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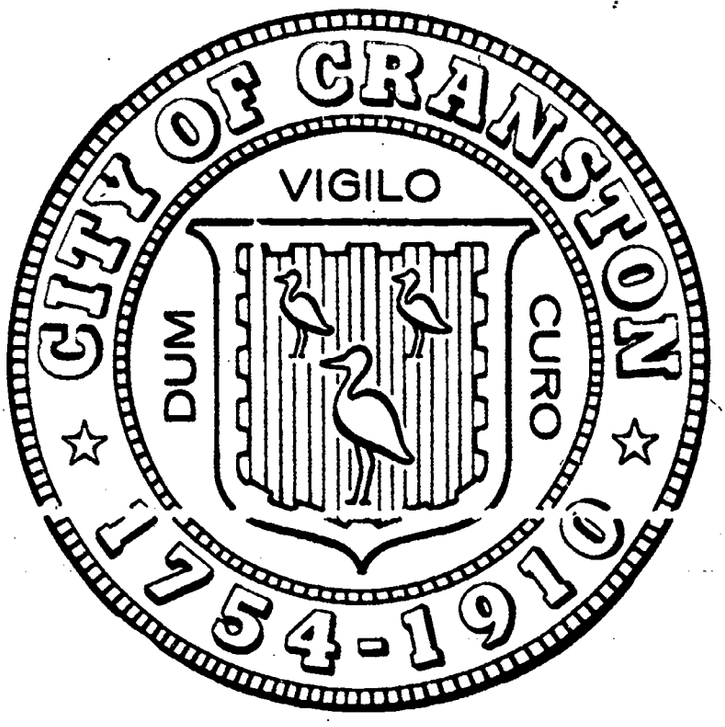
ABSTRACT

Behavioral objectives are specified for 82 topics in mathematics to be covered in grades 7 through 9. A general objective is given for each, followed by specific behavioral objectives with suggested activities. Topics include number properties and operations, geometry, number theory, algebra, set theory, ratio, proportion and percent, the metric system, etc. A separate college preparatory sequence is outlined, which includes units on trigonometry, metric geometry, linear and quadratic equations, logic, exponential and logarithmic functions, complex numbers, etc., in addition to those topics included in the regular course. (SD)

Secondary Schools

CURRICULUM

GUIDE



Cranston School Department
Cranston, Rhode Island
1973-74

MATH

Grades 7-9

SECONDARY SCHOOLS CURRICULUM GUIDES

Prepared by:

THE FIFTH QUARTER PLAN

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TITLE III, E.S.E.A.

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Title III, E.S.E.A., 1965

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1973-74

INTRODUCTORY NOTES

The Cranston Secondary School Curriculum Guides are intended to serve as a resource to teachers, students, department chairmen, guidance personnel, curriculum planners, and anyone else involved in present or future curriculum planning.

Teachers are urged to utilize the guides in lesson preparation and for purposes of providing individual students and groups of students with a resource; student achievement is often influenced by a knowledge of what is expected with respect to course objectives. Differences in abilities and needs among students and classes can be served by selecting appropriate objectives and activities.

The guides will also be useful for purposes of describing and communicating secondary curriculum goals to the public when such a need arises from time to time.

The organization of the guides is such that most sections present materials in terms of portions of a school year, thus making it possible for students to re-learn or make up a portion of a year's course. This is possible whether the course is offered in a full year or in shorter units of time.

GUIDE FORMAT

At least one major objective is stated for each section of the guide. Each is broad in statement encompassing the work of large units or entire sections.

Numbered objectives (Objective #1) are specific and intended to indicate the level of learning (the learning variable), the content (what will be learned), and the means of evaluation. Thus the objective describes learning in relationship to the learner. The teacher's function is to design methods which will effect the result. Most objectives in the guides are followed by "activities."

Suggested activities are intended to support the objective

to which they are assigned. Such statements either relate how the student will attain the objective or may be considered as sub-objectives.

OBJECTIVES IN TERMS OF LEARNING VARIABLES

Bloom and his colleagues devised a taxonomy of educational objectives designed to classify the behavior of students in three domains as a result of having participated in a series of instructional experiences. The three domains are the cognitive (intellectual), the affective (emotional), and the psychomotor (physical). Within each of these domains there is a hierarchy which denotes increasing complexity of learning as shown below.

Cognitive	Affective	Psychomotor
knowledge	receiving	frequency
comprehension	responding	energy
application	valuing	duration
analysis	organizing	
synthesis	characterizing	

In addition to the general technique of the behavioral statement, the authors were careful to differentiate the levels at which given behaviors could be expected of the student. Thus, in the cognitive domain a student's performance in the display of knowledge of a concept is less complex than the student's performance when he applies the concept in a given situation. Similarly, in the affective domain, a response to a situation is not as complex as the display of a value toward a given situation. Precise differentiation among variables is very difficult or, in many cases, impossible, but using these variables to formulate objectives is a means of focusing the attention of the teacher and the learner upon the existence of levels of learning.

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Mathematics

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Per Cent	M - 22	"
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*An optional section for some programs.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF THE STRUCTURE OF OUR NUMBER SYSTEM WITH ITS PROPERTIES AND OPERATIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Numbers and Sets

Objective #1: The student will demonstrate an increase in his knowledge of whole numbers and the counting process by recognizing sets as the basis for numeration and completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Recgonize the set of natural numbers and the set of whole numbers.
2. Recognize sets as the basis for ideas about numbers.
3. Match (through counting) the set of natural numbers to a set of objects and give the number for the set of objects.
4. Compare numbers telling if one is greater or less than the other.

II. Operations on Whole Numbers

Objective #2: The student will increase his knowledge of the four basic operations by recognizing symbols and an operation with two numbers and completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Given a pair of whole numbers and an operation, tell the third number that results.
6. Given a result, tell what operation is being performed on a pair of whole numbers.

III. Number Sentences

Objective #3: The student will increase his comprehension of number sentences by translating from statements in English to mathematical expressions and solving such expressions to the satisfaction of the teacher.

Activities:

The student will be able to:

7. Recognize the use of frames or letters (variables) in a number sentence as a method of indicating an unknown number.

8. Tell whether a given number sentence is an equality or an inequality.

9. Tell whether a given number sentence is true, false, or neither.

10. Make number sentences true.

11. Solve a number sentence with one variable.

12. Solve a number sentence where the same variable occurs more than once by using the same replacement for each occurrence of the variable.

13. Select and write number sentences for problems.

IV. Operations

Objective #4: The student will demonstrate an increase in his comprehension of the operations in our number system by interpreting examples and translating between inverse operations within the following suggested activities to the teacher's satisfaction.

Activities:

The student will be able to:

14. Find the sum in an addition such as 8 + 7 in less than 2 seconds.

15. State in his own words the commutative property of addition.

16. State in his own words the associative property of addition.

17. Find the difference in a subtraction such as 15-8 in less than 2 seconds.

18. Write related subtraction sentences for an addition sentence.

19. Find the product of a multiplication such as 8 x 7 in less than 2 seconds.

20. State the commutative and associative properties of multiplication in his own words.

21. Find the quotient of a division such as 56 ÷ 8 in less than 2 seconds.

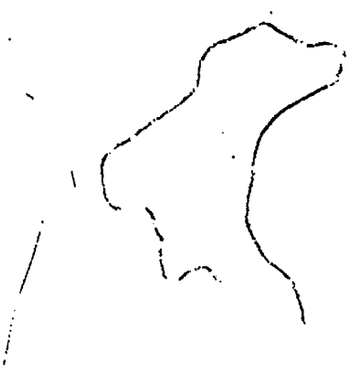
22. Divide any number by 1.

23. Divide zero by any number.

24. Divide any number other than zero by itself.

25. Recognize that we never divide by zero.

26. Write number sentences for problems with more than one variable.



MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF OUR POSITIONAL NUMERATION SYSTEM BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Ancient Numeration Systems

Objective #1: The student will demonstrate an increase in his knowledge of ancient numeration systems involving principles of repetition and addition by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Write standard numerals when Egyptian numerals are given, and vice versa.

2. Write standard numerals when Roman numerals are given, and vice versa.

II. Positional Numeration Systems

Objective #2: The student will demonstrate an increase in his comprehension of positional numeration systems by translating numbers among bases and interpreting place value of numbers within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Name the place value for the first nine positions in a standard numeral.

4. Write a standard or an expanded numeral, given the other, for numbers less than 1 billion.

5. Read and write word names for numbers up to 100 trillion.

6. Rename a product using exponential notation.

7. Write a standard numeral when exponential notation is given.

8. Write expanded numerals using exponential notation.

9. Write standard numerals when expanded numerals with exponential notation are given.

10. Write an expanded numeral when a base-five numeral is given.

11. Write a base-five numeral for the number of a given set less than 25.

12. Write a decimal number when a base-five numeral is given.

13. Add with regrouping in the first two places using base-five numerals.

14. Write decimal numerals when base-six, base-seven, or base-eight numerals are given.

15. Write a decimal numeral when a base-two numeral is given.

16. Write a base-two numeral when a decimal numeral less than 32 is given.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF ADDITION AND SUBTRACTION OF WHOLE NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Addition

Objective #1: The student will increase his comprehension of addition by interpreting the operation on numbers, the process of rounding off, and estimating within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Write a standard numeral for the sum of two whole numbers.
2. Add several whole numbers.
3. Use the associative property of addition in finding a sum.
4. Round any whole number less than 1,000 to the nearest ten.
5. Round any whole number less than 10,000 to the nearest hundred.
6. Round any whole number less than 100,000 to the nearest thousand.
7. Estimate a sum by rounding the addends to the nearest ten, to the nearest hundred, or to the nearest thousand.
8. Use numerical data shown on a map to solve problems involving addition of whole numbers.

II. Subtraction

Objective #2: The student will increase his comprehension of subtraction by interpreting the operation within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

10. Write a standard numeral for the difference of two whole numbers.

11. Find a difference using the short form for subtraction.

12. Check his work by adding.

13. Find differences such as 6,000 - 3,492 which involve zeros using the short form.

14. Use data from a table or answer questions involving addition or subtraction of whole numbers.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF MULTIPLICATION AND DIVISION OF WHOLE NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Multiplication

Objective #1: The student will increase his comprehension of multiplication by interpreting the process within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Solve sentences such as 3 x (6+3) = (3x6) + (3x3) without computing.
2. Apply the distributive property and do computations such as 5 x (3+4) in two ways.
3. Give a quick oral response (less than 5 seconds) to multiplications such as 8 x 100, 9 x 30, 30 x 40, 40 x 700, and 700 x 8,000.
4. Use the short form to find products of two factors where one factor is less than one million and the second factor is less than ten.
5. Use the short form to find products of numbers less than 100,000 and multiples of 10, 100, 1,000.
6. Multiply any two whole numbers less than 100,000, using the short form.
7. Multiply by a number whose numeral contains one or more zeros.
8. Round numbers to the nearest ten, hundred, or thousand and estimate the products.

II. Division

Objective #2: The student will increase his comprehension of division by interpreting the process within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

9. Find a missing factor in a multiplication sentence.

10. Perform a division by finding the missing factor in a related multiplication sentence.

11. Determine whether a quotient is between 1 and 10, 100 and 1,000, 1,000 and 10,000, and so on.

12. Choose the largest possible estimate which is a multiple of 10, 100, 1,000, etc. as the first estimate.

13. Find quotients.

14. Check by multiplication.

15. Divide to find the greatest multiple of the divisor that is less than the dividend, and then name the remainder.

16. Describe all possible values of the remainder without dividing.

17. Tell whether the quotient is a whole number by looking at the remainder.

18. Solve one-step problems using multiplication or division.

19. Solve problems involving more than one step.

20. Determine if a problem contains superfluous information.

21. Divide a number by any multiple of ten less than 1,000.

22. Divide by a number less than 100 where the dividend is less than 100,000.

23. Carry out the division algorithm with a divisor less than 10 without writing the partial quotients.

24. Carry out the short form of the division algorithm with a divisor between 10 and 100.

25. Use money notation correctly when dividing.

26. Find the average of a set of numbers.

27. Find the average of an unknown set of numbers when the number of addends and their sum are given.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF GEOMETRY BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Quadrilaterals and Triangles

Objective #1: The student will increase his knowledge of triangles and quadrilaterals by recognizing the differences and recalling the properties of specific types within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Construct a parallelogram, rectangle, square, and rhombus.
2. Classify quadrilaterals.
3. Give as many names for a specific quadrilateral as are appropriate, and tell which gives the most information.
4. Classify a triangle according to sides, as isosceles, equilateral, or scalene.
5. Classify a triangle according to angles as right, obtuse, or acute.

II. Congruent and Similar Figures

Objective #2: The student will increase his comprehension of geometric figures by interpreting and summarizing the properties within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

* 6. Draw a line of reflection (if one exists) between two figures.
* 7. Use graph paper to draw the reflection of a given figure.

*Optional activities in some programs.

8. Tell, for simple figures, whether a figure can be reflected to look exactly like another.

* 9. Explain that if figures can be made to look exactly alike by rotation, reflection, or both, they are congruent.

10. Given several simple figures, pick out those that are congruent to each other.

*11. Explain that if two figures look exactly alike or if one is an enlargement of the other, or if this is so after rotation or reflection or both, then the figures are similar.

12. Given simple figures, pick out those that are similar to each other.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF FACTORS AND MULTIPLES BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Prime and Composite Numbers

Objective #1: The student will increase his comprehension of prime and composite numbers by finding the factors of any given number within the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Tell whether a number is divisible by 2,3,5 and 10 by inspection.
2. List prime numbers from 1 to 20.
3. Use factor trees to find prime factorizations.
4. Find prime factorizations of selected numbers.

