INTERNATIONAL ASSOCIATION for the
EVALUATION of EDUCATIONAL ACHIEVEMENT

SECOND Study of MATHEMATICS

GRADE 8
TEACHER CLASSROOM PROCESSES QUESTIONNAIRE
FRACTIONS

BOOKLET 10L

For Evaluation Centre Use Only

**The Ontario Institute for
Studies in Education
Educational Evaluation Centre**

POPULATION A

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

FRACTIONS

☐ Check here if <u>neither</u> common fractions nor decimal fractions is included in your program. Disregard the remainder of this questionnaire and return it.

Circle the response which best describes the use you made of each of the following materials in your instruction on common and/or decimal fractions.

RESPONSE CODE

a. Primary source, used frequently.
b. Secondary source, used occasionally.
c. Not used or rarely used.

1.	Student textbook (containing explanations and exercises).	a b c
2.	Other published text materials (e.g., textbooks, workbooks, or worksheets).	a b c
3.	Locally produced text materials (e.g., textbooks, workbooks, or worksheets).	a b c
4.	Commercially or locally produced individualized materials (e.g., programmed instruction or computer assisted instruction).	a b c
5.	Commercially or locally produced films, filmstrips, or teacher demonstration models.	a b c
6.	Commercially or locally produced laboratory materials for student use (e.g., games or manipulatives).	a b c

PART I TEACHING TOPICS

The topics given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the topic was:

RESPONSE CODE

a. Taught as new content.
b. Reviewed and then extended.
c. Reviewed only.
d. Assumed as prerequisite knowledge and neither taught nor reviewed.
e. Not taught <u>and</u> not assumed as prerequisite knowledge.

Common Fractions

7.	Developing the concept.	a b c d e
8.	Finding equivalent fractions - including reducing fractions.	a b c d e
9.	Adding and subtracting - including finding common denominators.	a b c d e
10.	Multiplying.	a b c d e
11.	Dividing.	a b c d e
12.	Ordering.	a b c d e

Decimal Fractions

13.	Developing the concept.	a b c d e
14.	Converting decimal fractions to common fractions, or vice versa.	a b c d e
15.	Adding and subtracting.	a b c d e
16.	Multiplying.	a b c d e
17.	Dividing.	a b c d e
18.	Ordering.	a b c d e

<u>NOTE</u>: IF YOU DID NOT TEACH COMMON FRACTIONS, PROCEED DIRECTLY TO ITEM 74.

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PART II TEACHING METHODS - COMMON FRACTIONS

The interpretations of fractions given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).
b. Used, but not emphasized.
c. Not used.

This interpretation was:

d. In students' text.
e. Not in students' text.

For those interpretations emphasized, the primary reason(s) was (were):

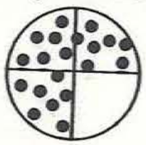
f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations not used, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not related to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

Fractions as parts of regions:

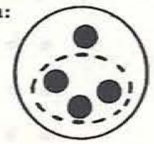
$\frac{3}{4}$ means



19. a b c	20. d e	21. f g h i j k l m	22. n o p q r s t u

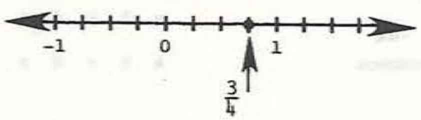
Fractions as parts of a collection:

$\frac{3}{4}$ means



23. a b c	24. d e	25. f g h i j k l m	26. n o p q r s t u

Fractions as the coordinates of points on a number line:



27. a b c	28. d e	29. f g h i j k l m	30. n o p q r s t u

Fractions as quotients:

$\frac{3}{4}$ means "3 divided by 4"

31. a b c	32. d e	33. f g h i j k l m	34. n o p q r s t u

Fractions as decimals:

$\frac{3}{4} = 0.75$

35. a b c	36. d e	37. f g h i j k l m	38. n o p q r s t u

The interpretations of fractions given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This interpretation was:

d. In students' text.

e. Not in students' text.

