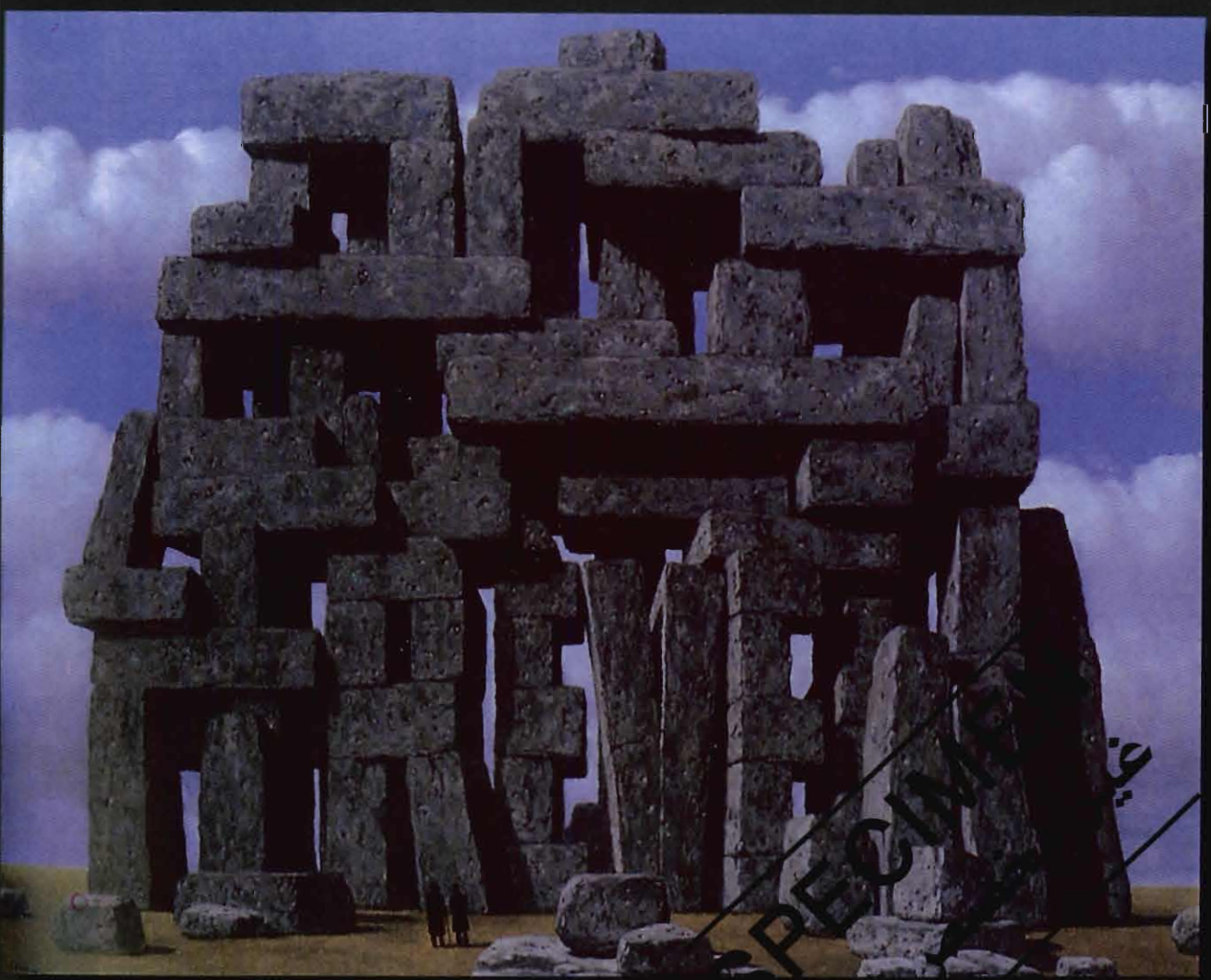
Building up MATHEMATICS

Secondary Education
Third Year
Sociology and Economics Section



SPECIMEN

Center for Educational Research and Development
National Textbook
New Curricula

Republic of Lebanon
Ministry of National Education, Youth and Sports

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General Coordinator
Victor Melhem

