DOCUMENT RESUME

ED 093 707   SE 018 081

AUTHOR   Kramer, Lynda H.
TITLE   Math Review, Mathematics: 5265.01.
INSTITUTION   Dade County Public Schools, Miami, Fla.
PUB DATE   72
NOTE   23p.; An Authorized Course of Instruction for the
                Quinmester Program

EDRS PRICE   MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS   Algebra; Basic Skills; Behavioral Objectives;
                *Curriculum; Geometric Concepts; Instruction;
                *Mathematical Applications; Mathematics Education;
                *Objectives; Problem Solving; *Secondary School
                Mathematics; *Teaching Guides; Tests
IDENTIFIERS   *Quinmester Program

ABSTRACT
                Designed for the students who have taken algebra and
geometry and who need to strengthen their skills in problem solving
and mathematical applications, this guidebook on minimum course
content emphasizes the kinds of skills and procedures used in college
placement tests. Overall course goals are specified, a course cutline
is provided, performance objectives are listed, and references keyed
to the performance objectives are provided. Also included is a sample
test with an answer key. (JP)

AUTHORIZED COURSE OF INSTRUCTION FOR THE

QUINMESTER PROGRAM

MATHEMATICS: Math Review 5265.01

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION•1973

QUINMESTER MATHEMATICS

COURSE OF STUDY

FOR

MATH REVIEW

5265.01

Written by

Lynda H. Kramer

for the

DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida 33132
1971-72

DADE COUNTY SCHOOL BOARD

Mr. G. Holmes Braddock, Chairman
Mr. William H. Turner, Vice-Chairman
Mrs. Ethel Beckham
Mr. Alfredo Duran
Mrs. Phyllis Miller
Mr. Robert Renick
Dr. Ben Sheppard

Dr. E.L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

Published by the Dade County School Board

PREFACE

The following course of study has been designed to
set a minimum standard for student performance after
exposure to the material described and to specify
sources which can be the basis for the planning of
daily activities by the teacher. There has been no
attempt to prescribe teaching strategies; those
strategies listed are merely suggestions which have
proved successful at some time for some class.

The course sequence is suggested as a guide; an
individual teacher should feel free to rearrange the
sequence whenever other alternatives seem more de-
sirable. Since the course content represents a
minimum, a teacher should feel free to add to the
content specified.

Any comments and/or suggestions which will help to
improve the existing curriculum will be appreciated.
Please direct your remarks to the Consultant for
Mathematics.

All courses of study have been edited by a subcommittee
of the Mathematics Advisory Committee.

CATALOGUE DESCRIPTION

A course designed for the students who have taken Algebra
and Geometry and who need to strengthen their skills in
problem solving and mathematics applications. Emphasis
will be on the kinds of skills and procedures used in the
college placement tests (SCAT, PSAT, and CEEB).

TABLE OF CONTENTS

OVERALL GOALS

The student will:

1. Become familiar with the types, forms and methods of presentation of questions on the mathematics section of PSAT, SAT, and CEEB examinations.

2. Improve his skill and speed in answering standard questions.

3. Improve his skill in analyzing and sythesizing general information given in questions in which reasoning, judgment, comparison, and evaluations are called for.

4. Provide a measure of his own areas of weakness and strength by taking sample test items provided.

5. Have an opportunity to synthesize computational analytical skills in direct application in problem settings.

PERFORMANCE OBJECTIVES

The student will:

1. Perform computation skills with non-negative rational numbers.

2. Solve word problems involving non-negative rationals.

3. Perform computational skills with rational numbers, rational expressions, and radicals.

4. Solve first and second degree number sentences in one variable and first degree number sentences in two variables.

5. Graph first and second degree number sentences.

6. Solve word problems using techniques of algebra.

7. Demonstrate an understanding of elementary relationships and theorems of geometry.

8. Solve word problems involving geometric applications.

3

KEY TO REFERENCES

Brownstein, Samuel and Weiner, Mitchel. How to Prepare for
     College Entrance Examinations. Woodbury, New York:
     Barron's Educational Series, Inc., 1970.

