Foreword

Academic success can be measured in many different ways, and I often tell my students that scoring high marks in exams is only one of the rewards from diligent study. The true measures of academic success should be the enjoyment of learning and the sense of accomplishment students get when that light flicks on in their heads and they think to themselves, “So that’s why!” The inception of NTK’s study guides and publications is based on the simple goal of making students’ learning process more enjoyable and less complicated, and to deliver positive results from students’ efforts.

Taking the Graduate Management Admission Test (GMAT) is an important part of your application to graduate business schools worldwide. The score you get will be a deciding element for admission, as it essentially reflects your ability to follow the demanding business courses.

This book is comprised exclusively of Data Sufficiency and Problem Solving questions of the Quantitative section because these are the question types that you are unlikely to have come across in any other test, and we understand that many of you may find your math skills a bit rusty since high school or college graduation. Starting well in advance to study for the GMAT and familiarizing yourself with the new question types will save you precious time during the test.

NTK’s study guides, courses and educational consulting services are designed to help prepare students for exam success as they continue to pursue secondary and college education.

As a leading educational service provider in Southeast Asia for more than 15 years, NTK has helped thousands of students reach their academic goals. Whether they are in primary, secondary, undergraduate or postgraduate studies, our students have benefited greatly from our specialized academic programs and expertise in all major international curricula and exams.

As you continue on your studies, I wish you every success; and most importantly, I hope you enjoy the learning process as well.

T.K. Ng
Founder and Managing Director
NTK Academic Group

Introduction to the GMAT

The Graduate Management Admission Test (GMAT) is a standardized test used for measuring a candidate's mathematical, verbal, and analytical writing skills acquired over the length of his or her studies and work. The test consists of four sections: the Analytical Writing Assessment (AWA), the Integrated Reasoning section, the Quantitative section, and the Verbal section. Candidates are given approximately four hours to complete the test, including two optional breaks (one after completing the Integrated Reasoning section and one between the Quantitative and Verbal sections). Candidates who do not opt for the two rest periods will finish the test in three and a half hours.

Except for the essay component, the Integrated Reasoning, Quantitative and Verbal sections are computer-adaptive. Each of the three multiple-choice sections begins with a question of moderate difficulty. If answered correctly, the question that follows will increase in difficulty. If your answer is incorrect, the computer will then select an easier question for you. During the test, one question is presented at a time and the computer instantly scores each question before generating the next one.

As the test progresses, the computer will adjust to each individual's ability level as indicated by the number of correct and wrong responses. Once you confirm an answer, it is not possible to go back and make changes. Also, you may not skip a question, because the computer uses your response to each question to determine the next one. Therefore, the best effort should be made when attempting any question. Although points will not be deducted for each wrong answer, random guessing may affect your overall score on the basis that the computer will select questions that are typically easier for you for the rest of the test. Calculators are not allowed in the GMAT, but an online calculator is available in the Integrated Reasoning section.

The computer-adaptive testing method allows an accurate assessment of each candidate's ability based upon his or her performance during the test.

Section	Format	Time allowed	Score
Analytical Writing Assessment	One writing task (i) Analysis of an Argument	30 minutes	Scale of 0 to 6 points
Integrated Reasoning section	12 questions on four question types (i) Graphics interpretation (ii) Two-part analysis (iii) Table analysis (iv) Multi-source reasoning	30 minutes	Scale of 1 to 8 points
Quantitative section	37 multiple-choice questions on two question types (i) Problem solving: mainly tests mathematical skills and quantitative questions, out of 5 choices (ii) Data sufficiency: decide whether the two given statements can answer the given question and choose one of the five options based on guidelines provided	75 minutes	Scale of 0 to 60 points
Verbal section	41 multiple-choice questions on three question types (i) Reading comprehension: answer questions based on a passage of less than 350 words (ii) Critical reasoning: reasoning skills (iii) Sentence correction: select the best choice in grammar and style to express an idea or relationship	75 minutes	Scale of 0 to 60 points

This study guide focuses on the Quantitative section and includes questions of all levels of difficulty.

Contents

Data Sufficiency Questions – Algebra	1
Data Sufficiency Questions – Arithmetic	11
Data Sufficiency Questions – Geometry	33
Problem Solving Questions – Algebra	45
Problem Solving Questions – Arithmetic	75
Problem Solving Questions – Geometry	131
Answers	155

Data Sufficiency Questions

Algebra

Data Sufficiency Questions

Each data sufficiency problem consists of a question and two statements, labeled (1) and (2), which contain certain data. Using these data and your knowledge of mathematics and everyday facts, decide whether the data given are sufficient for answering the question and then indicate one of the following answer choices:

A Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient;

B Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient;

C BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient;

D EACH statement ALONE is sufficient;

E Statements (1) and (2) TOGETHER are NOT sufficient.