II. Factors and Multiples

Objective #2: The student will increase his comprehension of factors and multiples by interpreting within the following suggested activities to the satisfaction of the teacher.

5. Find all factors of a given numeral.
6. Determine if a number is a factor or a multiple of another number.
7. Find the first 10 multiples of a given number.
8. Find the greatest common factor of any two numbers less than 100.
9. Find the least common multiple of any two or three numbers, each less than 30.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF MULTIPLICATION AND DIVISION OF FRACTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Multiplication

Objective #1: The student will increase his comprehension of the multiplication of fractions by interpreting the methods within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Use a fraction to describe a part of a set or a part of a whole.
2. Write fractional numerals.
3. Identify the numerators and denominators.
4. Tell whether a fractional numeral names a number less than, greater than, or equal to 1.
5. Write fractional numerals for whole numbers.
6. Tell whether a fractional numeral names a whole number or a fraction.
7. Find products such as 7 x 1/4, 1/3 x 4, and 1/3 x 1/4.
8. State the commutative and associative properties of multiplication for the numbers of arithmetic.
9. Identify uses of the commutative and associative properties in finding products.
10. Find the product of any two numbers of arithmetic using the standard algorithm.
11. Write several equivalent fractional numerals for a number.
12. Check to see if two fractional numerals are equivalent by using the cross-products method.
13. Solve equations such as 3/4 = n/12 by using what he has learned from the cross-products method.

14. Describe the property of one for multiplication.

15. Describe the property of zero for multiplication.

16. Use the property of one to find sets of equivalent fractional numerals.

17. Rename numbers, such as 1/2, with a fractional numeral that has a different denominator.

18. Find the simplest fractional numeral for a number.

19. Use =, <, or > to compare numbers of arithmetic.

20. Read and write mixed numerals.

21. Write a fractional numeral when a mixed numeral is given.

II. Division

Objective #2: The student will increase his comprehension of division of fractions by interpreting methods within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

22. Write a division when a fractional number is given.

23. Write a fractional numeral when a division is given.

24. Convert from a fractional numeral such as 7/2 to a mixed numeral, 3 1/2.

25. Find the reciprocal of a number.

26. Recognize that multiplying the dividend and divisor by the same number (except o) does not affect a quotient.

27. Find a quotient by multiplying the dividend by the reciprocal of the divisor.

28. Recognize the fact that the following is true for any numbers of arithmetic $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$

29. Divide with the numbers of arithmetic using complex fractions.

30. Solve word problems involving multiplication and division of fractional numbers.

ADDITION & SUBTRACTION OF FRACTIONS

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF ADDITION AND SUBTRACTION OF FRACTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Addition

Objective #1: The student will increase his comprehension of addition of fractions by interpreting methods within the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Add with fraction numerals when denominators are alike.
2. Use the commutative and associative properties in addition of fractions.
3. Add with mixed numerals when denominators are alike and write answer in the simplest form.
4. Add with fractional numerals by finding a common denominator.
5. Add with fractional numerals by finding the least common denominator.
6. Find sums using mixed numerals having different denominators.
* 7. Use a bar graph as a visual method of organizing and presenting numerical data.
* 8. Interpret a bar graph and answer questions based upon the information shown on it.
9. Solve word problems involving addition and subtraction of fractions.

II. Subtraction

Objective #2 The student will increase his comprehension of subtraction of fractions by interpreting methods within the following suggested activities to the satisfaction of the teacher.

*Optional activities in some programs.

Activities

The student will be able to:

10. Subtract using fractional numerals.

11. Find differences using mixed numerals when renaming is not necessary.

12. Find differences using mixed numerals where renaming is necessary.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF INTEGERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Addition

Objective #1: The student will increase his comprehension of integers by interpreting the addition of integers within the following suggested activities to the satisfaction of the teacher.

Activities:

1. Use integers to represent physical situations involving opposites.
2. Add two negative integers.
3. Add any integer and zero.
4. Add a positive and a negative integer.
5. Write an addition sentence to fit a story using positive and negative integers.
6. Relate the number line to addition of integers.
7. Write a number sentence for an addition shown by a number line picture.
* 8. Read a broken-line graph.

II. Subtraction

Objective #2: The student will increase his comprehension of integers by interpreting the subtraction of integers within the following suggested activities to the satisfaction of the teacher.

Activities:

9. Find differences, using related addition sentences and the number line.
10. Name the inverse of any integer.
11. Find differences by adding inverses.
12. Solve word problems using addition and subtraction of integers.

*Optional activities in some programs.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF DECIMAL FRACTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Concepts

Objective #1: The student will increase his comprehension of the basic concepts of decimal fractions by interpreting the meaning of decimal fractions within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Write decimals when fractional or mixed numerals expressed in tenths or hundredths are given and vice versa.
2. Write decimals when word names are given and vice versa.
3. Write a decimal equivalent to another decimal.
4. Write a fractional numeral equivalent to a decimal, or a decimal equivalent to a fractional numeral.
5. Read decimal numerals up to hundred-thousandths.
6. Write fractional numerals when decimal numerals up to hundred-thousandths are given and vice versa.
7. Compare two decimals numerals in order to tell which names the greater (or lesser) number.

II. Operations With Decimals

Objective #2: The student will increase his comprehension of decimal fractions by interpreting the operations performed on decimal fractions within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

8. Add decimal numerals.

9. Subtract decimal numerals.

10. Find the product of any whole number and .1, .01, .001, or .0001.

11. Re-name a given product to show a whole number and .1, .01, .001, or .0001 as factors.

12. Find the product of a whole number and a decimal numeral up to hundred-thousandths.

13. Find products with decimals when the factors are both fractions.

14. Round a number to the nearest one, tenth, hundredth, or thousandth.

15. Make reasonable estimates of products where one or both factors are decimal fractions.

16. To recognize how estimates can be used to place the decimal point in a product.

17. Identify a missing factor when the second factor and product is given.

18. Divide a decimal fraction by a whole number.

19. Convert fractions to decimals by dividing the numerator by the divisor.

20. Round and divide mentally to place a decimal point in a quotient.

21. Write a standard numeral in scientific notation.

22. Write a numeral expressed in scientific notation as a standard numeral.

23. Divide two decimal numerals.

24. Divide to find repeating decimals for certain fractions.

25. Identify and write repeating decimals that appear in the quotients of some division problems.

III. Problem Solving

Objective #3: The student will demonstrate an increase in applying the principles of decimals by writing equations for word problems and then solving to the satisfaction of the teacher.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF GEOMETRIC MEASUREMENT BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Areas

Objective #1: The student will demonstrate an increase in his comprehension of finding areas of rectangular and triangular regions by engaging in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Find the area of a rectangular region by multiplying length by width.
2. Find the area of a right triangular region by computing.
3. Draw a segment perpendicular to the bases in a parallelogram.
4. Compute the area of a parallelogram where the length of a base and the height is known.
5. Draw a segment from any vertex of a triangle perpendicular to the opposite base (in some cases this segment will be outside the triangle).
6. Compute the area of a triangle once the length of a base and the height are known by using the formula A=1/2bh

II. Scale Drawings

Objective #2: The student will increase his ability to apply the concepts of scale drawings by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

7. Measure a part and calculate the size of the actual object from a scale drawing where the scale is known.
8. Make a scale drawing of a simple polygon which will be half the size or twice the size.

9. Measure an angle and state the size of that angle on the actual object from a scale drawing where the scale is known.

*10. Measure the scale drawing of a room, and compute actual distances knowing the scale.

*11. Measure a map and compute actual distances knowing the scale.

*12. Make a simple scale drawing, such as that of a room.

III. Circles

Objective #3: The student will increase his comprehension of circles by interpreting within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

13. Explain what the symbol π means.

14. Compute the circumference of a circle knowing the length of its radius or diameter using either 3.14 or 22/7 as approximations for π.

15. Draw a circle using a compass or a device constructed with a piece of cardboard.

16. Write the formula $A = \pi \times r^2$ and explain what it means.

17. Compute the area of a circular region knowing the length of the radius and using either 22/7 or 3.14 for π and write the answer with the correct unit (square inches, etc.).

IV. Volume

Objective #4: The student will increase his comprehension of solid figures and their volume by interpreting within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*Optional activities in some programs.

18. Draw pictures of a rectangular prism, a triangular prism, a cone, and a cylinder.

19. Recognize spherical shapes.

20. Identify vertices, edges, and faces from a drawing of a prism.

21. Identify the vertex and base from a drawing of a cone.

22. Write the formula V = l x w x h and explain what it means.

23. Compute the volume of a rectangular prism and the volume of a right triangular prism.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF RATIO AND PER CENT BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Ratio

Objective #1: The student will increase his comprehension of ratio by engaging in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Write a ratio to compare one number to another.
2. Interpret rate as a special kind of ratio.

II. Percent

Objective #2: The student will increase his comprehension of percent by translating from one number form to another in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Write a percent numeral from fractional numerals with denominator 100.
4. Name the missing numerator in sentences like 28% = n/100.
5. Write percent notation for a ratio, as for example. 4 out of 25 is 16%.
6. Find a percent of a number.
7. Solve sentences with percents involving a missing factor.
8. Write percent notation for any fractions.
9. Recognize the terms interest and interest rate and solve simple interest problems.
10. Recognize the terms discount and discount rate and solve problems involving discount.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF SETS IN GENERAL AND THE SET OF WHOLE NUMBERS IN PARTICULAR BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Types of Sets

Objective #1: The student will increase his comprehension of sets by interpreting the properties of various types of sets within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Recognize a set.
2. Correctly use the following symbols in working with sets: $\{\}$, $\in$, A = .
3. Describe the empty set as one having no elements.
4. Designate the empty set by $\{\}$ or $\emptyset$.
5. Recognize and describe finite sets.
6. Recognize and describe infinite sets.
7. Correctly use the "and so on" notation (...) in both infinite sets and finite sets having more than ten elements.
8. Recognize the set of whole numbers.
9. Indicate the set of whole numbers using set notation.
10. Recognize and indicate the set of digits.

II. The Decimal System

Objective #2: The student will increase his comprehension of our decimal system of numeration by engaging in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

11. Demonstrate ability to combine digits to form numerals from 0 through 999,999,999,999.

12. Identify the hundreds, thousands, millions, and billions blocks in a number.

13. Identify the place value of any digit in a number from 0 through 999,999,999,999.

14. Multiply whole numbers having 1, 2, 3, 4, or 5 digits.

15. Express a number in exponential form knowing how many times it is used as a factor.

16. Express an exponential number in conventional form up to the value of 10,000.

17. Express a power of ten up to 1,000,000,000 in exponential form.

18. Express a whole number as the product of a number between 1 and 10 and a power of 10.

19. Express multiples of ten from 10 - 90, multiples of one hundred from 100 to 900, multiples of one thousand from 1000 - 9000 and so on to multiples of one billion from 1,000,000,000 - 10,000,000,000 as a digit times a power of ten.

20. Express a whole number up to one billion as the sum of the products of each digit times its place value as a whole number.

21. Express a whole number up to one billion as the sum of the products of each digit times its place value as a power of ten.

III. Number Systems other than the Decimal

Objective #3: The student will increase his comprehension of the decimal system by expressing numerals in other systems and bases other than the base ten as indicated by the following activities evaluated by the teacher.

Activities:

The student will be able to:

22. Express the decimal numerals 1 - 3000 in the Roman system.

23. Express the Roman numerals 1 - MMM in the decimal system.

*(24). Express the decimal numerals 1 - 9,999,999 in the Egyptian system providing the Egyptian symbols and their decimal equivalents are given.

*(25). Express the Egyptian numerals in the decimal system providing the Egyptian symbols and their decimal equivalents are given.

*(26). Express the expanded form of any numeral in any base 2-12.

*(27). Demonstrate the ability to convert from a numeral in any base 2-12 to a numeral in base 10.

*(28). Demonstrate the ability to convert from a numeral in base 10 to a numeral in any base 2-12.

29. Change word sentences into mathematical sentences or statements.

*Optional activities in some programs.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF THE PROPERTIES AND OPERATIONS OF WHOLE NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Properties of Whole Numbers

Objective #1: The student will increase his knowledge of the properties of whole numbers by recognizing and recalling the properties within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Recognize and state, using both numerals and variables, the:
   a. commutative property of addition,
   b. commutative property of multiplication,
   c. associative property of addition,
   d. associative property of multiplication,
   e. distributive property of multiplication over addition.
2. Recognize and state, using both numerals and variables, the:
   a. property of one under multiplication,
   b. property of one under division,
   c. property of non-zero number divided by itself.
3. Recognize and state, using both numerals and variables, the:
   a. property of zero under addition,
   b. property of zero under division ($0 \div n$),
   c. property of zero under multiplication,
   d. undefined property of zero under division ($n \div 0$).

