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ABSTRACT

Designed for the student who has acquired basic computational skills with non-negative rational numbers, this guidebook on minimum course content seeks further development of computational skills with fractions. General goals and performance objectives, a course outline, teaching strategies, sample test items, and a list of six references are included. The quin is based on chapters from the text, "Essentials of Mathematics 2", by Sobel, Maletsky and Hill. (DT)

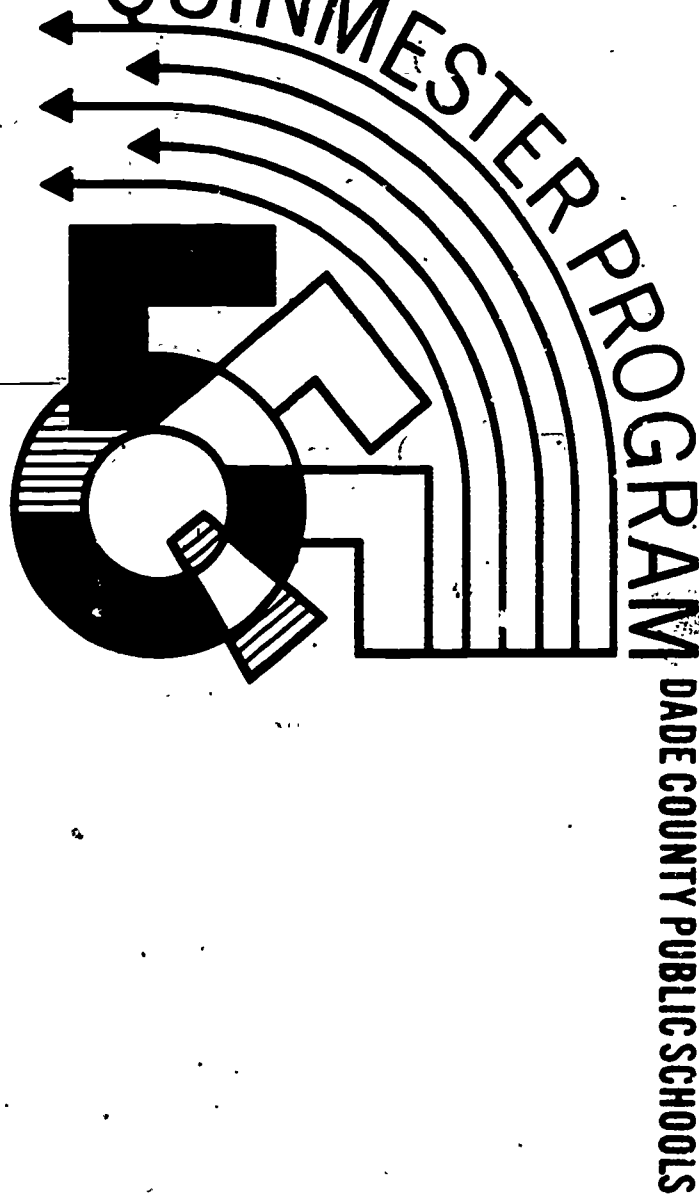
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AUTHORIZED COURSE OF INSTRUCTION FOR THE **QUINMESTER PROGRAM**



ACTIVITIES WITH FRACTIONS

5212.74, 5213.74

MATHEMATICS

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QUINMESTER MATHEMATICS

COURSE OF STUDY

FOR

Activities with Fractions

5212.74

5213.74

(EXPERIMENTAL)

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

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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 desirable. 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 which will develop computational skills with non-negative rational numbers through activities that promote interest. Emphasis is on fractions.

Designed for the student who has acquired basic computational skills with non-negative rational numbers.

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GOALS

1. To further develop computation skills with fractions.
2. To maintain computation skills with whole numbers, decimals and percents.
3. To develop a positive attitude toward mathematics.
4. To develop problem-solving skills.

