in class through brief daily exercises, during which they have to perform mental calculations to solve problems. Use exercises that relate to everyday situations.

- Promote estimation over exact calculation when performing mental calculations.

SUGGESTED INTERVENTIONS (cont.*)*

- Within the group, promote the pooling of strategies that can be used to perform mental calculations.

- Teach the adult learners to use various strategies, such as:

  ◊ rounding off numbers to make mental calculation easier, and arriving at an approximation. For example:
    57 + 44 becomes 60 + 40 = 100
  ◊ rounding off one number in the equation to the closest ten and modifying the answer based on what was added or taken away. For example:
    9 + 7 = ?
    Add 1 to 9; it becomes 10.
    10 + 7 = 17
    Take away 1 from 17; it becomes 16, therefore 9 + 7 = 16.
  ◊ rounding off one number in the equation to the closest ten and modifying the other number based on what was added or taken away. For example:
    32 + 53 = 50 + 35 = 85
    3 was taken away from 53 and 3 was added to 32
  ◊ proceeding by repeated addition, when the numbers being multiplied are too large, for example:
    35 x 12 = (35 x 6) + (35 x 6)
    210   +   210   = 420
  ◊ multiplying numbers by 10 and 100, by adding one or 2 zeros; with sums of money, moving the decimal one or two positions to the right
  ◊ dividing numbers by 10 or 100 by removing one or two zeros, if possible, or by moving the decimal one or two positions to the left

- Teach the adult learner to round off to the closest one, ten or hundred before carrying out the operation. Use sums of money to develop this skill. For example: $1.99 becomes $2.00; $159 becomes $160; $2375 becomes $2400.

- Link the skill of rounding off numbers and estimating the results of equations to the resolution of problems. Regularly ask the adult learners if the answer obtained through calculation corresponds to their prior estimation.

7.	Does the adult learner know:
7.1.	the addition tables?

YES: The adult learner knows the addition tables.	**NO:** The adult learner does not know the addition tables. **It is therefore necessary to verify if he or she already learned** the tables:
	• **If so:** Investigate and try to determine why the adult learner does not know the tables. Based on your findings, you may **suspect** a learning difficulty.
	• **If not:** Proceed to teach the adult learner the addition tables.

SUGGESTED INTERVENTIONS

Addition

- Supply the adult learner with addition tables that are clear, well spaced out and easy to read.

- Use different types of tables:

  ◊ additions based on a specific number, such as:
  5 + 1 = 6
  5 + 2 = 7
  5 + 3 = 8
  ◊ additions of numbers that produce the same answer, such as:
  1 + 9 = **10**
  2 + 8 = **10**
  3 + 7 = **10**

SUGGESTED INTERVENTIONS (cont.*)*

- Have the learners complete addition tables.

- Post addition tables in class. You may want to use tables prepared on large pieces of cardboard by the learners themselves.

- Work on the tables one at a time with the learners, for example, one per week. Remove the table from the wall once the work is complete, to encourage the learners to memorize and perform mental calculations.

- Have the adult learners play or do various games or exercises in which they must perform mental calculations. For example: team "battles," question and answer games, flash cards.

- To help the students learn the addition tables, present them, in writing, with a series of additions with numbers below 10. The object is to obtain the greatest possible number of correct answers within a set timeframe. Repeat this exercise from time to time over the learning period. Following each exercise, write the number of correct answers on a simple graph so that the learners can see their progress.

- Guide the adult learners in acquiring various mental calculation strategies that will help them learn the tables:

  ◊ Make sure they clearly understand the "reversible" character of addition. It may be easier to mentally calculate when the equation begins with the larger number. For example:
  $5 + 8 = 8 + 5$

  ◊ Use the addition of two identical numbers, such as $6 + 6$ and $7 + 7$, which are generally easier to memorize and can help in the learning of other strategies. For example:
  "I know that $7 + 7 = 14$ and that 8 is 1 more than 7.
  Therefore, $8 + 7 = 1$ more than 14, therefore 15."