Rich, Barnett. Mathematics for the College Boards. New York:
     School Publications, Inc., 1970.

Turner, David R. Scholastic Aptitude Tests. New York:
     Arco, 1969.

SOURCES FOR PROBLEMS

Watkin, Harold. How to Pass College Board Admissions. New
     York: Crowles Educational Corporation, 1970.

Wechsler, Louis; Blum, Martin; and Friedman, Sidney.
     College Entrance Examinations. New York: Barnes and
     Noble, 1971.

OUTLINES, STRATEGIES, AND REFERENCES

I. Arithmetic Skills

A. Fractions

1. Meaning of fractions

    a. Part of a whole number
    b. Ratio
    c. Division

2. Fractional numbers

    a. Written as improper fractions
    b. Written as mixed numbers

3. Equivalent fractions

    a. Higher terms
    b. Simplest form

4. Lowest Common Denominator

    a. By inspection
    b. By prime factorization of the denominator

5. Operations

    a. Addition
    b. Subtraction
    c. Multiplication
    d. Division
    e. Combination of operations

6. Comparing fractions

    a. Common denominator
    b. Proportion

B. Decimals

1. Reading and writing

2. Operations

    a. Addition
    b. Subtraction
    c. Multiplication
    d. Division
    e. Multiplication/division by powers of 10

3. Conversions

    a. Decimals to fractions
    b. Fractions to decimals

C. Percent

  1. Meaning

  2. Conversions

    a. Percent to decimal and decimal to percent
    b. Percent to fraction and fraction to percent

  3. Three cases of percent

    a. What percent of ___ is ___?
    b. Find ___% of ___.
    c. ___ is ___% of what number?

STRATEGIES

1. To improve the student's computation skills, work for understanding and then for shortcuts in the processes.

2. In multiplying fractions or mixed numbers, be sure the student learns the "cancellation" method, but stress that it is used only when multiplication of factors is involved.

3. Stress proportions since they are a valuable tool in the solution of many problems.

4. Make the student aware of the formula $\% = \frac{is}{of}$ if he is not already familiar with it.

6

REFERENCES

	(1)	(2)	(3)
Fractions	228-236	18-22	273-277
Decimals	240-242	26-28	279-282
Percents	242-249	32-45	284-287

II. Arithmetic Applications

A. Problems Involving Fractions

B. Problems Involving Decimals

C. Problems Involving Proportion

D. Problems Involving Percent

    1. Commission
    2. Discount
    3. Increase and decrease
    4. Profit and loss
    5. Interest
      a. Simple
      b. Compound
    6. Taxation

STRATEGIES

1. As much time as possible should be spent on problem solving as this is usually the student's weakest area.

2. Insist that students draw diagrams whenever possible to assist them in solving problems.

3. Have students write out a method for doing the types of problems with which they have difficulty. This will help them organize their work and it will provide a reference which they can review from time to time.

4. Understanding vocabulary is an important part of problem solving, so be sure to discuss the meaning of words often used in problems. This is particularly true in the applications of percent.

7

	(1)	(2)	(3)
Percentage		32-45	285-287
Fraction and Mixture	261-263	134-144	288-291
Profit and Loss		28-31	292-297
Interest and Taxation		152-157	298-306
Ratio and Proportion		33-39	307-312

III. Algebra Skills

A. Real Numbers

   1. Properties
   2. Computation with signed numbers

B. Laws of Exponents

   1. Products
   2. Quotients
   3. Powers of powers

C. Polynomials

   1. Addition
   2. Subtraction
   3. Multiplication
   4. Division
   5. Factoring

D. Rational Expressions

   1. Addition
   2. Subtraction
   3. Multiplication
   4. Division
   5. Simplification

E. Expressions with Radicals

   1. Addition
   2. Subtraction
   3. Multiplication
   4. Division
   5. Simplification

F. Solving Number Sentences

 1. Linear Equations
 2. Quadratic equations
 3. Simultaneous linear equations
 4. Inequalities

G. Graphing Number Sentences

 1. Linear
 2. Quadratic

STRATEGIES

1. When reviewing rational expressions, compare each operation to the parallel operation with fractions. The simplification of the expressions from rational expressions to fractions makes the properties and processes much easier to understand.