Proof Reader
May Abboud

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George M. Eid (Coordinator)
Sami C. Eid
George L. Faysal

Leïla Abi-Saleh Nasr
Raymonde Maalouf
Nazih Moukaddem
Wadad Saad

Center for Educational Research and Development
Educational Company
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The National Textbook Project

By issuing the textbooks for the third year of each educational cycle, the Educational Center for Research and Development will have completed the third and last installment of books called for by the New Curricula. We are placing these books in the hands of students with the great hope that we are moving, step by step, toward the goal of acquiring sound learning, using sophisticated educational means and up-to-date methodology that encourage and reinforce individual thinking and research, acquisition of skills, development of ethical and national attitudes, the feeling of national belonging as well as the feeling of belonging to humanity at large.

The on-going revolution in information, communication and educational-aids technology has undoubtedly limited the role of the textbook and lowered the rank it used so recently to occupy. However, in our society and in many other societies, the textbook remains the basic means of education, and it is our duty to exert our utmost effort and care to come up with the best product as to form and content. Yet we should not lose sight of the fact that the textbook is not sufficient by itself but should rather be used as a stepping stone to access other sources of information. What is important is to keep a clear vision and maintain the right course toward our objective. The means should not turn into the end and the student should always remain the focus of the learning/teaching process.

No one ignores or denies the fact that textbook writing requires very high academic and educational qualifications and very wide field experience. The authors committees undeniably possess such qualities. Yet the textbooks of the last two years contained some negative aspects. Such is the nature of human work, no matter how good the intentions or how great the effort extended. Here constructive criticism constitutes a real contribution to raising the standard of authorship, minimizing errors and filling gaps. We say that, with all due appreciation and respect to all those who have contributed to the success of this project.

The Educational Center for Research and Development is embarking this year on a process of evaluating the New Curricula and related textbooks, teacher training courses and student achievement. This is a natural and necessary step now that the new system has been put into effect. This process aims at identifying the curricular objectives that have been achieved as well as those that have not been achieved, with a view to proceeding with the positive aspects and correcting the negative ones.

As part of this correction process, we plan to review the versions that have been issued in order to secure good textbooks for our students, who always deserve the best.

March 13, 2000

President, Educational Center for Research and Development

Nemer FRAYHA

PREFACE

This textbook, entitled "Building up Mathematics, 3rd Year, Secondary Education, Sociology and Economics Section" is designed to serve the reader as an excellent learning aid and to meet the objectives and requirements of the Reform Plan of Education (RPE) and the New Structure of Education (NSE) set forth by the National Center for Educational Research and Development (NCERD), Hence, we, the authors have done our best to do so by :

- Displaying the involved subject matter in a lucid and lively style that can be read and understood by students through expository simplicity, carefully chosen illustrative examples, brief historical notes, geometrical illustrations as possible, and by highlighting rules, formulas and general procedures.

- Showing as possible, the relevancy of mathematics in real life through appropriate and easy to understand applications from Management, Business, Finance, Economics and Sociology.

- Employing in each chapter the pedagogical technique of building models, and problem solving through a balanced plan of work between the student and the teacher.

In fact, each chapter of the textbook includes the following features :

- Introduction
- Activities
- Text
- Focus
- Exercises and Problems
- Self-Evaluation
- Just for Fun

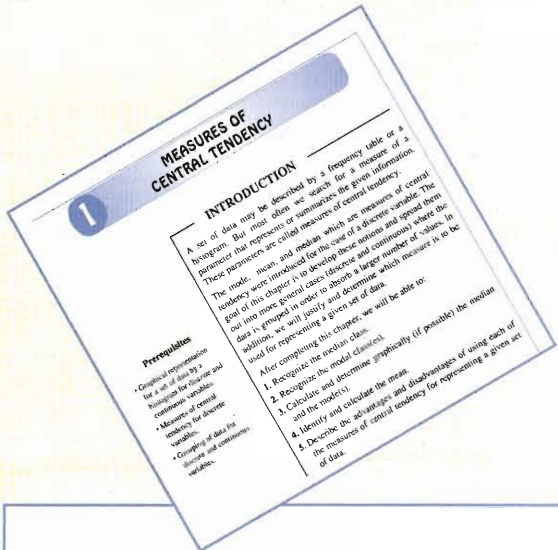
Each of these features are clearely defined in the nest pages of this textbook. We advise each reader to read these pages so as to learn their roles and hence to be able to make good use of the textbook.