OVERALL STRATEGIES

1. This quin is based on the state-adopted text, Essentials of Mathematics, 2 by Sobel, Maletsky and Hill. Chapters 4, 7, and 10 constitute the core of this course.
2. Do not cover more than chapters 4, 7, and 10 of the text as the remaining chapters are covered in other quins.
3. A pre-test should be administered to determine the ability of the students to work with fractions. All deficiencies should be noted, and activities should be planned to help each student overcome his particular deficiencies and develop additional skills.
4. Although some of the skills work can be done with the class as a whole, there should be individual prescriptions made for those students who do not master the skills during regular classroom instruction.
5. Performance objectives are listed only for computational skills. The performance in other areas is left to the teacher's discretion, depending on the ability level of the students he is teaching.
6. The skills work will need to be supplemented. This can be done with work from any basic text, by using any of the resources listed at the end of the quin, or by use of ditto material.
7. It is suggested that all of the activities in the text be used to help motivate the students.

PERFORMANCE OBJECTIVES FOR SKILLS

These objectives represent the minimum expectations for student performances at the end of a nine-week period.

The student will:

1. Determine the simplest form of any given fraction.
2. Determine a fraction that is equivalent to a given fraction but in higher terms.
3. Determine the mixed number equivalent to a given improper fraction.
4. Determine the improper fraction equivalent to a given mixed number.
5. Compare any two fractions by applying the cross-products method.
6. Find the L.C.D. of any pair of fractions.
7. Add any two fractions, whole or mixed numbers with like or unlike denominators.
8. Find the positive difference of any two fractions, whole or mixed numbers with like or unlike denominators.
9. Multiply any two fractions, whole or mixed numbers.
10. Divide any two fractions, whole or mixed numbers.
11. Solve word problems involving fractions.

COURSE OUTLINE

I. Skills - Fractions

- A. Equivalent forms
 - 1. Simplest terms
 - 2. Higher terms
 - 3. Mixed form to improper fraction
 - 4. Improper fraction to mixed form
- B. Comparing fractions
 - 1. Common denominator method
 - 2. Cross products method
- C. Least Common Denominator
- D. Computation
 - 1. Addition
 - 2. Subtraction
 - 3. Multiplication
 - 4. Division
- E. Word Problems

II. Other Topics

- A. Equations
 - 1. Solution by addition
- B. Ordering numbers
- C. Inequalities
 - 1. Solution by addition
- D. Graphing solution sets
- E. Formulas.
 - 1. Evaluating
 - 2. Developing formulas for perimeter, area and volume

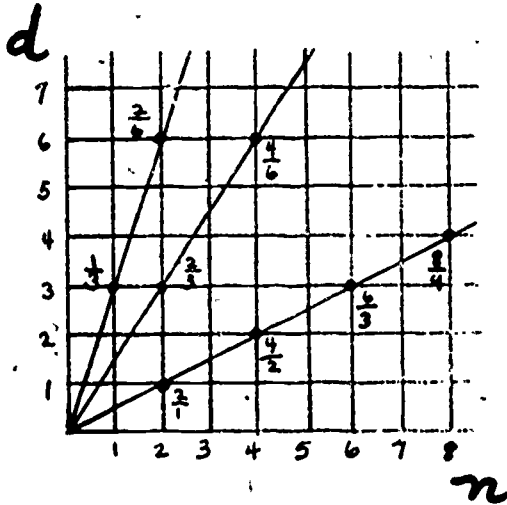
STRATEGIES

1. Use a large square subdivided into fractional parts to illustrate the processes of addition, subtraction, multiplication, and division. Use many large squares in the same manner to demonstrate the concepts with mixed numbers and improper fractions.
2. Have students rename given fractions on the ruler.

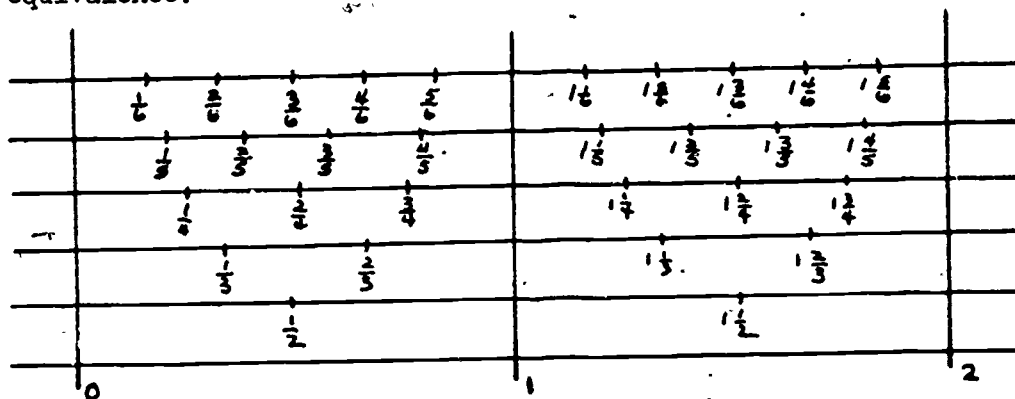
Example: a. $\frac{1}{4} = \frac{2}{8}$ b. $1 \frac{6}{8} = 1 \frac{?}{4} = \frac{?}{8} = \frac{?}{4}$