NOTE: In data sufficiency problems that ask for the value of a quantity, the data given in the statement are sufficient only when it is possible to determine exactly one numerical value for the quantity.

Numbers: All numbers used are real numbers.

Figures: A figure accompanying a data sufficiency problem will conform to the information given in the question but will not necessarily conform to the additional information given in statements (1) and (2).

Lines shown as straight can be assumed to be straight and lines that may appear jagged can also be assumed to be straight.

You may also assume that the positions of points, angles, regions and so forth exist in the order shown and that angle measures are greater than zero degrees.

All figures lie in a plane unless otherwise indicated.

Data Sufficiency Questions
Algebra

First and Second Degree Equations

1. Is $abc = 27$?

   (1) $a + b + c = 9$

   (2) $ab + bc + ac = 9$

2. What is the hundreds digit of the number K?

   (1) The tens digit of $\frac{K}{10}$ is 7.

   (2) The thousands digit of $20K$ is 5.

3. What is the value of $m - n$?

   (1) $m + n = 15$

   (2) $m^2 - n^2 = 25$

4. Suppose b is an integer. What is the value of b?

   (1) $b^2 - b - 12 = 0$

   (2) $6^{-b} > 1$

5. What is the number of Spanish people in a city of 4,000,000 people?

   (1) The number of non-Spanish people is half of that of Spanish people.

   (2) The number of non-Spanish people is 1,000,000 fewer than that of Spanish people.

6. What are the roots of the equation $ax^2 + 8x + c = 0$?

   (1) $a + c = 7$

   (2) One of the roots is -2.

7. Is $2^n > 2$?

   (1) n is an integer.

   (2) n is positive.

8. What is the positive root of the equation $x^2 - ax = 4$ where a is a constant?

   (1) The negative root of the equation is -4.

   (2) The sum of the roots is -3.

9. If a, b, c and d are integers such that $a + b = 6$, $b + c = 5$ and $c + d = 4$, what are their values?

   (1) $a - d = 1$

   (2) a, b, c and d are positive.

10. Participants in a swimming gala are divided into three groups A, B and C according to their ages. If the total number of participants is 160, how many of them are in group B?

    (1) The number of participants in group C is 60 more than that in group A.

    (2) The number of participants in group C is four times as much as that in group A.

11. What is the value of d in the equation $23 + \frac{d}{n} - 9n = d$?

    (1) $n = 3$

    (2) $\frac{d}{n} = -2$

Formulae, Tables and Functions

12. The population (P) of a species of organism can be modeled by the formula $P = \frac{a \times 2^{-t}}{1 + bt}$, where t is the number of hours after the beginning of the investigation, and a and b are non-zero constants. When will the population be reduced by half?

    (1) This species will become extinct in the long run.

    (2) The population will be reduced by one-third after three hours.

13.

	Bachelor's Degree	Master's Degree	Doctoral Degree
Male	18	16	3
Female	9	x	3

The table above lists the gender and academic background of the members of a committee. What is the value of x?

(1) Among the members of the committee, 45% are master degree holders.

(2) The proportion of bachelor degree holders on the committee is 2.5 times that of doctoral degree holders.

14. The population of a city after n years ($n \geq 0$) is given by the formula $P_n = P_0 r^n$, where P_0 is the initial population and $r > 0$. What is the value of P_0?

(1) After two years, the population becomes 200.

(2) After four years, the population becomes 800.

15. If $a \neq -b$, what is the value of $\frac{a+b+c}{a+b}$?

(1) $a+b=1$

(2) $\frac{c}{a+b}=1$

Simultaneous Equations

16. There are only pigs and goats on a farm. How many animals are there in total?

(1) The ratio of the number of pigs to that of goats is 7 : 8.

(2) The total number of legs of the animals on the farm is 3,240.

17. At the beginning of the year 2000, Peter donated \$2,500 to a charity. He went on to donate at the beginning of each following year, with the amount of donation \$$p$ less than the preceding year. Which year is it now?

(1) The donation made at the beginning of this year is exactly half the amount donated 10 years ago.

(2) The difference in amount donated between years 2007 and 2009 is \$100.

18. Four newspapers and three magazines together cost \$18. What is the price of two newspapers and a magazine?

(1) A newspaper and a magazine together cost \$4.5.

(2) A dozen newspapers and nine magazines together cost \$54.