Authors

HOW TO USE THIS BOOK

I. INTRODUCTION

This feature presents the general objectives of the chapter, as to its contents and methodology, as well as its specific objectives, and highlights the usefulness of the subject and its areas of applications.

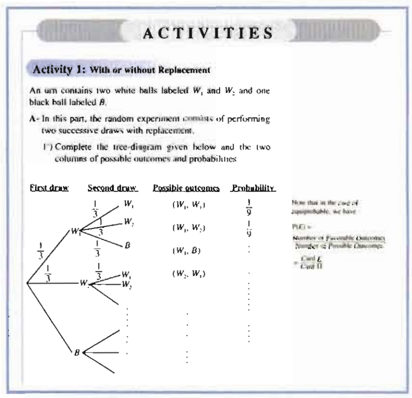


II. ACTIVITIES

This feature may include:

- *Review activities.*
- *Introductory relevant activities.*

These activities reflect, as possible, some real-word situations in social science or economics that students are able to treat using his/her previous knowledge.

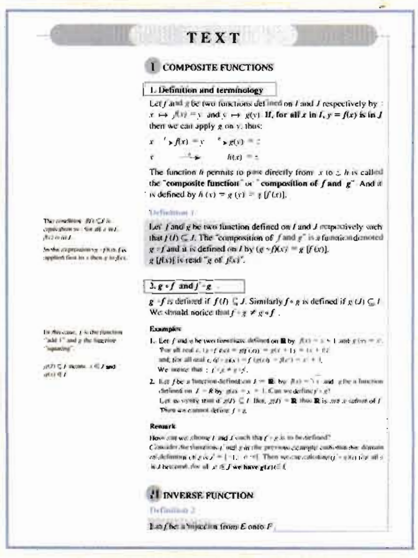


III. TEXT

This feature of the chapter is reserved for the instructor. He/she will perform the synthesis and generalization of the results found by the students in the "Activities" section. Certain properties will be proven, to help students on one part to understand the notion and relate it to other notions, and on the other part, to provide them with a model of demonstration that they will be able to apply in problem solving and validation of results.

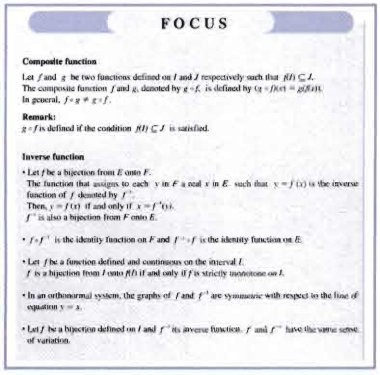
This feature will therfore consist of:

- Definitions and notations.
- Properties and formulas
- Concrete examples that differ from the introductory activities.
- Methodological remarks that may appear either in the text or in the margins.
- A solved exercise, if necessary.
- Historical notes.



IV. FOCUS

In this feature, the essential results of the chapter are listed at the end of each chapter. It shall be used as a summary for the chapter. Sometimes, this feature may also include an illustration of how to apply a scientific calculator to the some of the problems


FOCUS

Composite function

Let f and g be two functions defined on I and J respectively such that $f(I) \subseteq J$.
The composite function f and g, denoted by $g \circ f$, is defined by $(g \circ f)(x) = g(f(x))$.
In general, $f \circ g \neq g \circ f$.

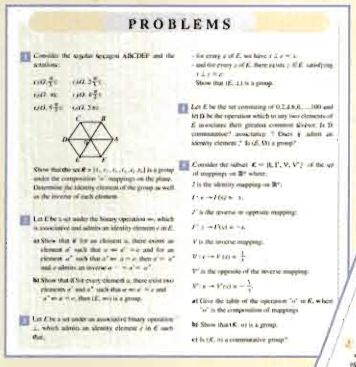
Remark:
$g \circ f$ is defined if the condition $f(I) \subseteq J$ is satisfied.