2. In reviewing the solution of number sentences, develop sets of exercises that include all types of solutions in one assignment. This gives the student a chance to review each process and also decide which process should be used.

3. In reviewing graphing, have students practice giving information for a given graph. Since they will not usually be required to draw a graph, this skill does not need to be emphasized.

REFERENCES

	(1)	(2)	(3)
Basic Operational Skills	220-225	62-68	343-351

IV. Algebra Applications

A. Special Types of Problems

 1. Work
 2. Rate, time, distance
 3. Mixture
 4. Age
 5. Coin
 6. Two-digit numeral

B. Miscellaneous Types of Problems

STRATEGIES

1. Work problems receive heavy emphasis on standardized tests. Some time should be spent analyzing the different types of work problems and formulating patterns for solving.

2. Be sure students have a system for approaching the solution of problems. This should include the drawing of diagrams where possible, as well as defining the variables they use.

3. Stress the importance of checking the solution with the original problem to see if the answer is reasonable.

REFERENCES

	(1)	(2)
Application		19-70
Problems	226-228	123-134

V. Geometry

A. Geometric Figures

1. Names
2. Properties
3. Associated parts

B. Relationships of Geometric Figures

1. Angles
2. Perpendicular and parallel lines and planes
3. Triangles
4. Other polygons
5. Circles

STRATEGIES

1. It might be worthwhile to have students list the more important relationships of geometric figures. This would be a review in itself, and would provide a ready reference as they worked through problem sets.

2. Be sure the student can sketch the geometric figures and their parts. Practice can be included in the daily work by requiring the student to draw figures for each problem.
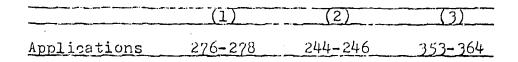
REFERENCES

VI. Geometric Applications

A. Special Types of Problems

1. Perimeter
2. Area
3. Volume
4. Pythagorean theorem
5. Similar figures - proportion

b. Miscellaneous Types of Problems

STRATEGIES

1. It would be helpful to have the student learn some of the Pythagorean triples in addition to the (3,4,5) Pythagorean triple.

2. Be sure the student knows the common formulas for area, surface area, and volume.

3. Many applications involve proportions resulting from similar figures. Review the conditions for similarity, and the selection of corresponding parts of similar figures.

REFERENCES

11.

SAMPLE TEST ITEMS

I. Arithmetic Skills

PROBLEMS   ANSWERS

1. Find the LCD of $\frac{1}{8}$, $\frac{1}{7}$, $\frac{1}{6}$, and $\frac{1}{10}$.   840

2. Add $16\frac{3}{8}$, $4\frac{4}{5}$, $12\frac{3}{4}$, and $23\frac{5}{6}$. $57\frac{91}{120}$

3. Subtract $27\frac{5}{14}$ from $43\frac{1}{6}$. $15\frac{17}{21}$

4. Multiply $17\frac{5}{8}$ by 128.   2256

5. Divide $\frac{5}{6}$ by $\frac{3}{8}$. $\frac{20}{9}$ or $2\frac{2}{9}$

6. Add 37.03, 11.5627, and 3.4005.   51.9932

7. Subtract 4.64324 from 7.   2.35676

8. Multiply 27.3 by 16.943.   462.5439

9. 19.6 divided by 3.2 carried to three
   decimal places is?   6.125

10. Convert $\frac{5}{11}$ to decimal form. (nearest hundredth) .45

11. What is $64\frac{2}{3}$ in fractional form? $\frac{194}{3}$

12. In decimal notation find the difference
    between $\frac{9}{8}$ and $\frac{3}{5}$.   .525

13. What percent is $2\frac{1}{2}$?   250%

14. Find the fractional equivalent of 5.4%. $\frac{27}{500}$

15. Convert $\frac{3}{4}\%$ to decimal notation.   .0075

12

Arithmetic Skills (continued)

16. Convert $2 \frac{3}{7}\%$ to fractional form.　　　　　　$\dfrac{17}{700}$

17. Find $4 \frac{1}{2}\%$ of 890.　　　　　　　　　　40.05

18. What percent of 39 is 25? (nearest tenth)　　64.1%

13

11. Arithmetic Applications

PROBLEMS	ANSWERS

1. The entrance price to see an exhibition was reduced by 25%, but the daily attendance increased 30%. What was the effect of such a price reduction on the daily receipts.

