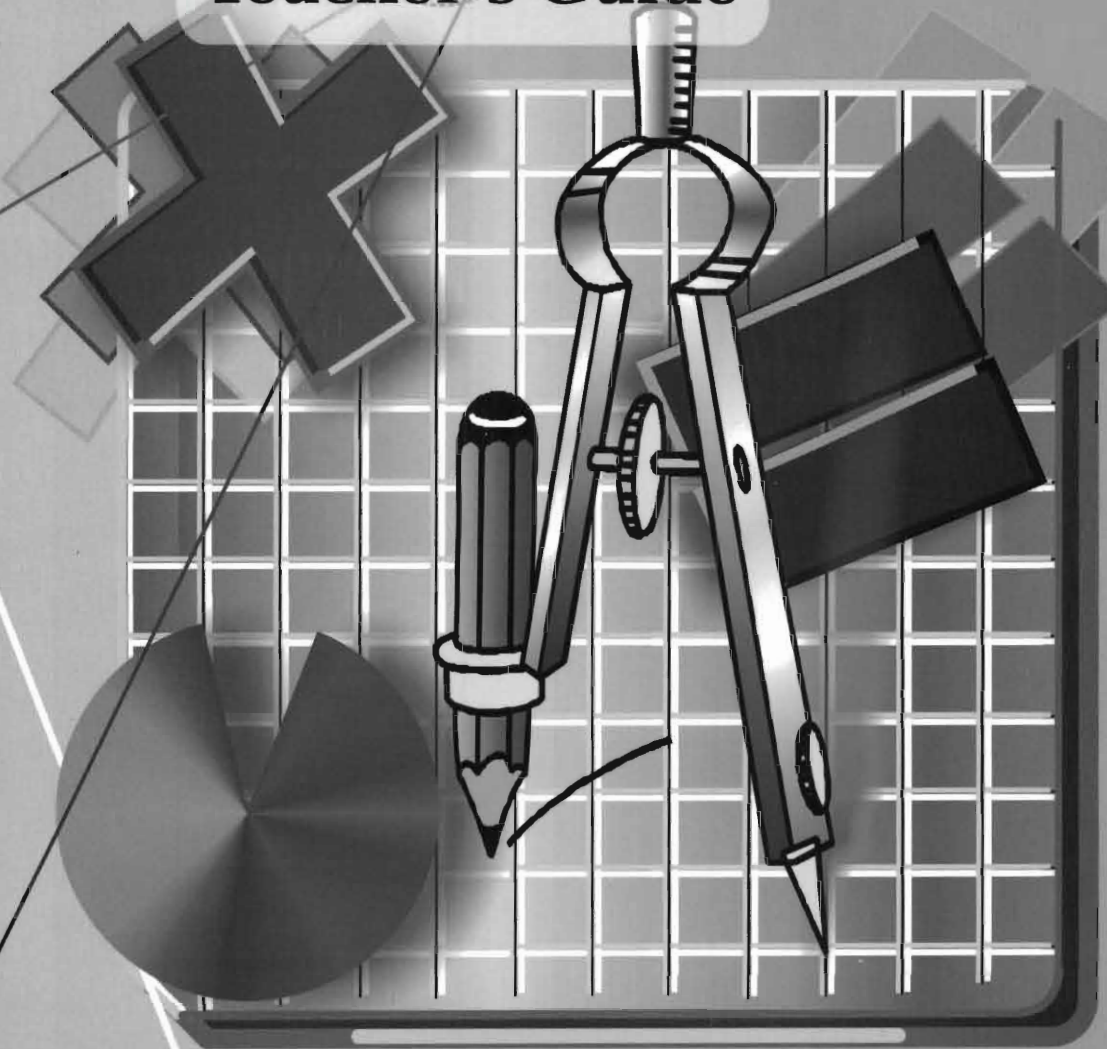


Building **UP** Mathematics

Grade **4** Basic Education

Teacher's Guide



Republic of Lebanon

Ministry of Education and Higher Education

BUILDING UP MATHEMATICS

Teacher's Guide

Basic Education

Grade Four

Center for Educational Research and Development



National
Textbook

New Curricula

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BUILDING UP MATHEMATICS

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... WE BUILD THROUGH EDUCATION

Four years ago, under the leadership of the Minister of National Education, Youth and Sports, the National Center for Educational Research and Development (NCERD) initiated the overall reform of the educational system in Lebanon. Today, NCERD is pleased to present the first collection of textbooks, developed in conformity with the new curricula announced by decree no. 10227, dated the 8th of May, 1997, to all those involved in the education sector.

This collection covers the first year of each of the three basic education cycles, as well as the first year of the secondary cycle. It will be followed, over the next two years, by the textbooks addressed to the remaining two years of each cycle.

The publication of these textbooks follows directly from previous steps undertaken as part of the overall effort to rebuild the educational system. The Plan for Educational Reform, the adoption of a new educational ladder, the new curricula and the new textbooks are all part of a continuous and coherent reform effort. The reform process views the education of the individual learner as a means to develop citizens capable of serving their country and self-confident adults ready to face the challenges of the twenty-first century.