Use the ruler to find the sum of fractions, improper fractions, whole numbers and mixed numbers. Ask students to first add on paper and then verify by using ruler.

3. Use the lattice points on a grid to find equivalent fractions. For instance:

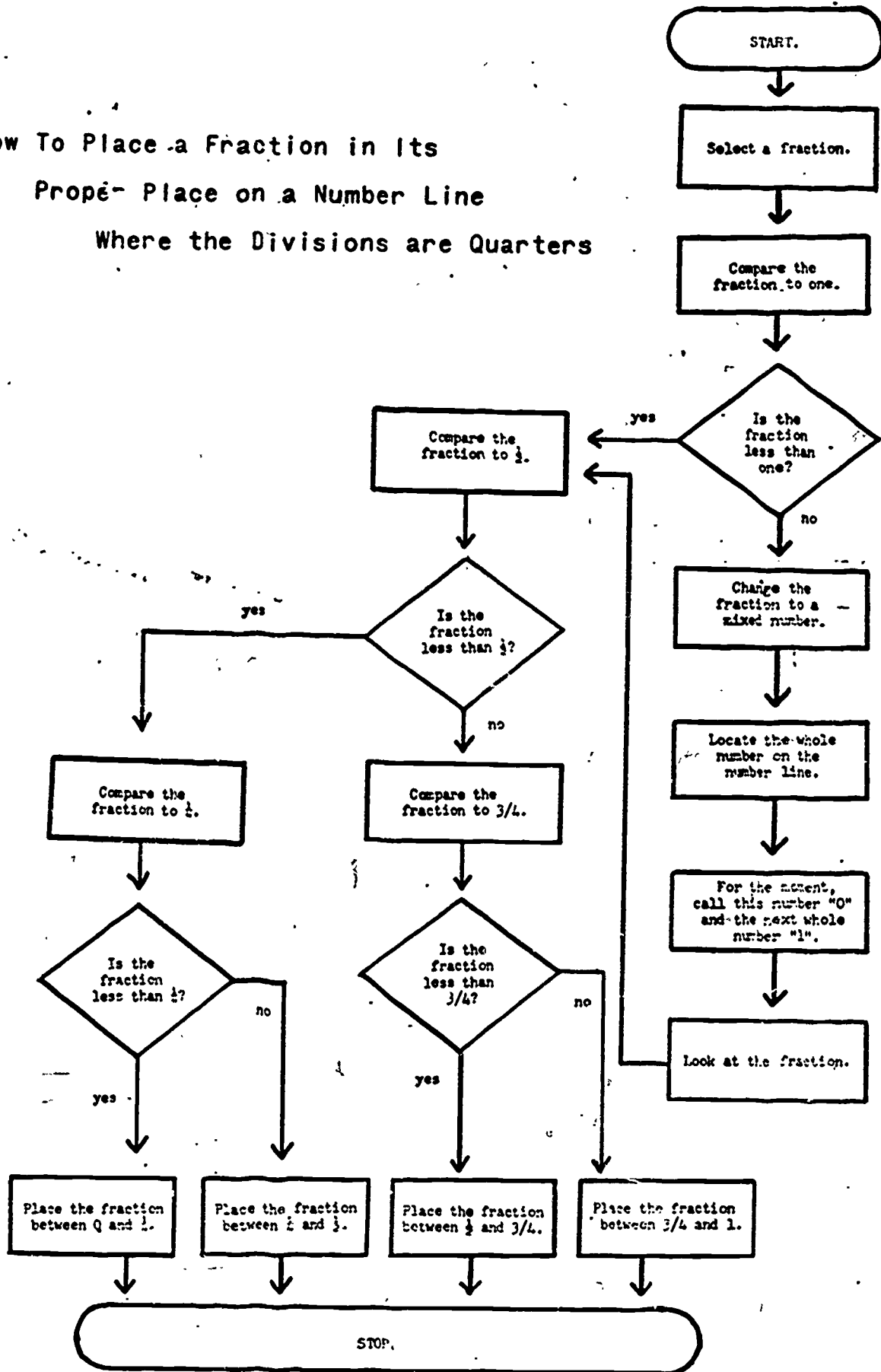


4. Several parallel number lines may be used to show order and equivalence.



Practice in placing several fractions on a single number line is important for visualization of "less than." If the flow chart which follows on the next page is helpful for a number line divided into quarters, it can be modified for other divisions.

How To Place a Fraction in Its
 Proper Place on a Number Line
 Where the Divisions are Quarters



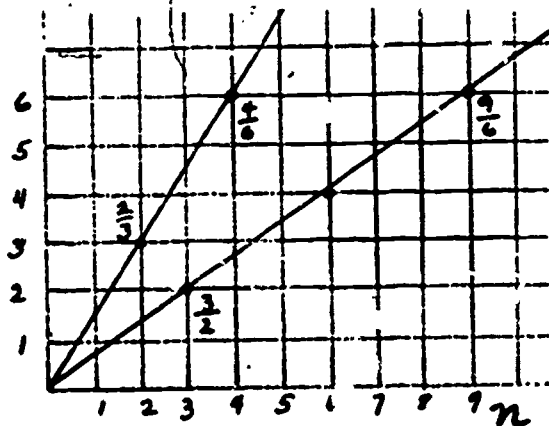
5. In addition to showing equivalent fractions, use the grid to compare and order. For instance:

1. Compare $\frac{3}{2}$ and $\frac{2}{3}$.