II. Operations with Whole Numbers

Objective #2: The student will increase his comprehension of the operations performed on whole numbers by engaging within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

4. State the inverse operations of addition and subtraction.

5. State the relationship: $a - b = c$ if and only if $c + b = a$.

6. Perform the operations of addition and subtraction with numerals having seven digits or less.

7. State the inverse operations of multiplication and division.

8. State the relationship: $a \div b = c$ if and only if $c \times b = a$.

9. Perform the operations of multiplication and division with numerals having four digits or less.

10. Round whole numbers up to 9,000,000 to the nearest:

    a. ten

    b. hundred

    c. thousand

    d. ten thousand

    e. hundred thousand

    f. million

III. Problem Solving

Objective #3: The student will increase his ability to apply the properties and operations of whole numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

11. Calculate the arithmetic mean of 2, 3, 4, 5, 6, 7, or other given sets of numbers.

12. Demonstrate reasoning and application of the four operations of addition, subtraction, multiplication, and division by solving word problems.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF THE STRUCTURE OF OUR NUMBER SYSTEM BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Sets and Factors

Objective #1: The student will increase his comprehension of certain sets and the sets of factors of numbers by engaging in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Recognize and state the set of whole numbers.
2. Recognize and state the set of even numbers.
3. Recognize and state the set of odd numbers.
4. Identify the factors and product of a multiplication example.
5. Identify all elements of the set of factors of a number less than 1000.
6. Express any number as a product of the two factors, 1 and the number.

II. Prime and Composite Numbers

Objective #2: The student will increase his comprehension of whole numbers by interpreting given numbers as prime or composite within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

7. Define a prime number.
8. Identify the elements of the set of prime numbers less than 100.
9. Define a composite number.

10. Determine a whole number less than 1000 as being prime or composite.

11. Express a composite number less than 1000 as a product of its prime factors.

12. State the divisibility test for 2, 3, 4, 5, 6, 8, 9, and 10.

13. Demonstrate ability to use the divisibility tests for numbers less than 1000.

III. Common Factors and Common Multiples

Objective #3: The student will increase his comprehension of factors and multiples by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

14. Determine the common factors and the greatest common factor of 2, 3, or 4 numbers.

15. Determine the common multiples and the least common multiple of 2, 3, or 4 numbers.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF RATIONAL NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Concepts

Objective #1: The student will increase his comprehension of the basic concepts of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a fraction.
2. Express a part of a set, region, or object as a fraction.
3. Define equivalent fractions.
4. Determine if any two given fractions are equivalent.
5. Create at least five fractions which are equivalent to a given fraction.
6. Establish an equivalent or inequality relationship between any two given fractions.
7. Define a "fraction in lowest terms."
8. Express a fraction in lowest terms if the numerator and denominator are less than or equal to 1000..

II. Types of Fractions

Objective #2: The student will increase his knowledge of the possible types of fractions which exist by recognizing them in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

9. Define a proper fraction.

10. Define an improper fraction.

11. Define like fractions.

12. Define unlike fractions.

13. Define mixed fractions.

14. Determine the type of any given fraction.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF RATIONAL NUMBERS BY COMPLETING THE FOLLOWING LEVEL ON RATIONAL NUMBER OPERATIONS TO THE SATISFACTION OF THE TEACHER.

I. Addition and Subtraction

Objective #1: The student will increase his comprehension of addition and subtraction of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Add and subtract like fractions.
2. Determine the least common denominator of at least four fractions where the least common denominator is less than or equal to 1000.
3. Add and subtract positive and negative rational numbers.

II. Multiplication

Objective #2: The student will increase his comprehension of multiplication of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

4. Define multiplication of common fractions.
5. Multiply common fractions.
6. Express mixed fractions as common fractions.
7. Multiply mixed fractions.
8. Multiply combinations of common fractions and mixed fractions.

III. Division

Objective #3: The student will increase his comprehension of division of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

9. Define reciprocals.

10. Identify the reciprocal of any given whole number, common fraction, or mixed fraction.

11. Define division of two fractions.

12. Divide combinations of whole numbers, common fractions, and mixed fractions.

13. Calculate a missing factor given a product and one factor.

14. Solve word problems involving fractional operations.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF DECIMAL FRACTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Place Value

Objective #1: The student will increase his comprehension of decimal fractions by interpreting place value within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Write in words decimal fractions having up to and including six places.
2. Express decimal fractions which are written in words as numerals up to and including six places.
3. Recognize the place value for each digit in a decimal fraction having up to and including six places.
4. Express decimal fractions having up to and including six places in expanded notation using powers of one-tenth or (optional - using negative powers of ten).
5. Express decimal fractions having up to and including six places as common fractions.
6. Express decimal mixed fractions having up to and including six decimal places as mixed fractions.
7. Round decimal fractions to the nearest tenth, hundredth, thousandth, ten-thousandth, and hundred-thousandth.
8. Establish an inequality relationship between any two given decimal fractions of up to and including six places.

II. Operations

Objective #2: The student will increase his comprehension of the operations of decimal fractions by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

9. Add at least five decimal fractions having up to six places each.

10. Subtract any two decimal fractions having up to six places each.

11. Multiply any two decimal fractions having up to four places each.

12. Multiply mentally a decimal fraction by a power of ten up to ten to the sixth power.

13. Divide a decimal fraction or decimal mixed fraction by a whole number.

14. Divide a whole number by a decimal fraction or decimal mixed fraction.

15. Divide a decimal fraction or decimal mixed fraction by a decimal fraction or decimal mixed fraction.

16. Mentally divide a decimal fraction or decimal mixed fraction by a power of ten up to ten to the sixth.

17. Express a mixed fraction as a decimal mixed fraction.

18. Correctly use the bar notation to express repeating decimals.

19. Express a whole number of decimal fraction estimate of the sum, difference, product, or quotient of decimal fractions.

20. Express a decimal fraction or a decimal mixed fraction as the product of a number between one and ten and a power of ten or one-tenth.

21. Solve word problems involving decimal operations.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION ON NON-METRIC GEOMETRY BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Terms

Objective #1: The student will increase his knowledge of the basic geometric terms by defining and recognizing terms within the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Correctly recognize and recall the concepts of point, line, and plane through written and verbal communication.
2. Identify and label points, lines, and planes with appropriate notation.
3. Find the measure of all the angles on a teacher-made exercise.
4. Define a line segment.
5. Identify and label line segments using appropriate notation.
6. Define a ray.
7. Identify and label rays using appropriate notation.

II. Angles and Their Measure

Objective #2: The student will increase his comprehension of angles and their measurement by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

8. Define an angle.
9. Identify and label angles using appropriate notation.

10. Define a degree.

11. Define an acute angle.

12. Define a right angle.

*13. Define an obtuse angle.

14. Use a protractor for measuring angles.

15. Use a protractor for constructing angles.

16. Identify by sight angles which are acute or obtuse.

III. Types of Lines, Line Segments, and Rays

Objective #3: The student will increase his knowledge of the various types of line, line segments, and rays by recognizing and defining terms within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

17. Identify horizontal, vertical, and oblique lines, line segments, and rays.

18. Define perpendicular lines, line segments, or rays.

19. Define parallel lines, line segments, or rays.

20. Define skew lines.

21. Define a congruence relation between two line segments.

22. Define a congruence relation between two angles.

IV. Polygons and Solids

Objective #4: The student will be able to increase his knowledge of plane and solid figures by recognizing and defining these figures in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*Optional activities in some programs.

23. Recognize and define a(n):

    a. triangle

    b. quadrilateral

    c. square

    d. rectangle

    e. parallelogram

    f. trapezoid

    g. pentagon

    h. hexagon

    i. septagon

    j. octagon

    k. nonagon

    l. decagon

    m. dodecagon

    n. circle

24. Recognize and define a:

    a. rectangular prism

    b. cube

    c. pyramid

    d. sphere

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF METRIC GEOMETRY BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Understanding

Objective #1: The student will increase his knowledge of the basic concepts of metric geometry by recognizing and recalling definitions and basic units of measurement within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define and use measurement as a comparison of lengths, areas, or volumes.

2. Recall basic units of length, area, and volume involving units of inch, foot, yard, and mile.

II. Perimeter, Area, and Volume

Objective #2: The student will increase his ability to apply formulas to find the perimeter, area, or volume of various geometric figures indicated in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to;

3. Determine the perimeter of any polygon given the measure of each side.

4. Apply the formulas for finding the perimeter of a square and rectangle and the circumference of a circle.

5. Apply the formulas for finding the area enclosed by a:

   a. triangle

   b. rectangle

c. square

d. parallelogram

e. trapezoid

f. circle

6. Apply the formula for finding the volume of a rectangular prism.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF RATIO AND PROPORTION BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Ratio

Objective #1: The student will increase his comprehension of ratio by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a ratio.
2. Define the simplest form of a ratio.
3. Express a ratio in simplest form.

II. Proportion

Objective #2: The student will increase his comprehension of proportion by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

4. Define a proportion.
5. Identify the means and extremes of a proportion.
6. Test the equivalency of two ratios.
7. Determine a missing term in a proportion knowing the other three terms.

III. Problem Solving

Objective #3: The student will increase his ability to solve problems involving ratio and proportions by completing at least twenty problems to the satisfaction of the teacher.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF PER CENT BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Equivalent Forms

Objective #1: The student will increase his comprehension of per cent by translating among the fractional, decimal, and per cent forms of a number by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Accurately describe the concept of per cent through both written and oral communication.
2. Identify the fractional and decimal equivalents of a per cent.
3. Express x% as a ratio x:100 and as a fraction x/100.
4. Express a per cent as an equivalent ratio, fraction, or decimal.
5. Express a ratio as an equivalent per cent.
6. Express a fraction as an equivalent per cent.
7. Express a decimal as an equivalent per cent.

II. Problem Solving

Objective #2: The student will increase his ability to apply the concepts of ratio and proportion to solving word problems by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

8. Demonstrate ability to solve word problems involving percents by utilizing the concept of ratio and proportion, such word problems to involve at least:

a. simple interest

b. discount

c. commission

d. sales tax

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF SET THEORY BY COMPLETING THE FOLLOWING SUGGESTED ACTIVITIES TO THE SATISFACTION OF THE TEACHER.

I. Terminology and Types of Sets

Objective #1: The student will increase his knowledge of basic set notation and types of sets by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Recognize a set.
2. Correctly use the following symbols in working with sets: $\{\}$, $\in$, $A =$
3. Describe the empty set.
4. Designate the empty set by $\{\}$ or $\emptyset$.
5. Recognize and describe finite and infinite sets.
6. Correctly use the "and so on" notation (...).
7. Recognize and designate the set of whole numbers using set notation.
8. Recognize and designate the set of digits using set notation.
9. Define a subset.
10. Correctly use the subset notation, .
11. Define a proper subset.
12. Correctly use the proper subset notation, .

II. Set Operations and Relations

Objective #2: The student will increase his comprehension of sets by interpreting the operations and relations of sets in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

13. Define the union of two sets.

14. Define the intersection of two sets.

15. Correctly use the union ($\cup$) and intersection ($\cap$) notation.

16. Determine the resulting set from the union or intersection of two given sets.

17. Define disjoint sets.

18. Define equal sets.

19. Define overlapping sets.

20. Identify the relationships between two or three sets from a Venn diagram.

21. Create a Venn diagram indicating the relationship between two or three given sets.

22. Recognize and then recall the following set operations:

    a. $A \cup \emptyset = A$

    b. $A \cap \emptyset = \emptyset$

    c. $A \cup A = A$

    d. $A \cap A = A$

23. Define the universal set.

24. Define the complement of a set.

25. Identify the complement of a set given the set and the universal set.

26. Recognize and then recall the following set equivalencies:

    a. $U = \overline{\emptyset}$

    b. $\emptyset = \overline{U}$

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF POSITIONAL NUMBER SYSTEMS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. The Decimal System

Objective #1: The student will increase his comprehension of the decimal system by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Identify the hundreds, thousands, millions, and billions blocks in a number.

2. Identify the place value of any digit in a number from 0 through 999,999,999,999.

3. Convert an exponential number to conventional form up to the value of 10,000.

4. Express a power of ten up to 1,000,000,000 in exponential form.

5. Express a whole number up to one billion as the sum of the products of each digit times its place value as a power of ten.

II. Bases Other Than Ten

Objective #2: The student will increase his comprehension of base systems other than ten by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*(6). Convert from the decimal system numbers up to 3,000 to the Roman system and vice versa.

*(7). Convert the decimal numerals 1 - 9,999,999 to the Egyptian system and vice versa providing the Egyptian symbols and their decimal equivalents are given.

*Optional activities in some programs.

*(8). Demonstrate the ability to convert from a numeral in any base 2 - 12 to a numeral in base 10 and vice versa.

*(9). Demonstrate ability to add two whole numbers (equivalent to a three place decimal whole number) in any base 2 - 12.

*(10). Demonstrate ability to subtract two whole numbers (equivalent to a three place decimal whole number) in any base 2 - 12.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF WHOLE NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Properties and Operations

Objective #1: The student will increase his comprehension of whole number operations and properties by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Recognize and state, using both numerals and variables, the:
   a. commutative property of addition and multiplication
   b. associative property of addition and multiplication
   c. distributive property of multiplication over addition
   d. property of one under multiplication and division
   e. property of a non-zero number divided by itself
   f. property of zero under addition and multiplication
   g. property of zero under division ($0 \div n$) and ($n \div 0$)
2. State the inverse operation of each of the four basic operations.
3. Perform the operations of addition and subtraction with numerals having seven digits or less.
4. Perform the operations of multiplication and division with numerals having four digits or less.

II. Problem Solving

Objective #2: The student will increase his application of the whole number operations by completing at least twenty word problems to the satisfaction of the teacher.

III. Types of Numbers

Objective #3: The student will increase his comprehension of the whole numbers by interpreting the characteristics of the subsets in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Identify and define the following numbers:
   a. odd and even
   b. prime and composite
   c. whole
   d. all factors of a given number
6. Determine a whole number less than 1000 as being prime or composite.
7. Express a composite number less than 1000 as a product of its prime factors.