$2\frac{1}{2}\%$ decrease

2. A man owned 50 shares of stock worth $75 each. The firm declared a dividend of 4% payable in stock. How many shares did he own AFTER the stock dividend?

52

3. A man spent $\frac{15}{16}$ of his entire fortune to buy a house for $7500. How much was his original fortune?

$8,000

4. What percent of $\frac{5}{6}$ is $\frac{3}{4}$?

90%

5. A typist earned $1350 in a given year which was $12\frac{1}{2}\%$ more than she earned the year before. How much did she earn the year before?

$1,200

6. A certain pole casts a shadow 24 feet long. At the same time another pole 3 feet high casts a shadow 4 feet long. How high is the first pole?

18 feet

7. A man purchased an equal number of $3, $2, and 75¢ ties. He spent $40.25 for all of the ties. How many of each did he buy?

7

8. If the entrance requirement of a certain college is 82, what mark must a student have in Geometry (weight 2) to be able to enter if his other marks are: English 88 (weight 3); Spanish 78 (weight 2); and History 80 (weight 2)?

79

9. Find the interest on $480 at $3\frac{1}{2}\%$ for two months and 15 days.

$3.50

10. What is the premium on a $7200 policy at $10.67 per 100?

$48.24

14

III. Algebra Skills

PROBLEMS | ANSWERS

1. Reduce to lowest terms: $\dfrac{3x}{6x^3}$

$\dfrac{1}{2x^2}$

2. Multiply $3x^2$ and $4x^5$

$12x^7$

3. The roots of the equation $x^2 + 16 = 0$ are: (1) real and equal (2) real and unequal; or (3) imaginary.

(3) imaginary

4. The sum of the roots of the quadratic equation $2x^2 - 4x - 5 = 0$ is?

2

5. Solve for x in the equation $\sqrt{x + 2} = 3$

7

6. The positive root of the equation $2x^2 \quad 3x - 2 = 0$ is?

2

7. The roots of the equation $2x^2 - 8x + 3 = 0$ are: (1) unequal; (2) irrational; or (3) both

(3) both

8. Simplify $\left(\dfrac{5}{2} - 3\right) \cdot \left| -6 + \dfrac{1}{4} \right|$

$\dfrac{23}{-8}$

9. Factor $6x^2 - 24$

$6(x + 2)(x - 2)$

10. Subtract $\dfrac{t}{r^2 + 2r - 3}$ from $\dfrac{4t + 3}{r - 1}$

$\dfrac{4rt + 11t + 3r + 9}{(r - 1)(r + 3)}$

11. Simplify: $12 + \dfrac{2\sqrt{3}}{3}$

$\dfrac{8}{3}\sqrt{3}$

12. Solve: $\begin{cases} y + x = 4 \\ 3x - 2y = 1 \end{cases}$

$\left(\dfrac{9}{5}, \dfrac{11}{5}\right)$

15

IV. Algebra Applications

1. If $\frac{1}{4}$ of A's money is equal to $\frac{2}{7}$ of B's
   money and their total wealth is $75.00,
   how much money has B?   _____3500_____

2. An estate is divided among three heirs,
   A, B, and C, so that A has $\frac{5}{12}$ of the whole
   estate, and B has twice as much as C. A
   has 56 acres more than C. How many acres
   in the entire estate?   _252 acres_

3. If x varies directly as y^2 and if $x = 9$
   when $y = 2$, what is the value of x when
   $y = 8$?   __144_____

4. If clerk A can type 50 letters in 10
   minutes, whereas clerk B can only type
   40 letters in 10 minutes, in how many
   minutes can they type 360 letters to-
   gether?   __40_____