For those interpretations <u>emphasized</u>, the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations <u>not used</u>, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

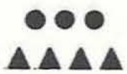
Fractions as repeated addition of a unit fraction:

$\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$

39. a b c 40. d e 41. f g h i j k l m 42. n o p q r s t u

Fractions as ratios:

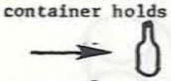
$\frac{3}{4}$ means



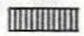
43. a b c 44. d e 45. f g h i j k l m 46. n o p q r s t u

Fractions as measurements:
this container holds

$\frac{3}{4}$ L

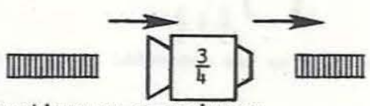


this stick is $\frac{7}{4}$ cm



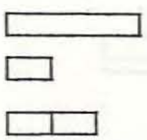
47. a b c 48. d e 49. f g h i j k l m 50. n o p q r s t u

Fractions as operators:



51. a b c 52. d e 53. f g h i j k l m 54. n o p q r s t u

Fractions as comparisons:



unit rod

$\frac{1}{3}$ rod

$\frac{2}{3}$ rod

Two $\frac{1}{3}$ rods = a $\frac{2}{3}$ rod

55. a b c 56. d e 57. f g h i j k l m 58. n o p q r s t u

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Addition of Fractions

The interpretations of the addition of fractions given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

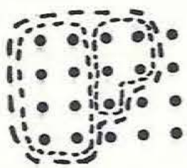
c. Not used.

59. The sum of two fractions as the union of two regions. a b c

Ex: $\frac{1}{3} + \frac{1}{4}$ as

60. The sum of two fractions as the combination of fractional parts of a collection. a b c

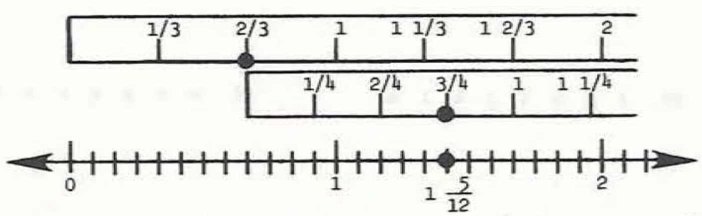
Ex: $\frac{2}{5} + \frac{1}{4}$ as



(Note: the collection consists of 20 dots.)

61. The sum of two fractions on the number line. a b c

Ex: $\frac{2}{3} + \frac{3}{4}$ as



62. The sum of two fractions as the sum of two quotients. a b c

Ex: $\frac{2}{3} + \frac{3}{4}$ as $(2 \div 3) + (3 \div 4)$

Since $2 \div 3 = 8 \div 12$ and $3 \div 4 = 9 \div 12$,

then the sum is $(8 \div 12) + (9 \div 12) = (8 + 9) \div 12$

$= 17 \div 12$ or $\frac{17}{12}$

Addition of fractions (cont.)

63. The sum of two fractions as the sume of two decimals. a b c

Ex. $\frac{3}{4} + \frac{2}{5} = 0.75 + 0.40$

$= 1.15$

64. The sum of two fractions using fractions as repeated addition of the unit fractions. a b c

Ex. $\frac{2}{5} + \frac{4}{5}$

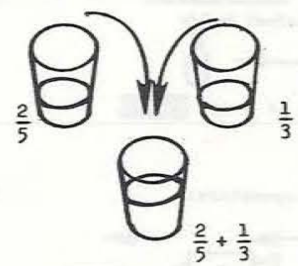
$= \left(\frac{1}{5} + \frac{1}{5}\right) + \left(\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}\right)$

$= \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}$

$= \frac{6}{5}$

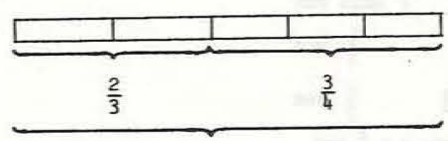
65. The sum of two fractions as a combination of two measurements. a b c

Ex. $\frac{2}{5} + \frac{1}{3}$ as



66. The sum of two fractions as joining two segments. a b c

Ex. $\frac{2}{3} + \frac{3}{4}$ as



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Procedures for Adding Fractions

The procedures for adding fractions given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the procedure was:

RESPONSE CODE

a. Emphasized (used as a primary procedure, referred to extensively or frequently).
b. Used, but not emphasized.
c. Not used.