SUGGESTED INTERVENTIONS *(*cont.*)*

- Present exercises:

  ◊ in which the learner must find equivalents. For example:
    $7 + 2 = 3 + \underline{\quad}$
  ◊ such as $7 + \underline{\quad} = 11$ (For this type of equation, use tokens and ask the learner: "What must be added to 7 tokens to obtain 11?")

  Gradually guide the learner in resolving this type of equation mentally, without having to use tokens.

| 7. | Does the adult learner know: |
| 7.2. | the subtraction tables? |

YES:	The adult learner knows the subtraction tables.	**NO:**	The adult learner does not know the subtraction tables. **It is therefore necessary to verify if he or she already learned** the tables:
		• **If so:**	Investigate and try to determine why the adult learner does not know the tables. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner the subtraction tables.

SUGGESTED INTERVENTIONS

Subtraction

- Supply the adult learner with subtraction tables that are clear, well spaced out and easy to read.

- Use different types of tables:

  ◊ subtractions based on a specific number, such as:
     10 - 1 = 9
     10 - 2 = 8
     10 - 3 = 7
  ◊ subtractions of numbers that produce the same answer, such as:
     11 - 4 = **7**
     12 - 5 = **7**
     13 - 6 = **7**

- Have the learners complete subtraction tables.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Post subtraction tables in class. You may want to use tables prepared on large pieces of cardboard by the learners themselves.

- Work on the tables one at a time with the learners, for example, one per week. Remove the table from the wall once the work is complete, to encourage the learners to memorize and perform mental calculations.

  N.B.: Addition tables can also be used for the learning of subtraction tables, given that addition and subtraction are inverse operations.

- Have the adult learners play or do numerous games or exercises in which they must perform mental calculations. For example: team "battles," question and answer games, flash cards.

- To help the students learn the subtraction tables, present them, in writing, with a series of subtractions (those studied). The object is to obtain the greatest possible number of correct answers within a set timeframe. Repeat this exercise from time to time over the learning period. Following each exercise, write the number of correct answers on a simple graph so that the learners can see their progress.

- Guide the adult learners in acquiring various mental calculation strategies that will help them learn the tables:

  ◊ Point out that addition and subtraction are inverse operations. For each addition, have the learners find the corresponding subtraction. For example:
     $9 + 7 = 16 \rightarrow 16 - 7 = 9$
  ◊ Teach the learners to verify the accuracy of their answers by carrying out the inverse operation.

- Present exercises:

  ◊ in which the learner must find equivalents. For example:
     $6 - 3 = 5 -$ ___
  ◊ such as $7 -$ ___ $= 4$ (For this type of equation, use tokens and ask the learner: "What must be subtracted from 7 tokens to obtain 4?")

  Gradually guide the learner in resolving this type of equation mentally, without having to use tokens.

7.	Does the adult learner know:		
7.3.	the multiplication tables?		

YES:	The adult learner knows the multiplication tables.	**NO:**	The adult learner does not know the multiplication tables. **It is therefore necessary to verify if he or she already learned** the tables:
		• **If so:**	Investigate and try to determine why the adult learner does not know the tables. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner the multiplication tables.

SUGGESTED INTERVENTIONS

Multiplication

- Supply the adult learner with multiplication tables that are clear, well spaced out and easy to read.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Use different types of tables:

  ◊ multiplications based on a specific number, such as:
  2 x 1 = 2
  2 x 2 = 4
  2 x 3 = 6
  ◊ in the form of a table:

x	0	1	2	3	
0	0	0	0	0	
1	0	1	2	3	
2	0	2	4	6	
3	0	3	6	9	
4	0	4	8	12	

- Have the learners complete multiplication tables.

- Post multiplication tables in class. You may want to use tables prepared on large pieces of cardboard by the learners themselves.

- Work on the tables one at a time with the learners, for example, one per week. Remove the table from the wall once the work is complete, to encourage the learners to memorize and perform mental calculation.

- Have the adult learners play or do numerous games and exercises in which they must perform mental calculations. For example: team "battles," question and answer games, flash cards.