IV. Factors and Multiples

Objective #4: The student will increase his comprehension of factors and multiples by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

8. State and use the divisibility tests of 2, 3, 4, 5, 6, 8, 9, and 10 for numbers less than 1000.
9. Determine the common factors and the greatest common factor of 2, 3, or 4 numbers.
10. Determine the common multiples and the least common multiples of 2, 3, or 4 numbers.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF INTEGERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Inverse Equivalencies

Objective #1: The student will increase his knowledge of integers by recognizing and stating the inverse equivalencies within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. State, using both numerals and variables, the following equivalencies:

   a. $a - b = a + (-b)$

   b. $a \div b = a \times 1/b$

   c. $a - b = c$ if and only if $c + b = a$

   d. $a \div b = c$ if and only if $bc = a$

II. Operations and Relationships

Objective #2: The student will increase his comprehension of the operations and relationships of integers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

2. Perform the following operations with all integers:

   a. addition

   b. subtraction

   c. multiplication

   d. raising to a positive power

   e. division

3. Define the "less than" relationship between any two integers.

4. Establish a "less than", "equal to", or "greater than" relationship between any two integers.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF RATIONAL NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Concepts

Objective #1: The student will increase his comprehension of the basic concepts of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Define a rational number.
2. Define and determine equivalent rational numbers.
3. Define a "fraction in lowest terms", a proper fraction, an improper fraction, like fractions, unlike fractions, mixed fractions, and complex fractions.
4. Establish "less than" or "greater than" relationships between any two given rational numbers.

II. Operations (see page 17)

Objective #2: The student will increase his comprehension of the operations of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Add and subtract like and unlike fractions.
6. Define multiplication of two rational numbers.
7. Multiply rational numbers.
8. Define division of two rational numbers.
9. Divide rational numbers.
10. Convert a complex fraction to a common fraction in simplest form.

Objective #3: The student will increase his comprehension of the operations of negative rational numbers to the satisfaction of the teacher.

IRRATIONAL NUMBERS

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MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF IRRATIONAL NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Concepts

Objective #1: The student will increase his comprehension of the basic concepts of irrational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*1. Define an irrational number.

*2. Create examples of irrational numbers.

*3. Communicate the idea that irrational numbers are real numbers and do not need to approximate whole numbers.

*4. Identify the inverse operation of raising to powers as finding roots.

* 5. Correctly use the terminology of "radical sign", "radicand", "index", and "root".

II. Square Roots and Pythagorean Theorem

Objective #2: The student will increase his comprehension of square roots and the Pythagorean Theorem by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

* 6. State the square roots of the perfect squares from 1 to 144 without computation.

* 7. Estimate the square roots of all whole numbers less than 1000, accurate to the nearest whole number.

*Optional activities in some programs.

* 8. Correctly use a table of roots.

* 9. State the Pythagorean Theorem.

*10. Identify the hypotenuse and legs of any given right triangle.

*11. Determine the length of a missing side of a right triangle given the other two sides.

*12. Determine the square root of a number.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF RATIO AND PROPORTION BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Ratio

Objective #1: The student will increase his comprehension of ratio by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a ratio.
2. Define the simplest form of a ratio.
3. Express a ratio in simplest form.

II. Proportion

Objective #2: The student will increase his comprehension of proportion by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

4. Define a proportion.
5. Identify the means and extremes of a proportion.
6. Test the equivalency of two ratios.
7. Determine a missing term in a proportion knowing the other three terms.

III. Problem Solving

Objective #3: The student will increase his ability to solve problems involving ratio and proportions by completing at least twenty problems to the satisfaction of the teacher.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF PER CENT BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Equivalent Forms

Objective #1: The student will increase his comprehension of per cent by translating among the fractional, decimal, and per cent forms of a number by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Accurately describe the concept of per cent through both written and oral communication.
2. Identify the fractional and decimal equivalents of one per cent.
3. Express x% as a ratio x:100 and as a fraction x/100.
4. Express a per cent as an equivalent ratio, fraction, or decimal.
5. Express a ratio as an equivalent per cent.
6. Express a fraction as an equivalent per cent.
7. Express a decimal as an equivalent per cent.

II. Problem Solving

Objective #2: The student will increase his ability to apply the concepts of ratio and proportion to solving word problems by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

8. Demonstrate ability to solve word problems involving per cents by utilizing the concept of ratio and proportion, such word problems to involve at least:

a. simple interest

b. discount

c. commission

d. sales tax

9. Estimate to a whole number the solution to problems involving per cent.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF GEOMETRY BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Figures

Objective #1: The student will increase his comprehension of geometry by interpreting and labeling basic figures in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Correctly interpret and label points, lines, and planes with apporpriate notation.
2. Identify and label line segments and rays and angles.
3. Define, measure with a protractor, and construct with a protractor acute, right, and obtuse angles.
4. Define and identify horizontal, vertical, oblique, perpendicular, parallel, and skew lines, line segments, and rays.

II. Perimeter and Polygons

Objective #2: The student will increase his comprehension of polygons and their perimeters by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Recognize and define a(n) triangle, quadrilateral, square, rectangle, parallelogram, trapezoid, pentagon, hexagon, septagon, octagon, nonagon, decagon, dodecagon, and circle.
6. Determine the perimeter of polygons given the measure of each side.

7. Recall and use the formulas for finding the perimeter of a square, rectangle, regular polygons, and the circumference of a circle.

III. Area and Volume

Objective #3: The student will increase his ability to apply geometric formulas of area and volume by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

8. Apply the formulas for finding the area enclosed by a: triangle, rectangle, square, parallelogram, trapezoid, and circle.

9. Determine the area enclosed by figures which may be a combination of triangles, rectangles, squares, parallelograms, trapezoids, and circles.

10. Recognize and define a rectangular prism, cube, pyramid, sphere, cylinder, and cone.

11. Apply the formula for finding the volume of a rectangular prism, cube, pyramid, sphere, cylinder, and cone.

IV. Congruence and Transversals

Objective #4: The student will increase his comprehension of geometry by interpreting congruence relationships among line segments, angles, triangles, and quadrilaterals by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

12. Define a congruence relation between two line segments and two angles.

13. Define a congruence relation between two triangles and two quadrilaterals.

14. Define a transversal.

15. Identify and determine congruence where applicable of alternate interior angles, alternate exterior angles, and corresponding angles.

V. More Angles

Objective #5: The student will increase his comprehension of angles by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

16. Define, identify, and construct with appropriate instruments the following angles:

    a. supplementary

    b. complementary

    c. vertical

    d. central

    e. inscribed

17. State and illustrate by any method that the sum of the measures of the angles of a triangle is 180 degrees.

18. Determine missing angles in various geometric figures where enough information is given.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF THE METRIC SYSTEM BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Concepts

Objective #1: The student will increase his knowledge of the metric system by recognizing and identifying basic metric prefixes and units of measurement in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Recognize and identify the six basic prefixes in the metric system:
   a. kilo
   b. hecto
   c. deka
   d. deci
   e. centi
   f. milli
2. Recognize and identify the three basic units of measurement:
   a. meter (length)
   b. liter (volume)
   c. gram (mass)

II. Conversions

Objective #2: The student will increase his ability to apply conversions within the metric system and between the metric system and the British-American system by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Convert from one metric unit of length to another metric unit of length.

4. Convert from one metric unit of mass to any other metric unit of mass.

5. Convert from one metric unit of volume to any other metric unit of volume.

*(6). Convert from the British-American system of measurement to the metric system given appropriate conversion tables.

*(7). Convert from the metric system to the British-American system given appropriate conversion tables.

*Optional activities in some programs.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF EQUATIONS AND INEQUALITIES BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Sentences and Sets

Objective #1: The student will increase his comprehension of number sentences and sets by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Identify a mathematical sentence.
2. Distinguish between true mathematical sentences and false mathematical sentences.
3. Describe the nature of a variable.
4. Describe the nature of a constant.
5. Define a replacement set.
6. Define a solution set.
7. Determine a solution set for equations in one variable involving rational numbers.
8. Determine the solution set for inequalities in one variable involving rational numbers.
9. Define equivalent equations and inequalities.
10. Define like terms in an equation or inequality in one variable.
11. Combine like terms in an equation or inequality in one variable.

II. Simplifying and Solving

Objective #2: The student will increase his ability to apply properties of solution to solving equations and inequalities within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

12. Simplify equations or inequalities in one variable to the form $x = k$, $x < k$, $x > k$.

13. Apply addition and subtraction properties to an equation or inequality to simplify it.

14. Apply multiplication and division properties to an equation or inequality to simplify it.

15. Solve equations and inequalities using rules of simplification.

16. Solve equations of the form $x^2 = k$.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF THE GRAPHING OF ORDERED PAIRS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Terminology

Objective #1: The student will increase his knowledge of graphing by recognizing and identifying basic terminology in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Establish a Cartesian-coordinate system with labeled axis and unit lengths.
2. Define an ordered pair.
3. Identify and correctly describe terms such as ordinate, abscissa, origin, quadrant, and axis associated with a Cartesian coordinate system.

II. Cartesian Co-ordinates

Objective #2: The student will increase his ability to apply properties of a Cartesian coordinate system to the graphing of points and equations in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

4. Plot ordered pairs from the set of integers.
5. Identify the four quadrants of a Cartesian-coordinate system.
6. Identify the sign of both the ordinate and abscissa in each of the four quadrants.
7. Identify the ordered pair of a given point.
8. Graph the solution set of linear equation in two variables.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF NUMBERS AND SETS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Numbers

Objective #1: The student will increase his comprehension of numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. State which of the following types of numbers a given number is: cardinal, ordinal, natural, whole, odd, even, composite.

2. Define and identify prime numbers.

II. Sets

Objective #2: The student will increase his comprehension of sets by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Determine if an element is a member of a given set.

4. Define the null set.

5. State if a set is finite, infinite or null.

III. Factors and Multiples

Objective #3: The student will increase his comprehension of factors and multiples by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

6. Determine factors, common factors, and the greatest common factor, including the Euclid method for finding the greatest common factor.

7. Completely factor numbers.

8. Find multiples, common multiples and the least common multiple of a set of numbers.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF SYSTEMS OF NUMERATION BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Decimal System of Numeration

Objective #1: The student will increase his comprehension of the decimal system of numeration by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Read and write numerals naming whole numbers.
2. Define the terms exponent and base.
3. Express numbers in exponential form.
4. Express numerals in expanded form.

II. Non-Decimal Systems of Numeration

Objective #2: The student will increase his comprehension of non-decimal systems of numeration by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*5. Count in any base from two through twelve.
6. Express a numeral given in a base other tha en as a base ten numeral.
7. Express a base ten numeral in a base other than ten.
8. Express a non-decimal numeral as another non-decimal numeral in a different base.

*Optional activities in some programs.

9. Perform the factorial operations on any given number.

*(10) Add, subtract, multiply and divide in non-decimal bases.

*11. Add and multiply in modular arithmetic.

12. Write mathematical phrases from given word phrases involving whole numbers.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF FRACTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Types of Fractions

Objective #1: The student will increase his comprehension of fractions by interpreting and translating among the various types of fractions within the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Express a fraction in lowest terms.
2. Express a fraction in higher terms.
3. Determine if two fractions are equivalent.
4. Determine if a numeral is a proper fraction, an improper fraction or a mixed number.
5. Find the lowest common denominator of a given set of fractions.
6. Determine if a fraction is less than, equal to, or greater than another fraction by using the common denominator method or the theorem method.

II. Computation

Objective #2: The student will increase his ability to apply the principles of computation with fractions in the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

7. Add and subtract fractions, with like and unlike denominators.

8. Add and subtract any combination of fractions involving whole numbers and mixed numbers.

9. State a definition for multiplicative inverse.

10. Multiply and divide fractions in any form.

11. Determine the multiplicative inverse (reciprocal) of a given number.

III. Fractional Relationships Between Numbers

Objective #3: The student will increase his comprehension of the fractional relationships existing between numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

12. Determine a fractional part of a number.

13. Determine what fractional part one number is of another.

14. Determine a number when a fractional part is known.

15. Write the correct mathematical phrase from the given word phrases involving fractions.

DECIMAL FRACTIONS

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF DECIMALS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Concepts

Objective #1: The student will increase his comprehension of place value, expanded form, rounding off, and relationships between decimals by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Read and write numerals naming decimal fractions.
2. Write a decimal numeral in expanded form.
3. Round off a numeral to the required place.
4. Determine whether a given decimal numeral is less than, equal to, or greater than another decimal numeral.

II. Computation

Objective #2: The student will increase his ability to apply the principles of computation with decimals by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

5. Add and subtract decimal numerals.
6. Multiply and divide decimal numerals.
7. Multiply and divide by powers of ten.
8. Write very large or very small numerals in the scientific notation form.

III. Conversions

Objective #3: The student will increase his ability to apply principles of fractions and decimals to conversions between fractions and decimals and to determine the relationship between two decimals by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

9. Change fractions into terminating and repeating decimals and change terminating and repeating decimals to fractions.

10. Determine the decimal part of a number.

11. Determine what decimal part one number is of another.

12. Determine a number when a decimal part of it is known.

*(13.) Determine the value of common fractions in non-decimal bases.

14. Write the correct mathematical phrase from the given word phrases involving decimals.

*Optional activities in some programs.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS APPLICATION OF PERCENT BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Conversions

Objective #1: The student will increase his ability to apply the principles of fractions, decimals, and percent by converting among the three forms in the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Express percent as a common fraction or mixed number.