5. If in 5 days a clerk can copy 125 pages,
   with 36 lines on each page and 11 words
   to the line, how many pages of 30 lines
   each and 12 words to the line can he
   copy in 6 days?   _165_____

6. A can do a job in 4 days, B assists
   him for 2 days and then both stop
   working. C who can do the work in 10
   days, works 4 days and completes the
   job. How long would it take B to do the
   complete job himself?   _20 days__

7. A man can cover a distance of 360 miles
   in 12 hours by automobile and 30 hours
   on foot. He starts out in his car but
   it breaks down on the way, and he walks
   the rest of the distance spending twice
   as much time on foot as in the automo-
   bile. How long did the trip take?   _20 hours_

8. Two trains running on the same track
   travel at the rates of 25 and 30 mph.
   If the first train starts out an hour
   earlier, how long will it take the
   second train to catch up with it?   _5 hours__

16

Algebra Applications (continued)

9. Two ships are 1550 miles apart and
   sailing towards each other. One sails
   at the rate of 85 miles per day and
   the other at the rate of 65 miles per
   day. How far apart will they be at
   the end of 9 days?   <u>200 miles</u>

10. A and B started toward one another at
    the same time from places 350 miles
    apart and met in 7 hours. If A's rate
    was 30 mph, what was B's rate?   <u>20 mph</u>

17

V. Geometry

1. In a parallelogram ABCD angle B is twice as large as angle A. How many degrees are there in angle A?

   60^{0}

2. In a right triangle ABC, altitude CD is drawn to hypotenuse AB. If angle A contains 32^{0} how many degrees are there in angle BCD?

   32^{0}

3. How many degrees are there in each angle of a regular polygon of 8 sides?

   135^{0}

4. Angle ABC formed by diameter AB and chord BC of a circle contains 30^{0}. If the diameter of the circle is 10, find the chord AC.

   5

5. A line parallel to base AB of triangle ABC intersects the sides AC and BC at points D and E respectively. If CD equals 4 and DA equals 6 and CE equals 8, find EB.

   12

6. The area of a triangle is 24. If one side of the triangle is 12, find the altitude drawn to that side.

   4

7. Find the area of a square circumscribed about a circle whose radius is 10.

   400

8. If an acute angle of a parallelogram contains 73^{0}, how many degrees are there in an obtuse angle of the parallelogram?

   107^{0}

9. Find an altitude of an equilateral triangle whose side is 10. Express the answer in simple radical form.

   $5\sqrt{3}$

10. The altitude to the hypotenuse of a right triangle divides the hypotenuse into segments 2 and 8. Find the altitude.

    4

11. The sum of the angles of a polygon is 540^{0}. How many sides does the polygon have?

    5

18

Geometry (continued)

12. Find the length of the side of a rhombus
    whose diagonals are 8 and 6.   <u>5</u>

13. Tangents PA and PB from an external point
    P to circle O form an angle of 70°. If
    radii OA and OB are drawn, how many
    degrees are there in angle AOB?   <u>110°</u>

14. In a circle two parallel chords opposite
    side of the center have arcs of 100°
    and 120°. Find the number of degrees in
    one of the arcs included between the
    chords.   <u>70°</u>

VI. Geometry Applications

PROBLEMS	ANSWERS
1. An automobile wheel has a diameter of 24 inches. How many revolutions will it make to cover 3 miles?	2520 approx.
2. A ladder 65 feet long is leaning against the wall. It's lower end is 25 feet away from the wall. How much further away will it be if the upper end is moved down 8 feet?	14 feet
3. A square lot has a diagonal path cut through it. If the path is 40 yards long, what is the area of the lot?	800 sq. yds.
4. How many boxes 3 inches by 4 inches by 5 inches can fit into a carton 3 feet by 4 feet by 5 feet?	1728
5. The area of a rectangular garden is 60 square yards and the width is 5 yards. How much longer is the perimeter than the sum of both diagonals?	8 yards
6. What is the area of a right triangle whose hypotenuse is 5 inches and one of its legs is 3 inches?	6 sq. inches
7. A box is 12 inches in width, 16 inches in length and 6 inches in height. How many square inches of paper would be required to cover it on all sides?	720 sq. in.