SUGGESTED INTERVENTIONS (cont.**)**

- To help the students learn the multiplication tables, present them, in writing, with a series of multiplication exercises in which the multiplicand and the multiplier are ≤12. The object is to obtain the greatest possible number of correct answers within a set timeframe. Repeat this exercise from time to time over the learning period. Following each exercise, write the number of correct answers on a simple graph so that the learners can see their progress.

- Guide the adult learners in acquiring various mental calculation strategies that will help them learn the tables:

  ◊ Transform the multiplication into repeated addition. For example:
    $2 \times 9 = 9 + 9$
  ◊ Use the reversibility of multiplication. For example:
    $4 \times 9 = 9 \times 4$
  ◊ Use the following "trick" to help the learners memorize the 9 table: replace 9 by 10, multiply the multiplier by 10 and subtract the multiplier from the product. For example:
    $9 \times 3 = (10 \times 3) - 3 = 27$
    $9 \times 4 = (10 \times 4) - 4 = 36$

- Have the learners count out loud by 2s, 5s, 10s, to begin with, and then by 3s, 4s, 6s, etc., beginning at 0. For example:
  0, 2, 4, 6, 8, etc.
  0, 5, 10, 15, 20, etc.

- Draw the learners' attention to multiplication by 0 and by 1.

- Present exercises like 6 x ___ = 18, or exercises in which the learner must find all of the equations that produce 18.

N.B.:   Memorization of the multiplication tables is very important since other concepts, like fractions and percentage, require a mastery of these tables. Therefore, the time and effort spent now on these tables will pay off later on.

7.	Does the adult learner know:
7.4.	the division tables?

YES:	The adult learner knows the division tables.	**NO:**	The adult learner does not know the division tables. **It is therefore necessary to verify if he or she already learned** the tables:
		• **If so:**	Investigate and try to determine why the adult learner does not know the tables. Based on your findings, you may **suspect** a learning difficulty.
		• **If not:**	Proceed to teach the adult learner the division tables.

SUGGESTED INTERVENTIONS

Division

- Supply the adult learner with division tables that are clear, well spaced out and easy to read.

- Use different types of tables:

  ◊ divisions based on a specific divisor, such as:
  $2 \div \mathbf{2} = 1$
  $4 \div \mathbf{2} = 2$
  $6 \div \mathbf{2} = 3$
  ◊ divisions of numbers that produce the same answer, such as:
  $4 \div 2 = \mathbf{2}$
  $6 \div 3 = \mathbf{2}$
  $8 \div 4 = \mathbf{2}$

- Have the learners complete division tables.

SUGGESTED INTERVENTIONS *(*cont.*)*

- Post division tables in class. You may want to use tables prepared on large pieces of cardboard by the learners themselves.

- Work on the tables one at a time with the learners, for example, one per week. Remove the table from the wall once the work is complete, to encourage the learners to memorize and perform mental calculations.

- Have the adult learners play or do numerous games or exercises in which they must perform mental calculations. For example: team "battles," question and answer games, flash cards.

- To help the students learn the division tables, present them, in writing, with a series of divisions like those studied in class. The object is to obtain the greatest possible number of correct answers within a set timeframe. Repeat this exercise from time to time over the learning period. Following each exercise, write the number of correct answers on a simple graph so that the learners can see their progress.

- Teach the learner:

  ◊ to use multiplication tables to find the answers to division
  ◊ to transform multiplications into two divisions. For example:
  $6 \times 8 = 48 \quad \rightarrow \quad 48 \div 8 = 6$
  $48 \div 6 = 8$
  ◊ to resolve equations such as:
  $6 \div \underline{\quad} = 3$

- Pay particular attention to the division of numbers containing 0.

N.B.: **Learning division tables necessarily requires the prior learning of multiplication tables, just as learning subtraction tables requires knowledge of addition tables. For this reason, a good knowledge of addition and multiplication tables should considerably facilitate the learning of subtraction and division tables.**

VII—REMEDIAL FIELD

MODULE: ARITHMETIC (WRITING)

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