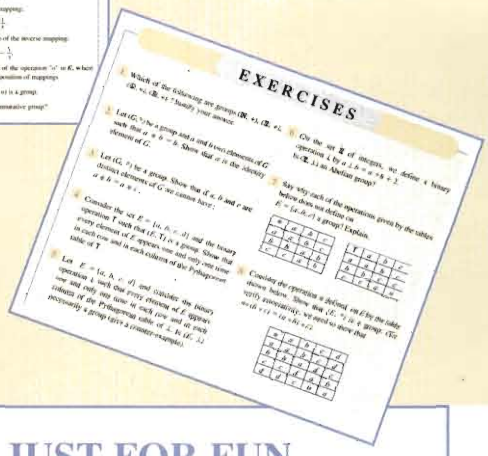
Inverse function

- Let f be a bijection from E onto F.
The function that assigns to each y in F a real x in E such that $y = f(x)$ is the inverse function of f denoted by f^{-1}.
Then, $y = f(x)$ if and only if $x = f^{-1}(y)$.
f^{-1} is also a bijection from F onto E.
- $f \circ f^{-1}$ is the identity function on F and $f^{-1} \circ f$ is the identity function on E.
- Let f be a function defined and continuous on the interval I.
f is a bijection from I onto $f(I)$ if and only if f is strictly monotone on I.
- In an orthonormal system, the graphs of f and f^{-1} are symmetric with respect to the line of equation $y = x$.
- Let f be a bijection defined on I and f^{-1} its inverse function. f and f^{-1} have the same sense of variation.

V. EXERCISES AND PROBLEMS

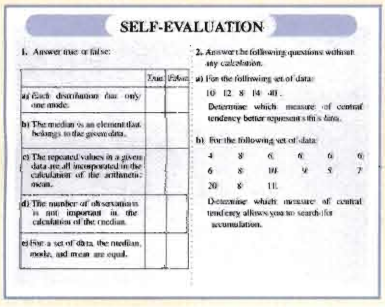
This feature of exercises and problems is included as an integral part of the chapter. It is designed to help students to master all objectives of the chapter as well as the appropriate notions, terminology and notations. Very often these problems and exercises illustrate the criteria based on the integration of knowledge, theory and applications.


PROBLEMS


EXERCISES

VI. SELF-EVALUATION

This feature is to be used to reinforce students grasp of the already developed material, and to encourage them to have a better understanding of the objectives of the chapter involved, and to help them review the main results and properties of the chapter through problem-solving, true-false questions, and multiple-choice exercises, as possible. The solution to this feature appears at the end of the textbook.


SELF-EVALUATION

1. Answer true or false:

	True	False
a) Each distribution that only one mode.		
b) The median is an element that belongs to the given data.		
c) The repeated values in a given data are all incorporated in the calculation of the arithmetic mean.		
d) The number of observations is not important in the calculation of the median.		
e) For a set of data, the median, mode, and mean are equal.		

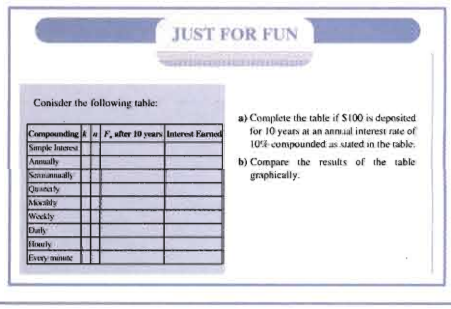
2. Answer the following questions without any calculation.

a) For the following set of data:
10 12 8 14 40
Determine which measure of central tendency better represents this data.

b) For the following set of data:
4 8 6 6 6 6
6 8 10 9 5 7
20 8 11
Determine which measure of central tendency allows you to search for accumulation.

VII. JUST FOR FUN

This feature is introduced as an extra work for those students intersted in further developing their knowledge and skills of the topics under consideration in the concerned chapter.


JUST FOR FUN

Conisder the following table:

Compounding	k	n	F, after 10 years	Interest Earned
Simple Interest				
Annually				
Semiannually				
Quarterly				
Monthly				
Weekly				
Daily				
Hourly				
Every minute				

a) Complete the table if $100 is deposited for 10 years at an annual interest rate of 10% compounded as stated in the table.

b) Compare the results of the table graphically.