After graphing, by inspection one can see $\frac{4}{6} < \frac{9}{6}$.

$$\therefore \frac{2}{3} < \frac{3}{2}$$

d



2. Arrange the fractions

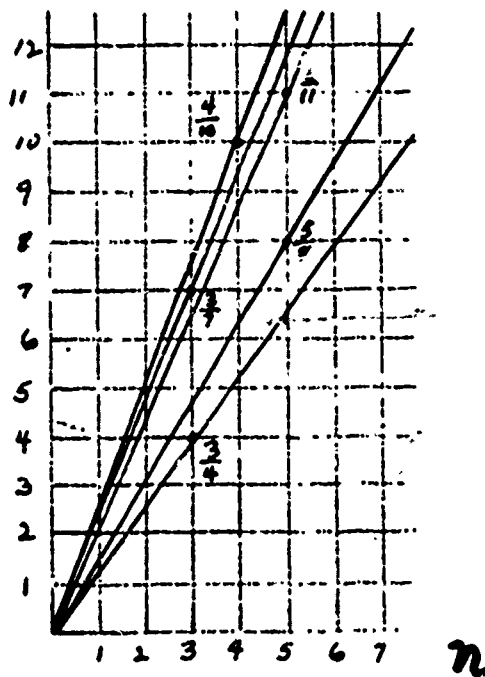
$$\frac{5}{11}, \frac{4}{10}, \frac{5}{8}, \frac{3}{4}, \frac{3}{7}$$

in order, beginning with the smallest.

After graphing, one can see that

$$\frac{4}{10} < \frac{3}{7} < \frac{5}{11} < \frac{5}{8} < \frac{3}{4}$$

d



To illustrate the limitations of this method, try to compare $\frac{4}{9}$ and $\frac{5}{11}$; it would take a fine pen point and careful drawing indeed! Thus, the youngster can see that another method is needed. This is a good time to introduce cross-multiplying:

$$\frac{5}{11} \overset{?}{\lt} \frac{4}{9}$$

$$9 \times 5 \quad ? \quad 11 \times 4$$

$$45 \quad > \quad 44$$

$$\therefore \frac{5}{11} > \frac{4}{9}$$

SAMPLE TEST ITEMS FOR SKILLS

(Keyed to Objectives)

The skills tested represent a minimum for the 9-week course.