2. Express common fractions or mixed numbers as percent.

3. Express decimals as percent.

II. Computation

Objective #2: The student will increase his ability to apply the principles of percent computation by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

4. Find a percent of a number by using both proportions and the formula P ÷ R x B.

5. Find what percent one number is of another by using both proportions and the formula P ÷ R x B.

6. Find a number when a percent of it is known by using both proportions and the formula P ÷ R x B.

7. Write the correct mathematical phrase from given word phrases involving percents.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF NUMBER SENTENCES BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Number Statements

Objective #1: The student will increase his comprehension of number statements by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Know the definition of a statement.
2. Determine if a statement is true or false.
3. Determine if one number is less than, equal to, or greater than another number.

II. Properties

Objective #2: The student will increase his ability to apply the properties of equality to sets of numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

4. Apply the reflexive property to a given set of numbers.
5. Apply the symmetric property to a given set of numbers.
6. Apply the transitive property to a given set of numbers.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF IRRATIONAL NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Irrational Numbers

Objective #1: The student will increase his comprehension of the real number system by interpreting numbers as rational or irrational in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define an irrational number.
2. Determine if a number is irrational or rational.

II. Square Roots

Objective #2: The student will increase his ability to apply the concepts of square root by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Determine the square root of a given number by the square root method.
4. Determine the square root of a given number by the estimation method.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS KNOWLEDGE OF HOW OUR PRESENT DECIMAL NUMERATION SYSTEM EVOLVED FROM ANCIENT NUMERATION SYSTEMS BY SATISFACTORILY COMPLETING THE FOLLOWING LEVEL AS DETERMINED BY THE INSTRUCTOR.

I. Additive Numeration Systems

Objective #1: The student will demonstrate on a teacher made test an increase in knowledge of the Egyptian and Roman numeration systems by completing the following suggested activities.

Activities:

The student will be able to:

1. Express decimal numerals up to 500,000 in the Egyptian numeration system.

2. Express decimal numerals up to 500,000 in the Roman numeration system.

3. Express Roman numerals, equivalent to numerals up to 500,000 in the decimal numeration system.

II. Positional Numeration Systems

Objective #2: The student will demonstrate an increase in comprehension of positional numeration systems as determined by a teacher made test by completing the following suggested activities.

Activities:

The student will be able to:

4. Name the place value of each digit in any base ten numeral greater than or equal to one.

5. Express powers of ten by using a base of ten and an exponent greater than or equal to zero.

6. Express a number in exponential form as a product.

7. Expand a decimal numeral greater than or equal to one by powers of ten.

8. Determine the four place values to the left of the units place of a numeral in any positional numeration system.

9. Express a five place numeral in any positional numeration system as an equivalent numeral in the decimal system.

10. Add and multiply numerals in bases other than 10.

11. Subtract and divide numerals in bases other than 10.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF THE TYPES OF SETS POSSIBLE IN OUR NUMERATION SYSTEM AND THE RESULTS OF PERFORMING OPERATIONS ON THOSE SETS BY SATISFACTORILY COMPLETING THE FOLLOWING LEVEL AS EVALUATED BY THE TEACHER.

I. Members of a Set

Objective #1: The student will demonstrate comprehension of sets by interpreting given sets and translating them from the listing method to the description method and vice versa as indicated in the following suggested activities and measured by a teacher made test.

Activities:

The student will be able to:

1. Define the term set.
2. Identify the members of a well defined set by the listing method.
3. Identify the members of a well defined set by the description method.

II. Types of Sets

Objective #2: The student will demonstrate a knowledge of the various types of sets by recognizing and identifying examples of these sets as indicated in the following suggested activities and determined by a teacher-made test.

Activities:

The student will be able to:

4. Define the term subset.
5. List all the subsets of a well defined set.
6. Define the term proper subset.
7. Define the term null set.
8. Define the term finite set.
9. Define the term infinite set.

10. Illustrate a one-to-one correspondence between any two finite sets which have the same number of elements.

11. Give examples of infinite sets which can be put into a one-to-one correspondence.

III. Set Operations

Objective #3: The student will apply the operations of union and intersection to any sets determined by the teacher after completing the following suggested activities.

Activities:

The student will be able to:

12. Determine the intersection of any two finite sets.

13. Determine the intersection of any two infinite sets.

14. Determine the union of any two finite sets.

15. Determine the union of any two infinite sets.

16. Define the term universal set.

17. Determine the complement of a set with respect to the universal set.

MAJOR OBJECTIVE

THE STUDENT WILL APPLY THE FOUR BASIC OPERATIONS OF MATHEMATICS AND VERBAL PROBLEM SOLVING BY SATISFACTORILY COMPLETING THE FOLLOWING LEVEL AS EVALUATED BY THE TEACHER.

I. Properties of Whole Numbers

Objective #1: The student will increase his knowledge of the properties of whole numbers by recognizing and recalling them on a teacher-made test after completing the following suggested activity.

Activity:

The student will be able to:

1. State, using both numerals and variables, the following properties:

   a. commutative properties of addition and multiplication;

   b. associative properties of addition and multiplication;

   c. distributive property of multiplication over addition;

   d. properties of one under multiplication and division;

   e. properties of zero under addition, multiplication, and division.

II. Inverse Operations

Objective #2: The student will increase his knowledge of inverse operations by recalling them on a teacher-made test after completing the following suggested activity.

Activity:

The student will be able to:

2. State the inverse operations of:

   a. addition;
   b. subtraction;
   c. multiplication;
   d. division.

III. Problem Solving

Objective #3: The student will demonstrate application of changing word phrases to mathematical phrases and mathematical phrases to word phrases utilizing the four basic operations by satisfactorily completing a teacher-made test composed of word phrases and mathematical phrases.

Objective #4: The student will demonstrate application of the four operations of addition, subtraction, multiplication, and division by completing activities involving a variety of word problems and satisfactorily completing a teacher-made test composed of word problems.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF THE FACTORS AND MULTIPLES OF NUMBERS BY SATISFACTORILY COMPLETING THE FOLLOWING LEVEL AS EVALUATED BY THE TEACHER.

I. Tests for Divisibility

Objective #1: The student will demonstrate an increase in his knowledge of factors by recalling divisibility tests and recognizing the factors of numbers by completing the following suggested activities and satisfactorily passing a teacher made test.

Activities:

The student will be able to:

1. State the divisibility test for 2, 3, 4, 5, 6, 8, 9, 10.
2. Demonstrate ability to use the divisibility tests for numbers less than 1,000.
3. Identify the factors and product of a multiplication example.
4. Identify all elements of the set of factors of numbers less than 1,000.

II. Prime and Composite Numbers

Objective #2: After completing the following suggested activities, the student will display an increase in comprehension of prime and composite numbers by interpreting a given number as prime or composite and defending, in written or oral form, his position to the teacher.

Activities:

The student will be able to:

5. Define a prime number.
6. Identify the elements of the set of prime numbers less than 100, by using the Sieve of Erotosthenes.
7. Define a composite number.
8. Determine a whole number less than 1,000 as being prime or composite.

9. Express a composite number less than 1,000 as a product of its prime factors.

III. Common Factors and Common Multiples

Objective #3: The student will demonstrate an increase in comprehension of common factors and common multiples by satisfactorily determining them on a teacher-made test.

Activities

The student will be able to:

10. Determine the common factors and greatest common factor of 2, 3, or 4 numbers.

11. Determine the common multiples and least common multiple of 2, 3, or 4 numbers.

12. Determine the greatest common factor of two numbers using the Euclidian Algorithm.

13. Determine the least common multiple of two numbers (a,b) by using the theorem:

$$a\,b = \text{g.c.f.}\ (a,b) \times \text{l.c.m.}\ (a,b)$$

$$\frac{ab}{\text{g.c.f.}\ (a,b)} = \text{l.c.m.}\ (a,b)$$

MAJOR OBJECTIVE

THE STUDENT WILL BE ABLE TO ANALYZE THE RELATIONSHIPS WHICH EXIST AMONG INTEGERS WITH RESPECT TO THEIR PROPERTIES AND THE OPERATIONS BY COMPLETING THE FOLLOWING LEVEL. SUCCESSFUL COMPLETION WILL BE DETERMINED BY THE TEACHER.

I. Operations and Relationships

Objective #1: The student will increase his comprehensions of the operations and relationships among integers by satisfactorily completing the following suggested activities as evaluated by a teacher-made test.

Activities

The student will be able to:

1. State a definition for the set of integers.
2. Establish a "less than", "equal to", or "greater than" relationship between any two integers.
3. Define absolute value and additive inverse.
4. Determine additive inverse in systems other than decimal systems.
5. Add integers.
6. Subtract integers.
7. Multiply integers.
8. Define: Multiplicative inverse.
9. Divide integers.

II. Properties of Integers

Objective #2: The student will increase his comprehension of the properties of integers by completing the following suggested activities to the teacher's satisfaction.

Activities

The student will be able to:

10. State under which of the four operations of addition, subtraction, multiplication, or division the set of integers is closed.

11. Give examples using integers to illustrate the commutative properties of addition and multiplication.

12. Give examples using integers to illustrate the associative properties of addition and multiplication.

13. Give examples using integers to illustrate the distributive property of multiplication over addition.

14. Give examples illustrating the right distributive property of division over addition.

15. Give a counter example illustrating that left distributive laws of division over addition is not valid.

RATIONAL NUMBERS

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF RATIONAL NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Form of Rational Numbers

Objective #1: The student will increase his comprehension of the standard form of rational numbers, a/b, by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. State a definition for the set of rational numbers.
2. Express whole numbers in the form a/b where a and b are integers and $b \neq 0$.
3. Express mixed numerals in the form a/b where a and b are integers and $b \neq 0$.
4. Establish a "less than","equal to", or"greater than" relationship between any two rational numbers.
5. Locate rational numbers on a ray.

II. Terminating and Repeating Decimals

Objective #2: The student will increase his comprehension of terminating and repeating decimals by translating them into the standard form, a/b, and vice versa by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

6. State a definition with respect to decimal representation for the set of rational numbers.
7. Express terminating decimals in the form a/b where a and b are integers and $b \neq 0$.

8. Express rational numbers as terminating or repeating decimals by using the method of division.

9. Express repeating decimals in the form a/b where a and b are integers and $b \neq 0$.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF IRRATIONAL NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Square Root

Objective #1: The student will increase his comprehension of irrational numbers by interpreting square roots to the satisfaction of the teacher.

Activities

The student will be able to:

1. State a definition for the set of irrational numbers.
2. Determine the square root of an irrational number to the nearest tenth by the square root method and estimation method.
3. Determine the square root of an irrational number >100 that has a perfect square factor using the algebraic theorem $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$.

II. The Pythagorean Relationship

Objective #2: The student will be able to apply the concept of irrational numbers to the right triangle by completing the following suggested activities and satisfactorily passing a teacher-made test.

Activities

The student will be able to:

4. State the Pythagorean Relation.
5. Identify a right triangle.
6. Identify the hypotenuse and legs of any given right triangle given the three lengths.
7. Determine the length of a missing side of a right triangle given the other two sides.

8. Locate irrational numbers on a ray.

9. Locate irrational numbers on a ray by geometric construction.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF PERCENT AND RATIO BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Conversions

Objective #1: The student will increase his comprehension of conversions among fractions, decimals, and percents by completing the following suggested activities satisfactorily as determined on a teacher-made test.

Activities:

The student will be able to:

1. Define percent.
2. Express a percent as an equivalent decimal.
3. Express a percent as an equivalent fraction or mixed numeral.
4. Express a decimal as an equivalent percent.
5. Express a fraction as an equivalent percent.
6. Express a mixed numeral as an equivalent percent.

II. Ratio and Proportion

Objective #2: The student will increase his comprehension of ratio and proportion by completing the following suggested activities satisfactorily as determined on a teacher-made test.

Activities:

The student will be able to:

7. Define ratio.
8. Set up a ratio when given a situation comparing two sets.
9. Define proportion.
10. Set up a proportion when given a situation comparing two sets.

11. Define the means and extremes of a proportion.

12. Solve a proportion when one term is missing.

III. Problem Solving

Objective #3: The student will be able to apply the concepts of percent ratio, and proportion by completing word problems involved in the following suggested activity and satisfactorily completing a teacher made test composed of word problems.

Activity

The student will be able to:

13. Solve word problems involving percents by utilizing the concepts of ratio and proportion, such word problems involving:

    a. discount

    b. commission

    c. batting averages

    d. percent of increase and decrease

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN COMPREHENSION OF NON-METRIC GEOMETRY BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Elements

Objective #1: The student will demonstrate an increase in knowledge of the basic elements of geometry by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Draw and name a model of a point.
2. Define, draw, and name a model of a line.
3. Define, draw, and name a model of a plane.
4. Define, draw, and name a model of a ray.
5. Define, draw, and name a model of an angle.
6. Define vertical angles.
7. Define, draw, and name a model of a line segment.

II. Polygons

Objective #2: The student will demonstrate an increase in comprehension of non-metric geometry by utilizing the basic elements to create and interpret polygons within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

8. Define a polygon. Draw at least 10 polygons.
9. Define a regular polygon. Draw at least 6 different polygons.
10. Define and draw a model of a triangle.