Textbooks play an important role in this ambitious project because they embody the educational and civic objectives of the new curricula. In keeping with the spirit and philosophy of the new curricula, a large number of specialists who had contributed to shaping the new curricula were called upon, from both the private and the public sector, to become members of author committees. The Higher Committee for Planning and the Advisory Committee, which were created by NCERD to oversee the whole reform process, closely monitored the development of the new textbooks. In addition, NCERD sought the assistance of experts from outside Lebanon.

However, we do not claim that the textbook we present to you today is perfect, or that it does not require any revisions whatsoever. Our work is certainly far from complete. After thirty years of stagnation, it was important to act and to do so promptly. We thus considered it appropriate to view this first edition as a starting point and to subject the first collections to the classroom test. A textbook's strengths and weaknesses can really only be identified in the classroom. It is now

up to teachers and students to evaluate these new textbooks. Thanks to their collaboration, we should arrive at concrete proposals for the improvement of subsequent editions.

It should also be pointed out that textbooks have become only one of many available sources for the transfer of knowledge. Indeed, our students are confronted with a constant deluge of information from a variety of media. Consequently, it becomes imperative for students to "learn how to learn" from textbooks, as well as from other sources. This means that we must adopt new work and teaching strategies in order to transform the classroom into an interactive space between a dynamic and enterprising learner and an informed teacher. The teacher's role must lie in assisting the student to acquire knowledge and competencies, to heighten his or her critical sense and to develop teamwork and participatory skills. This is why the educational reform calls for teacher training, the establishment of a structure capable of advising teachers and providing guidance and counseling to students, and the modernization of the exam and evaluation systems to be undertaken alongside the development of new textbooks.

Our attention is now focussed on the next three years. This period will provide an experimental phase, not only for the new textbooks, but also for all the activities that have preceded or accompanied their launch. Thus, the next three years should be viewed as an evaluation phase for the overall educational system of Lebanon.

Finally, I wish to thank sincerely all those who contributed to writing, editing, designing and producing the new textbooks. We hope that our combined efforts to build the future for the children of Lebanon will contribute to the reconstruction of our country.

Beirut, July 22, 1998

President, NCERD
Mounir ABOU-ASSALI

Introduction

The textbook on which this teacher's guide is based, is designed in accordance with the spirit of the new curricula. This new system of education is based on the results of pedagogical research and on the principles of epistemology, as much genetical as mathematical, and requires appropriate methodology based on the action and autonomy of the learner.

- Under this methodology, mathematics is treated through measured action continuous and unlimited. This action uses as its range the actual environment of the child where the utilitarian aspects of mathematics are often manifested. The student thus faces real problems, and has to conjecture, try, and verify solutions, gradually devising approaches that allows him, later on, to construct his own models, and develop his own concepts of paper mathematical models.
- On the other hand, the independence and individuality of the child constitute a major concern directing all the activities and methods of the student textbook (even those of explanations). This concern pervades throughout with a view to developing all the learner's capacities of expression and communication.

In order to attain the objectives of the programs, it is recommended that the users, teachers, and parents observe the following:

- 1) The structural layout of the book and the order of chapters.
- 2) The methodological structure of each chapter (see user's instructions).
- 3) The instructions provided by this teacher's Guide

The authors welcome all critical remarks, inquiries and suggestions. All will be treated with utmost respect and recognition.

The Authors

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PROGRAM OF THE FOURTH YEAR

ARITHMETIC AND ALGEBRA (110 h)

1. NATURAL NUMBERS (15 h)

- 1.1. Numbers greater than 100 000.
- 1.2. Multiples of a whole number.
- 1.3. Characteristics of divisibility by 2, 5 and 10.
- 1.4. Sexagesimal numeration.

2. FRACTIONS (15 h)

- 2.1. Fractions $\frac{a}{b}$ ($a \leq b$).
- 2.2. Comparison of fractions.

3. DECIMALS (10 h)

Decimal numbers.

4. ADDITION (15 h)

- 4.1. Addition of decimals.
- 4.2. Addition of fractions having the same denominator
- 4.3. Addition of duration and time.

5. SUBTRACTION (15 h)

- 5.1. Subtraction of decimals.
- 5.2. Subtraction of fractions having the same denominator.
- 5.3. Subtraction of duration and time.

6. MULTIPLICATION (10 h)

- 6.1. Multiplication of a decimal by a whole number.
- 6.2. Properties: commutativity and associativity.
- 6.3. Distributivity of multiplication with respect to addition and subtraction.

7. DIVISION (30 h)

- 7.1. Computational techniques on whole numbers: divisors with two digits at most, whole number quotient.
- 7.2. Function "divide by n".

GEOMETRY (20 h)

1. LOCALIZATION AND LOCATION (5 h)
 - 1.1. Distance from a point to a line.
 - 1.2. Location of a point on a grid.
2. SOLID BODIES (5 h)

Construction of solids.
3. PLANE FIGURES (5 h)
 - 3.1. Concurrent lines. Parallel lines.
 - 3.2. Classification of quadrilaterals according to their sides.
 - 3.3. Circle. Disk.
4. TRANSFORMATIONS (5 h)

Drawing the symmetric of a figure with respect to an axis.

MEASURE (15 h)

1. LENGTH (6 h)

Metric system of units of length.
2. MASS (3 h)

Metric system of units of mass.
3. SURFACE (3 h)

Comparison of areas.
4. CAPACITY (3 h)

Liter and sub-multiples.

STATISTICS (5 h)

1. HANDLING DATA (5 h)

Collecting and organizing data.