1. Find the simplest form of each fraction.

a. $\frac{4}{6}$ b. $\frac{12}{14}$ c. $\frac{28}{70}$

2. Find the missing number.

a. $\frac{2}{3} = \frac{?}{9}$ b. $\frac{5}{8} = \frac{?}{16}$ c. $\frac{3}{4} = \frac{?}{12}$

3. Write each fraction as a mixed number.

a. $\frac{12}{7}$ b. $\frac{19}{5}$ c. $\frac{42}{15}$

4. Write each mixed number as an improper fraction.

a. $2\frac{1}{3}$ b. $7\frac{1}{2}$ c. $3\frac{5}{9}$

5. Write one of the symbols $>$, $<$, or $=$ between each pair of fractions to make a true statement.

a. $\frac{5}{7}, \frac{3}{4}$ b. $\frac{9}{8}, \frac{4}{3}$ c. $\frac{11}{12}, \frac{15}{17}$

6. Find the L.C.D. of each pair of fractions.

a. $\frac{2}{3}, \frac{5}{6}$ b. $\frac{1}{4}, \frac{5}{6}$ c. $\frac{2}{3}, \frac{5}{8}$

7. Add. Express all fractions in simplest form.

a. $\frac{5}{8} + \frac{7}{8}$ b. $\frac{2}{3} + \frac{4}{5}$ c. $5\frac{1}{4} + \frac{5}{8}$ d. $3\frac{2}{3} + 4\frac{1}{2}$

8. Subtract. Express all fractions in simplest form.

a. $\frac{8}{9} - \frac{2}{9}$ b. $4\frac{1}{3} - 2\frac{1}{6}$ c. $7 - 3\frac{2}{5}$ d. $5\frac{1}{6} - 2\frac{3}{4}$

9. Multiply. Simplify all answers.

a. $\frac{2}{5} \times \frac{1}{3}$ b. $2\frac{1}{4} \times 10$ c. $3\frac{1}{7} \times \frac{21}{55}$ d. $5\frac{1}{2} \times 4\frac{2}{5}$

10. Divide. Simplify all answers.

a. $\frac{5}{8} \div \frac{1}{3}$ b. $\frac{1}{4} \div 2\frac{1}{2}$ c. $6\frac{1}{2} \div 2\frac{2}{3}$ d. $3\frac{1}{5} \div 4$

SAMPLE TEST ITEMS FOR SKILLS (cont.)

11. Solve each problem.

- a. Jack is going to make 5 shelves. Two shelves are to be $2\frac{1}{2}$ feet long and 3 shelves are to be $3\frac{1}{4}$. How long a board must Jack buy to make all 5 shelves.
- b. If 1 cubic foot holds about $7\frac{1}{2}$ gallons, how many gallons will there be in $15\frac{1}{2}$ cubic feet?

ANSWER KEY

1. a. $\frac{2}{3}$ b. $\frac{6}{7}$ c. $\frac{2}{5}$
2. a. 6 b. 10 c. 9
3. a. $1\frac{5}{7}$ b. $3\frac{4}{5}$ c. $2\frac{12}{15}$ or $2\frac{4}{5}$
4. a. $\frac{7}{3}$ b. $\frac{15}{2}$ c. $\frac{32}{9}$
5. a. $<$ b. $<$ c. $>$
6. a. 6 b. 12 c. 24
7. a. $\frac{3}{2}$ or $1\frac{1}{2}$ b. $1\frac{7}{15}$ c. $5\frac{7}{8}$ d. $8\frac{1}{6}$
8. a. $\frac{2}{3}$ b. $2\frac{1}{6}$ c. $3\frac{3}{5}$ d. $2\frac{5}{12}$
9. a. $\frac{2}{15}$ b. $\frac{45}{2}$ or $22\frac{1}{2}$ c. $\frac{6}{5}$ or $1\frac{1}{5}$ d. $\frac{121}{5}$ or $24\frac{1}{5}$
10. a. $\frac{15}{8}$ or $1\frac{7}{8}$ b. $\frac{1}{10}$ c. $\frac{39}{16}$ or $2\frac{7}{16}$ d. $\frac{4}{5}$
11. a. $14\frac{3}{4}$ b. $116\frac{1}{4}$ gallons

RESOURCES

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