11. Name the sides and vertices of a triangle.

12. Define and draw a model of a quadrilateral.

13. Name the sides and vertices of a quadrilateral.

14. Define and draw a model of a parallelogram.

15. Define and draw a model of a rectangle.

16. Define and draw a model of a pentagon.

17. Define and draw a model of a hexagon.

18. Define and draw a model of an octagon.

19. Determine the number of diagonals which can be drawn for a polygon with more than 3 sides.

III. Circle

Objective #3: The student will demonstrate an increase in comprehension of the circle by creating and interpreting circles within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

20. Define and draw a model of a circle.

21. Define and draw a radius of a circle.

22. Define and draw a diameter of a circle.

23. Define and draw an arc of a circle.

24. Define and draw a semicircle.

IV. Solids

Objective #4: The student will demonstrate an increase in comprehension of solids by defining, constructing, and interpreting solids within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

25. Define and draw a model of a rectangular prism.

26. Define and draw a model of a pyramid.

27. Define and draw a model of a cylinder.

28. Define and draw a model of a cone.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN COMPREHENSION OF METRIC GEOMETRY BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Angle Measure

Objective #1: The student will demonstrate an increase in comprehension of angles and their measure by defining and interpreting within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Determine the measure of an angle by using a protractor.
2. Draw a model of an angle given a certain measure by using a protractor.
3. Define an acute angle.
4. Define an obtuse angle.
5. Define a right angle.
6. Define a straight angle.
7. Define a reflex angle.
8. Define complementary angles.
9. Define supplementary angles.
10. Define an acute triangle.
11. Define a right triangle.
12. Define an obtuse triangle.
13. Determine the sum of the vertex angles of any polygon.
14. Define and draw a scalene triangle.
15. Define and draw an isosceles triangle.
16. Define and draw an equilateral triangle.

II. Similar Triangles

Objective #2: The student will demonstrate an increase in comprehension of similarity by interpreting similar triangles within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

17. Determine when similarity exists between two triangles.

18. Determine the lengths of the missing sides of two given triangles when the triangles are similar.

19. Determine the measure of the missing angles of given triangles when the triangles are similar.

III. Perimeter, Area, and Volume

Objective #3: The student will apply the knowledge of methods for finding perimeter, area, and volume of various geometric figures by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

20. Determine the perimeter and area of a rectangle.

21. Determine the area of a triangle.

22. Determine the area of a parallelogram.

23. Determine the circumference and area of a circle.

24. Determine the surface area of a rectangular prism.

25. Determine the surface area of a pyramid.

26. Determine the surface area of a cylinder.

27. Determine the volume of a rectangular prism.

28. Determine the volume of a pyramid.

29. Determine the volume of a cylinder.

30. Determine the volume of a cone.

MAJOR OBJECTIVE

THE STUDENT WILL APPLY A KNOWLEDGE OF CONSTRUCTION IN GEOMETRY BY SATISFACTORILY COMPLETING THE FOLLOWING LEVEL DETERMINED BY A TEACHER-MADE TEST.

I. Constructions

Objective #1: The student will increase his knowledge of constructions using compass and straightedge by applying methods used within the following suggested activities as determined by a teacher-made test.

Activities:

The student will be able to:

1. Locate the midpoint of a segment by using a compass and a straight edge.
2. Construct the perpendicular to a line by using a compass and a straight edge.
3. Copy an angle by using a compass and a straight edge.
4. Bisect an angle by using a compass and a straight edge.
5. Construct an equilateral triangle by using a compass and a straight edge.
6. Construct an angle of a given measure by using a compass and a straight edge.

II. Central and Inscribed Angles

Objective #2: The student will increase his knowledge of central and inscribed angles and the determination of their measurement by recognizing the angles and applying the method of measurement within the following suggested activities as determined by a teacher-made test.

Activities:

The student will be able to:

7. Define a central angle.

8. Determine the measures of central angles when given appropriate arc measures.

9. Define an inscribed angle.

10. Determine the measures of inscribed angles when given appropriate arc measures.

11. Construct a line segment of a given length by using a compass and a straight edge.

12. Separate a line segment into congruent parts.

13. Copy given triangles.

14. Construct polygons of more than three sides.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF EQUATIONS AND INEQUALITIES BY SATISFACTORILY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Sentences

Objective #1: The student will increase his comprehension of equations and inequalities by translating between English and mathematical sentences by satisfactorily completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Express given mathematical sentences as English sentences.

2. Express given English sentences as mathematical sentences.

II. Solution

Objective #2: The student will increase his comprehension of equations and inequalities by interpreting and solving equations and inequalities within the following suggested activities and evaluated on a teacher-made test.

Activities:

The student will be able to:

3. Solve given linear equations in one variable by using the addition, subtraction, multiplication and division properties of equality.
4. Set up given linear equations in order to solve a verbal problem and determine its solution.

5. Show on a number line the solution set of a given equation in one variable.

6. Show on a number line the solution set of a given inequality in one variable.

III. Graphing

Objective #3: The student will increase his comprehen-

sion of graphing by translating linear equations and inequalities onto graphs in a co-ordinate system. He will do this by engaging in the following suggested activities as evaluated by the teacher.

Activities:

The student will be able to:

7. Locate ordered pairs on a coordinate plane.

8. Show on a coordinate plane the solution set of a given linear equation in two variables by locating ordered pairs.

9. Show on a coordinate plane the solution set of a linear inequality in two variables by locating ordered pairs.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF TRIGONOMETRY BY SATISFACTORILY COMPLETING THE FOLLOWING LEVEL AS DETERMINED BY THE TEACHER.

I. Sine, Cosine, Tangent, Cotangent

Objective #1: The student will increase his comprehension of the four trigonometric functions: sine, cosine, tangent, and cotangent by defining and interpreting them within the following suggested activities as evaluated by the teacher.

Activities:

The student will be able to:

1. Define the following functions: sine, cosine, tangent, and cotangent.
2. Determine the sine, cosine, tangent, and cotangent of given whole degree angles by using a table.
3. Determine the sine, cosine, tangent, and cotangent of a measure given to one decimal place by interpolation.
4. Determine the angle to the nearest tenth when given its sine, cosine, tangent, or cotangent by interpolation.

II. Word Problems

Objective #2: The student will apply his knowledge of trigonometric functions by completing the following suggested activity to the satisfaction of the teacher.

Activity:

The student will be able to:

5. Solve word problems involving right triangles by using trigonometric functions.

SET RELATIONS & OPERATIONS

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF SETS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Concepts

Objective #1: The student will increase his comprehension of some of the basic concepts of sets by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Define a well-defined set.
2. Tell whether or not a given set is well-defined.
3. Use the symbols "$\in$" and "$\notin$" to determine whether or not a given element belongs to or is an element of a given set.
4. Construct a given finite or infinite set by the listing method.
5. Name and construct a given finite or infinite set by the description method, using a variable.
6. Determine whether or not two sets have a one-to-one correspondence.

II. Venn Diagrams

Objective #2: The student will increase his comprehension of Venn diagrams by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

7. Identify parts of a Venn diagram.
8. State the purpose of Venn diagrams.

9. Define each of the four principle set relations.

10. Tell in which of the four principle ways any two given sets are related.

11. Use the correct symbols for the equal and proper subset relations.

12. Draw Venn diagrams illustrating the four principle set relations.

III. Set Operations

Objective #3: The student will increase his comprehension of set operations by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

13. Define set "union."

14. Write, using the symbol "U", the union of two sets.

15. Illustrate the union of the two sets by a Venn diagram.

16. Define set "intersection."

17. Write, using the symbol "$\cap$", the intersection of two sets.

18. Illustrate the intersection of two sets by a Venn diagram.

19. Define set "complement".

20. Write, using the symbol ', the complement of a set.

21. Illustrate the complement of a set by a Venn diagram.

22. Construct, using the symbol "X", the Cartesian product of two sets.

23. Construct a lattice to illustrate the Cartesian product of two given finite sets.

(24) Write the union, intersection, and complement of any 3 sets, and draw their Venn Diagrams.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF WHOLE NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Definitions

Objective #1: The student will increase his knowledge of the basic definitions of whole numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Identify a whole number.
2. Identify a natural number.
3. Simplify expressions of whole and natural numbers with or without grouping symbols.

II. Properties

Objective #2: The student will increase his comprehension of the properties of whole numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

4. Determine whether or not a given set is closed with respect to a given operation.
5. Recognize the commutative properties of multiplication and addition.
6. Apply the commutative properties in various situations.
7. Recognize the distributive property of multiplication over addition.
8. Apply the distributive property in various situations.

9. Recognize the property of one for multiplication.

10. Recognize the property of one for division.

11. Recognize the property of zero for addition.

12. Recognize the property of zero for multiplication.

13. Apply the properties of zero and of one in various situations.

14. Translate word phrases into mathematical phrases.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF INTEGERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Graphing on the Number Line

Objective #1: The student will increase his comprehension of graphing by interpreting points on a number line in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Graph the point on the number line corresponding to a given integer.

2. Given a point on the number line, give the integer corresponding to that point.

II. Operations

Objective #2: The student will increase his application of the principles of computation with integers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Define "absolute value" and give the absolute value of any integer.

4. Find the sum of any finite number of integers.

5. Define "additive inverse."

6. Give the additive inverse of any given integer.

7. Find the difference between any two integers by using the definition: $a-b=a+(-b)$.

8. Find the product of any finite number of integers.

9. Find the quotient of any one integer divided by a second integer provided the second integer is a non-zero factor of the first.

10. Given any integer as a base and any counting number less than 10 as an exponent, perform the operation and find the correct answer without use of a power table.

*11. Given an integral radicand with absolute value less than 700 for which the indicated root exists in the set of integers and an index smaller than 5, find the correct answer without use of the root tables.

III. Properties

Objective #3: The student will increase his ability to apply the properties of integers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

12. State under which of the six operations the set of integers is closed, and he must be able to find and probe by counterexample why this set is not closed under other operations.

13. Give the identity element, if it exists, for each of the six operations defined on the set of integers.

14. State which operation laws hold true in the set of integers.

IV. Integral Solutions

Objective #4: The student will increase his ability to apply the principles of integers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

15. Define and locate the X-axis, Y-axis, and origin on the I x I plane.

*Optional activities in some programs.

16. Given a set of ordered pairs of integers, construct a finite model of the I x I plane and properly locate the graphs of the given points on the plane.

17. Given a finite model of the I x I plane with points located on it, give the ordered pairs corresponding to each point.

18. Find the solution set of an open sentence using trial-and-error, substitution, and common sense (using no formal methods) given a replacement set of the set of integers or any subset of I for the variable in an open sentence involving the six operations and integers.

19. Determine the existence of additive inverse in abstract or modular systems of numeration.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF RATIONAL NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Operations

Objective #1: The student will increase his ability to apply the principles of computation of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Define the set of rational numbers.
2. Locate a given rational number on a number line.
3. Simplify fractions to lowest terms.
4. Tell whether or not two rational numbers are equal.
5. Find the sum of rational numbers using the definition: $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$.
6. Find the additive inverse of any rational number.
7. Find the difference between any two rational numbers using the definition: $\frac{a}{b} - \frac{c}{d} = \frac{ad - bc}{bd}$.
8. Find the product of rational numbers using the definition: $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$.
9. Define "multiplicative inverse".
10. Give the multiplicative inverse of any non-zero rational number.
11. Find the quotient of any two rational numbers by using the definition: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$.

12. Perform the operation of raising to powers and find the correct answer without using a power table for any rational number base and any counting number less than 10 as an exponent.

13. Find roots without the use of root tables for a rational number radicand with both numerator and denominator having absolute values less than 700 for which the indicated root exists in the set of rational numbers and on index less than five.

14. Find the absolute value of any rational number.

II. Properties

Objective #2: The student will increase his comprehension of the properties of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

15. State under which of the six operations the set of rational numbers is closed. Prove by counterexample why rational set is not closed under any given operation.

16. Give the identity element, if it exists, for each of the six operations defined on the set of rational numbers.

17. State which operation laws hold true in the set of rational numbers.

18. Define the concept of betweeness (c is between a + b if $a<c<b$)

19. Define the property of density.

III. Conversions

Objective #3: The student will increase his ability to apply the principles of converting between fractional and decimal forms of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

20. Change any fraction to its decimal equivalent.

21. Convert any terminating or repeating decimal to its equivalent fraction form.

IRRATIONAL NUMBERS I

LEVEL OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF IRRATIONAL NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Definitions

Objective #1: The student will increase his knowledge of the real number system by recognizing definitions to the satisfaction of the teacher.

Definitions:

1. The set of numbers whose names are non-terminating and non-repeating decimals is called the set of irrational numbers.

2. The set consisting of numbers that are either rational or irrational is called the set of real numbers.

3. The set of real numbers is the union of the set of rational numbers and the set of irrational numbers.

Activity:

1. Show the relationships that exist among the rationals, reals, irrationals, whole numbers and natural numbers by set notation (operation signs) and Venn Diagrams.

II. Properties

Objective #2: The student will increase his ability to apply the properties of real numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

2. State the closure property for addition and multiplication of real numbers.

3. State the commutative property for addition and apply it to the real numbers.

4. State the commutative property for multiplication and apply it to real numbers.

5. State the associative property for addition and apply it to real numbers.

6. State the associative property for multiplication and apply it to real numbers.

7. State the identity property for addition and apply it to real numbers.

8. State the identity property for multiplication and apply it to real numbers.

9. State the inverse property for addition and apply it to real numbers.

10. State the inverse property for multiplication and apply it to real numbers.

11. State the distributive property for multiplication over addition and apply it to real numbers.

12. State the completeness property for real numbers.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS ABILITY TO APPLY THE REAL NUMBER PRINCIPLES OF COMPUTATION BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Operations

Objective #1: The student will increase his ability to apply the principles of operating with real numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Express a real number in simplest form.
2. Find the sum of any two radicals and express the answer in simplest form.
3. Find the difference of any two radicals and express the answer in simplest form.
4. Divide any two real numbers.
5. Express a radical in standard form by rationalizing the denominator.

II. The Pythagorean Theorem

Objective #2: The student will increase his ability to apply the principles of right triangles and the Pythagorean Theorem by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

6. Find the unknown side of a right triangle by use of the Pythagorean Theorem.
7. Apply the properties of a right triangle to the solution of word problems.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF POLYNOMIALS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Definition

Objective #1: The student will increase his knowledge of polynomials by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a polynomial.
2. Recognize whether or not a given expression is a polynomial.

II. Operations

Objective #2: The student will increase his ability to apply the principles of computation of polynomials by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Add any two polynomials of like terms.
4. Subtract one polynomial from another.
5. Multiply terms with like bases by adding the exponents.
6. Multiply any polynomial of any degree by another polynomial of any degree.
7. Divide terms with like bases by subtracting the exponents.
8. Divide a polynomial of any degree by another polynomial of any degree.

9. Multiply a binomial by a binomial using a short-cut method, rather than multiplying and showing every step.

10. Find the product of the sum and difference of the same two binomials, and be able to use a short-cut method to find their product.

11. Find the square of a binomial using a short-cut method.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS ABILITY TO APPLY METHODS OF SOLUTION TO EQUATIONS IN ONE VARIABLE BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Additive Inverse Solution

Objective #1: The student will increase his ability to apply the additive inverse method of solving equations in one variable by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

1. Assign a degree to any given polynomial equation or inequality.
2. Recognize whether or not a given open sentence is of first degree.
3. Find the solution set of open sentences of the form: $x + a \# b$, where a and b are real numbers and # is any equation or inequality symbol, using the additive inverse method.
4. Set up and solve all types of number problems.
5. Set up and solve consecutive integer problems.
6. Set up and solve age problems in which the ages of one or more persons are dependent on another's age.

II. Multiplicative Inverse Solution

Objective #2: The student will increase his ability to apply the multiplicative inverse method by solving equations in one variable by completing the following suggested activities to the satisfaction of the teacher.

Activities

The student will be able to:

7. Find the solution set of open sentences of the following forms:

(continued next page)

a) ax#b, where a and b are real numbers and # is any equation or inequality symbol,

b) ax + b#c, where a, b, and c are real numbers and # is any equation or inequality symbol,

c) ax + b#cx + d, where a, b, c, and d are real numbers and # is any equation or inequality symbol, using a multiplicative inverse method for type a, and both the additive and multiplicative inverse methods in the correct order for types b and c.

5. Graph the solution set of a first degree open sentence in one variable on the real number line.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS ABILITY TO APPLY THE PROPERTIES OF EQUATIONS IN TWO VARIABLES TO A VARIETY OF GRAPHING SITUATIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Open Sentences and Standard Form

Objective #1: The student will increase his comprehension of open sentences and standard equation form by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Graph an open sentence in two variables by using a table of values which has been constructed.

2. Convert all linear equations in two variables to the standard form $y = mx + b$, where x and y are variable and m and b are constants.

II. Graphing

Objective #2: The student will increase his ability to apply properties of graphing and equations to determine equations and graphs from minimal information in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Graph a linear equation in two variables by predetermining the slope of the line and the point at which the line intercepts the y axis.

4. Find the equation of a line from two given points on that line.

5. Find the equation of a line given its slope and a point on the line.

6. Graph inequalities in two variables.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF RELATIONS AND FUNCTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Relations

Objective #1: The student will increase his comprehension of relations by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a relation.
2. Graph a relation whose rule is expressed in the form of an inequality on a coordinate plane.

II. Functions

Objective #2: The student will increase his comprehension of functions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Define a function.
4. State the domain and range of any function.
5. Evaluate a function at a particular value of the domain using functional notation.
6. Graph functions associated with any polynomial.
7. Set up and solve any motion problem involving one variable and a linear equation with the relationship distance equals rate times time.
8. Set up and solve any coin problem involving one variable and a linear equation.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS ABILITY TO APPLY THE PROPERTIES OF LINEAR FUNCTIONS TO THE SOLUTION AND GRAPHING OF THOSE FUNCTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Classification

Objective #1: The student will increase his knowledge of the classification of linear functions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define and recognize "inconsistent," "consistent", "independent", and "consistent and dependent" systems of linear equations.

II. Methods of Solution

Objective #2: The student will demonstrate an increase in his ability to apply methods of solution to solving linear functions in the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

2. Find the solution (provided it is integral) of a consistent and independent system of linear equations by the graphing method.

3. Graph the solution set of a system of linear inequalities.

4. Solve a system of linear equations by the addition-multiplication method.

5. Solve a system of linear equations by the substitution method.

III. Problem Solving

Objective #3: The student will increase his ability to apply methods of solution of linear functions to the solution of word problems involving a system of first degree equations in two variables.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF FACTORING BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Common Factors

Objective #1: The student will increase his comprehension of common factors by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. State the largest common factor of two or more terms.
2. Factor an expression into simplified form.
3. Group the terms of a given four-term polynomial so that it can be factored if possible.
4. Factor a trinomial either by changing it to a four-term polynomial or by trial and error.

II. Special Cases

Objective #2: The student will increase his comprehension of special cases of polynomials which can be factored by completing the following activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Recognize a perfect trinomial square.
6. Factor a perfect trinomial square into a binomial squared.
7. Recognize the difference of two perfect squares.
8. Factor the difference of two perfect squares.

9. Recognize that the form $a^2-b^2-2bc-c^2$ is the difference of two squares.

10. Factor polynomials of the form $a^2-b^2-2bc-c^2$.

11. Find an equivalent polynomial having integral coefficients when the given polynomial has rational coefficients.

12. Factor completely, if possible:

    a) polynomial with rational coefficients.

13. Set up and solve any mixture problem involving one variable and a linear equation.

14. Set up and solve any per cent mixture problem involving one variable and a linear equation.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS ABILITY TO APPLY THE PRINCIPLES OF QUADRATIC EQUATIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Definition

Objective #1: The student will increase his knowledge of quadratic equations by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a "quadratic equation in one variable".
2. Recognize whether or not a polynomial equation is a quadratic equation in one variable.

II. Methods of Solution

Objective #2: The student will increase his ability to apply the methods of solution for quadratic equations by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. Find the solution set of a quadratic equation of the form: $ax^2 + c = o$, where a and b are real numbers, by the square root method.
4. Solve any quadratic equation in one variable by completing the square method.
5. Solve any quadratic equation of the form $ax^2 + bx = o$, where a and b are any real numbers, by the factoring method.
6. Find the solution set of a quadratic equation of the form $ax^2 + bx + c = o$, where a, b, and c are integers, that can be factored over the set of integers.

7. Set up and solve any word problem involving perimeter or area of basic geometric figures.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS APPLICATION OF RATIONAL EXPRESSIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Concepts

Objective #1: The student will increase his comprehension of the basic concepts of rational expressions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a rational expression.
2. Determine whether or not a given expression is rational.
3. State any excluded value or values of a rational expression.
4. Tell whether or not two given rational expressions are equal.
5. Simplify any given rational expression noting excluded values.

II. Operations

Objective #2: The student will increase his ability to apply the principles of the operational concepts of rational numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

6. Find the product (fully simplified) of any two rational expressions.
7. Find the quotient (fully simplified) of any rational expression divided by any non-zero rational expression.

8. Raise any given rational expression to the second or third power.

9. Find the sum (fully simplified) of any two rational expressions.

10. Find the difference (fully simplified) between any two rational expressions.

III. Solving Equations

Objective #3: The student will increase his ability to apply the principles of rational expressions and the methods of solving linear and quadratic equations by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

11. Solve any given equation containing rational expressions that leads to an equivalent equation, either linear or quadratic, in one variable.

12. Solve word problems which lead to the solution of an equation containing rational expressions.

13. Find the solution set of a quadratic equation of the form $ax^2 + bx + c = 0$ where a, b, c are real numbers by the use of quadratic formula.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF LOGIC BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Statements and Negation

Objective #1: The student will increase his comprehension of statements and their negation by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define the concepts of symbolic logic that deal with statements.
2. Define negation.
3. Form a statement's negation both verbally and symbolically.
4. Determine the logical truth or falsity of a negation by means of a truth table.

II. Conjunction and Disjunction

Objective #2: The student will increase his comprehension of the conjunction and disjunction of statements by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Define conjunction.
6. Form two statements of conjunction both verbally and symbolically.
7. Determine the logical truth or falsity of a conjunction by means of a truth table.
8. Define disjunction.

9. Determine the logical truth or falsity of a disjunction by means of a truth table.

III. Conditionals

Objective #3: The student will increase his comprehension of conditionals by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

10. Define conditional.

11. Form the conditional of two statements.

12. Determine the logical truth or falsity of a conditional by means of a truth table.

13. Define bi-conditional.

14. Form the bi-conditional of two statements.

15. Determine the logical truth or falsity of a bi-conditional of the statements.

16. Form two statements of disjunction both verbally and symbolically.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF THE REAL NUMBER SYSTEM BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Natural Numbers and Integers

Objective #1: The student will increase his comprehension of natural numbers and integers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Write a definition for the set of natural numbers.
2. List the properties of the set of natural numbers.
3. Write a definition for the set of integers.
4. List the properties of the set of integers.

II. Rational, Irrational, and Real Numbers

Objective #2: The student will increase his comprehension of rational, irrational, and real numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Write a definition for the set of rational numbers.
6. List the properties of the set of rational numbers.
7. Express a fractional or mixed numeral as a decimal.
8. Convert a terminating decimal to a rational number.
9. Convert a repeating decimal to a rational number.
10. Write a definition for the set of irrational numbers.

11. Write a definition for the set of real numbers.

12. List the properties of the set of real numbers.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE APPLICATION OF MATHEMATICAL REASONING BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Sets and Sentences

Objective #1: The student will increase his knowledge of basic set definitions and terminology by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a closed sentence.
2. Define a variable.
3. Define a replacement set.
4. Define an open sentence.
5. Explain what is meant by universal and existential quantifiers.

II. Logic

Objective #2: The student will increase his comprehension of logic by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

6. Use deductive reasoning to prove conclusions.
7. Form the negation of a statement.
8. Form the basic composite statements (conjunction, disjunction, conditional, and biconditional).
9. Assign in table form the truth values of composite statements.

10. Form the negation of a composite statement.

*11. Define a tautology.

*12. Form the variants of a conditional.

*13. Apply a deductive system to proofs.

*Optional activities in some programs.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF THE MATHEMATICAL STRUCTURE OF THE REAL NUMBER SYSTEM BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Operations

Objective #1: The student will increase his knowledge of unary and binary operations by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*1. Define a unary operation.

2. Define a binary operation.

II. Groups and Fields

Objective #2: The student will increase his comprehension of groups and fields by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

3. List the properties exhibited by a group.

*4. List the properties exhibited by an abelian group.

5. List the properties exhibited by a field.

*6. Determine whether a set upon which an operation is defined as a group or an abelian group.

7. Determine whether a set upon which operations are defined is a field.

*Optional activities in some programs.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF OPERATIONS AND FACTORING BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Operations

Objective #1: The student will increase his comprehension of the operations with algebraic expressions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Evaluate algebraic expressions.
2. Simplify expressions using grouping symbols.
3. Simplify expressions without grouping symbols.
4. Add algebraic expressions.
5. Subtract algebraic expressions.
6. Multiply a monomial by a monomial.
7. Multiply a monomial by a binomial.
8. Multiply a binomial by a binomial.
9. Multiply a monomial by a multinomial.
10. Multiply a multinomial by a multinomial.
11. Square a trinomial.
12. Expand a binomial.
13. Divide a multinomial by a monomial.
14. Divide a multinomial by a multinomial.
15. Divide by using synthetic division.

II. Factoring

Objective #2: The student will increase his comprehension of the factoring of algebraic expressions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

16. Factor algebraic expressions having a common monomial factor.

17. Factor algebraic expressions having a common binomial factor.

18. Factor the difference of 2 squares.

19. Factor a perfect trinomial square.

20. Factor a general trinomial.

21. Factor an algebraic expression of the form $a^n = b^n$.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF ALGEBRAIC FRACTIONS AND EXPONENTS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Fractions

Objective #1: The student will increase his comprehension of algebraic fractions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Simplify algebraic fractions.
2. Add algebraic fractions.
3. Subtract algebraic fractions.
4. Multiply algebraic fractions.
5. Divide algebraic fractions.
6. Simplify complex fractions.

II. Exponents

Objective #2: The student will increase his comprehension of exponents with algebraic expressions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

7. Define an exponent.
8. Multiply numbers in exponential form (with the same base).
9. Divide numbers in exponential form (with the same base).

10. Raise numbers in exponential form to a power.

11. Raise a product or a quotient to a power.

12. Define a zero exponent.

13. Express a number raised to a negative power as an equivalent number raised to a positive power.

III. Radicals

Objective #3: The student will increase his comprehension of finding roots of algebraic expressions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

14. Express the root of a number using a fractional exponent.

15. Express radicals in simplest form.

16. Add radicals.

17. Subtract radicals.

18. Multiply radicals.

19. Divide radicals.

20. Simplify expressions involving fractional exponents.

MAJOR OBJECTIVE 0

THE STUDENT WILL DEMONSTRATE AN INCREASE IN APPLICATION OF METHODS OF SOLUTION OF OPEN SENTENCES IN ONE VARIABLE BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. First Degree Equations and Inequalities

Objective #1: The student will increase his ability to apply the methods of solution to first degree equations and inequalities by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Solve first degree equations in one variable.
2. Define a conditional equation.
3. Define an identity equation.
4. Solve first degree inequalities in one variable.
5. Graph the solution sets of open sentences on a number line.
6. Solve composite open sentences.
7. Graph the solution sets of open sentences on a number line.
8. Solve open sentences involving absolute value.
9. Graph the solution sets of open sentences involving absolute value.

II. Quadratic Equations and Inequalities

Objective #2: The student will increase his ability to apply the methods of solution to quadratic equations and inequalities by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

10. Solve quadratic equations by graphing.

11. Solve quadratic equations by factoring.

12. Solve quadratic equations by completing the square.

13. Solve the general quadratic equation by completing the square.

14. Solve quadratic equations by using the quadratic formula.

15. Solve quadratic inequalities by factoring.

16. Solve irrational equations.

17. Determine the sum of the roots of a quadratic equation.

18. Determine the product of the roots of a quadratic equation.

19. Write a quadratic equation having given roots by using the sum and product of the roots.

20. Define discriminant.

21. Determine the nature of the roots of a quadratic equation by using the discriminant.

III. Word Problems

Objective #3: The student will increase his ability to apply methods of solution of linear and quadratic equations to word problems involving one variable by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

22. Solve age problems.

23. Solve coin problems.
24. Solve consecutive integers problems.
25. Solve digit problems.
26. Solve geometric problems.
27. Solve mixture problems.
28. Solve motion problems.
29. Solve work problems.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE HIS COMPREHENSION OF RELATIONS AND FUNCTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Relations

Objective #1: The student will increase his comprehension of relations by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a relation.
2. Define the abscissa of an ordered pair.
3. Define the ordinate of an ordered pair.
4. Define the domain of a relation.
5. Define the range of a relation.
6. Graph a relation on a Cartesian coordinate system.

II. Functions

Objective #2: The student will increase his comprehension of functions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

7. Define a function.
8. Graph a function on a Cartesian coordinate system.
9. Define an inverse relation.
10. Define an inverse function.

11. Graph inverse relations and functions on a Cartesian coordinate system.

12. Define an independent variable.

13. Define a dependent variable.

14. Use functional notation.

*15. Determine and graph the sum of 2 functions.

*16. Determine and graph the product of 2 functions.

*17. Determine and graph the difference of 2 functions.

*18. Determine and graph the quotient of 2 functions.

*19. Determine and graph the composition of 2 functions.

*Optional activities in some programs.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN HIS COMPREHENSION OF LINEAR FUNCTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Equations

Objective #1: The student will increase his comprehension of equations by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a linear function.
2. Write the equation of a straight line in point slope form.
3. Write the equation of a straight line in slope intercept form.
4. Write the equation of a straight line in standard form.

II. Lines

Objective #2: The student will increase his comprehension of lines by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Determine if a line is vertical, horizontal, or oblique.
6. Define the slope of a straight line.
7. Determine whether lines are parallel or perpendicular by using the slopes of the lines.
8. Determine the distance between 2 points in R x R plane.

9. Find the coordinates of the midpoint of a line segment.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE APPLICATION OF THE PROPERTIES OF CONIC SECTIONS TO THEIR CONSTRUCTION BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Circle

Objective #1: The student will demonstrate application of the properties of a circle to the construction and graphing of circles by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a circle.
2. Construct the equation of a circle whose center is at (0,0) and whose radius is r.
3. Graph a circle whose center is at (0,0).
4. Construct the equation of a circle whose center is at (h, k) and whose radius is r.
5. Graph a circle whose center is at (h, k).

II. Parabola

Objective #2: The student will demonstrate application of the properties of a parabola to the construction and graphing of parabolas by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

6. Define a parabola.
7. Define the directrix f a parabola.
8. Define the focus of a parabola.

9. Define the axis of symmetry of a parabola.

10. Define the vertex of a parabola.

11. Construct the equations of a parabola whose vertex is at (0,0).

12. Graph a parabola whose vertex is at (0,0).

13. Construct the equations of a parabola whose vertex is at (h, k).

14. Graph a parabola whose vertex is at (h, k).

III. Ellipse

Objective #3: The student will demonstrate his application of the properties of an ellipse to the construction and graphing of ellipses by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*15. Define an ellipse.

*16. Define the foci of an ellipse.

*17. Define the center of an ellipse.

*18. Construct the equations of an ellipse whose center is at (0,0).

*19. Define the major and minor axes of an ellipse.

*20. Graph an ellipse whose center is at (0,0).

*21. Construct the equations of an ellipse whose center is at (h, k).

*22. Graph an ellipse whose center is at (h, k).

IV. Hyperbola

Objective #4: The student will demonstrate application

*Optional activities in some programs.

of the properties of a hyperbola to the construction and graphing of hyperbolas by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*23. Define a hyperbola.

*24. Define the foci of a hyperbola.

*25. Define the center of a hyperbola.

*26. Construct the equations of a hyperbola whose center is at (0,0).

*27. Graph a hyperbola whose center is at (0,0).

*28. Define the transverse axis of a hyperbola.

*29. Define the vertices of a hyperbola.

*30. Define the conjugate axis of a hyperbola.

*31. Define the asymptotes of a hyperbola.

*32. Construct the equations of a hyperbola whose center is at (h, k).

*33. Graph a hyperbola whose center is at (h, k).

V. Systems of Equations and Inequalities

Objective #5: The student will demonstrate application of the properties of linear and quadratic equations to the graphing and solution of systems of equations and inequalities by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

34. Graph a linear - quadratic system of equations and determine the solution set of the system from the graph.

35. Graph a quadratic - quadratic system of equations and determine the solution set of the system from the graph.

36. Graph a system of quadratic inequalities in two variables and determine the solution set of the system from the graph.

37. Solve verbal problems by using quadratic systems of equations.

SOLUTION OF EQUATIONS IN MORE THAN ONE VARIABLE

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE APPLICATION OF THE METHODS OF COMPUTATION WITH ALGEBRAIC EXPRESSIONS AND SOLUTION OF EQUATIONS TO THE GRAPHING AND SOLVING OF SYSTEMS OF EQUATIONS IN MORE THAN ONE VARIABLE BY COMPLETING THE FOLLOWING SUGGESTED ACTIVITIES TO THE SATISFACTION OF THE TEACHER.

I. Graphic Solutions

Objective #1: The student will apply techniques of graphing solution sets by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Find the solution set of systems of simultaneous linear equations in 2 variables by graphing.
2. Define a consistent and independent system of linear equations.
3. Define a consistent and dependent system of linear equations.
4. Define an inconsistent and independent system of linear equations.
5. Find the solution set of systems of one first degree equation and one second degree equation by graphing.
6. Find the solution set of systems of 2 second degree equations by graphing.
7. Find the solution set of systems of inequalities by graphing.

II. Algebraic Solutions

Objective #2: The student will apply the methods of solving equations by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

8. Find the solution set of systems of simultaneous linear equations in 2 variables by the multiplication - addition method.

9. Find the solution set of systems of simultaneous linear equations in 2 variables by the substitution method.

10. Find the solution set of systems of 3 equations in 3 variables.

11. Find the solution set of systems of one first degree equation and one second degree equation algebraically.

12. Find the solution set of systems of 2 second degree equations algebraically.

13. Find the solution set of systems of inequalities algebraically.

14. Find the solution set of systems of simultaneous linear equations by the comparison method.

LOGARITHMIC FUNCTIONS

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE IN COMPREHENSION OF EXPONENTIAL AND LOGARITHMIC FUNCTIONS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Functions

Objective #1: The student will increase in comprehension of functions by defining and translating to a graph the functions ~~in the~~ following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define an exponential function.
2. Graph an exponential function.
3. Define a logarithmic function.
4. Graph a logarithmic function.

II. Properties

Objective #2: The student will increase in comprehension of the properties of logarithms and exponents by translating between logarithmic and exponential notation within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Interchange exponential and logarithmic notation.
6. State the multiplication, division, raising to a power, and extracting a root properties of logarithms.
7. Apply exponential laws to the properties of logarithms.

8. Use the properties of logarithms to evaluate expressions involving logarithms.

III. Logarithms

Objective #3: The student will increase in comprehension of logarithms by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*9. Solve equations involving logarithms to any base.

10. Define a common logarithm.

11. Define the characteristic of a logarithm.

12. Find the common logarithm of a real number by using a table to mantissas.

13. Find antilogarithms by using a table of mantissas.

14. Approximate mantissas and antilogarithms not found in a table by using linear interpolation.

IV. Operations

Objective #4: The student will increase in comprehension of the function of logarithms by translating real number operations into logarithmic notation and then computing within the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

15. Perform the operation of multiplication by using common logarithms.

16. Perform the operation of division by using common logarithms.

17. Perform the operation of raising to a power by using common logarithms.

18. Perform the operation of extracting roots by using common logarithms.

*19. Solve exponential equations using common logarithms.

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*Optional activities in some programs.

MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN COMPREHENSION OF COMPLEX NUMBERS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Basic Concepts

Objective #1: The student will increase in comprehension of the basic concepts of complex numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

1. Define a complex number.
2. Express any real number or imaginary number in complex form.
3. Determine the powers of "i" greater than or equal to one.
4. Determine when 2 complex numbers are equal.

II. Operations and Properties

Objective #2: The student will increase in comprehension of the properties and operations of complex numbers by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

5. Add complex numbers.
6. Subtract complex numbers.
7. Multiply complex numbers.
8. Divide complex numbers.
9. Prove the following properties of complex numbers:

a. closure,

b. existence of identity elements and inverses,

c. associative laws,

d. commutative laws, and

e. distributive law.

10. Graph complex numbers on a coordinate plane.

11. Define the conjugate of a complex number.

12. Give geometric interpretation of addition and subtraction of complexes.

13. Find the square root of complex numbers.

14. Solve quadratic equations with complex solutions.

SEQUENCES, SERIES, MATHEMATICAL INDUCTION

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MAJOR OBJECTIVE

THE STUDENT WILL DEMONSTRATE AN INCREASE IN COMPREHENSION OF SEQUENCES, SERIES AND MATHEMATICAL INDUCTION BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Arithmetic Sequences

Objective #1: The student will increase in comprehension of arithmetic sequences by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*(1). Define an arithmetic sequence.

*(2). Define the common difference in an arithmetic sequence.

*(3). Find the nth term in an arithmetic series.

*(4). Find the sum of the first n terms in an arithmetic sequence.

*(5). Define arithmetic means.

*(6). Insert arithmetic means between 2 extremes.

*(7). Solve verbal problems involving arithmetic series.

II. Geometric Sequences

Objective #2: The student will increase in comprehension of geometric sequences by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*(8). Define a geometric sequence of numbers.

*(9). Define the common ratio in a geometric sequence.

*An optional section for some programs.

*(10). Find the nth term in a geometric series.

*(11). Find the sum of the first n terms in a geometric sequence.

*(12). Define geometric means.

*(13). Insert geometric means between 2 extremes.

*(14). Solve verbal problems involving geometric series.

*(15). Define an infinite geometric series.

*(16). Find the sum of an infinite geometric series.

III. Mathematical Induction

Objective #3: The student will be able to identify and apply the process of mathematical induction in a variety of proofs to the satisfaction of the teacher.

MAJOR OBJECTIVE

THE STUDENT WILL APPLY THE PROPERTIES OF PERMUTATIONS, COMBINATIONS, AND PROBABILITY TO THE SOLUTION OF PROBLEMS BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Permutations and Combinations

Objective #1: The student will apply properties of permutations and combinations to the solution of word problems by completing the following suggested activities to the satisfaction of the teacher.

Activities:

*(1). Define a permutation.

*(2). Solve verbal problems involving permutations.

*(3). Define a combination or a selection.

II. Probability

Objective #2: The student will apply the properties of probability to the solution of word problems by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*(4). Solve verbal problems involving combinations.

*(5). Determine the probability that a particular event will occur.

*(6). Solve verbal problems involving probabilities.

*An optional section for some programs.

MAJOR OBJECTIVE

THE STUDENT WILL INCREASE IN COMPREHENSION OF TRIGONOMETRY BY COMPLETING THE FOLLOWING LEVEL TO THE SATISFACTION OF THE TEACHER.

I. Functions

Objective #1: The student will increase in comprehension of trigonometric functions by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*(1). Define an angle in standard form.

*(2). Define a radius vector.

*(3). Define the sine, cosine, tangent, cosecant, secant, and cotangent functions using for each, two of the following: abscissa, ordinate, and radius.

*(4). Express the tangent and cotangent functions in terms of sine and cosine.

*(5). Express the sine function using the cosecant and vice versa.

*(6). Express the cosine function using the secant and vice versa.

*(7). Express the tangent function using the cotangent and vice versa.

*(8). Express the Pythagorean relation in terms of trigonometric functions.

*(9). Manipulate the fundamental trigonometric identities.

II. Application

Objective #2: The student will increase in ability to

*An optional section for some programs.

apply the trigonometric functions to angles and solving problems involving right triangles by completing the following suggested activities to the satisfaction of the teacher.

Activities:

The student will be able to:

*(10). Determine the sine, cosine, tangent, cosecant, secant, and cotangent of the following angles without using a table: 0, 30, 45, 60, 90, 180, 270.

*(11). Determine the sine, cosine, tangent, cosecant, secant, and cotangent of any angle using a table of values.

*(12). Determine the sine, cosine, tangent, cosecant, secant, and cotangent of any angle not listed exactly in a table of values by interpolation.

*(13). Determine the missing side or angle in a right triangle by using trigonometric functions.

*(14). Solve verbal problems involving right triangles by using trigonometric functions.

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