67. Using the least common denominator in a horizontal format. a b c

$$\frac{4}{9} + \frac{1}{6} = \frac{4}{9} \times \frac{2}{2} + \frac{1}{6} \times \frac{3}{3} = \frac{8}{18} + \frac{3}{18} = \frac{11}{18}$$

68. Using the least common denominator in a vertical format. a b c

$$\begin{array}{r} \frac{4}{9} = \frac{8}{18} \\ + \frac{1}{6} = \frac{3}{18} \\ \hline \frac{11}{18} \end{array}$$

69. Using the "formula" a b c

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$$

....

$$\frac{4}{9} + \frac{1}{6} = \frac{(4 \times 6) + (1 \times 9)}{9 \times 6} = \frac{24 + 9}{54} = \frac{33}{54} = \frac{11}{18}$$

70. Using any common denominator in a horizontal format. a b c

$$\frac{5}{9} + \frac{1}{6} = \frac{5}{9} \times \frac{6}{6} + \frac{1}{6} \times \frac{9}{9} = \frac{24}{54} + \frac{9}{54} = \frac{33}{54} = \frac{11}{18}$$

71. Using any common denominator in a vertical format. a b c

$$\begin{array}{r} \frac{4}{9} = \frac{24}{54} \\ \frac{1}{6} = \frac{9}{54} \\ + \\ \hline \frac{33}{54} = \frac{11}{18} \end{array}$$

72. Using decimals. a b c

$$\frac{1}{5} + \frac{5}{8} = 0.2 + 0.625 = 0.825 = \frac{825}{1000}$$

Techniques for Adding Fractions

73. Which of the following best describes the technique you used in teaching the addition of fractions? (Circle only one response.)

a. I presented only numerical examples demonstrating the procedure(s).

Ex:

$$\begin{array}{r} \frac{3}{5} = \frac{21}{35} \\ + \frac{4}{7} = \frac{20}{35} \\ \hline \frac{41}{35} \end{array}$$

b. I first used numerical examples and then presented the procedure symbolically (i.e., the general case).

Ex: Numerically: $\frac{3}{5} + \frac{4}{7} = \frac{(3 \times 7) + (4 \times 5)}{5 \times 7} = \frac{21 + 20}{35} = \frac{41}{35}$

Symbolically: $\frac{a}{b} + \frac{c}{d} = \frac{ad + cb}{bd}$

c. I first presented the procedure symbolically (i.e., the general case), and then illustrated it with numerical examples.

Ex: Symbolically: $\frac{a}{b} + \frac{c}{d} = \frac{ad + cb}{bd}$

Numerically: $\frac{3}{5} + \frac{4}{7} = \frac{(3 \times 7) + (4 \times 5)}{5 \times 7} = \frac{21 + 20}{35} = \frac{41}{35}$

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PART III TEACHING METHODS - DECIMAL FRACTIONS

The interpretations of decimals given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This interpretation was:

d. In students' text.

e. Not in students' text.

For those interpretations emphasized, the primary reason(s) was (were):

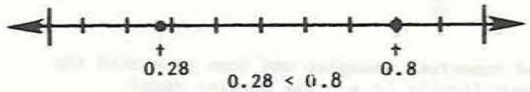
f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations not used, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

A decimal as the coordinate of a point on the number line.

74. a b c 75. d e 76. f g h i j k l m 77. n o p q r s t u



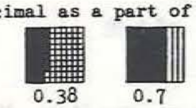
A decimal as another way of writing a fraction.

78. a b c 79. d e 80. f g h i j k l m 81. n o p q r s t u

$0.17 = \frac{17}{100}$ $\quad 0.8 = \frac{8}{10}$

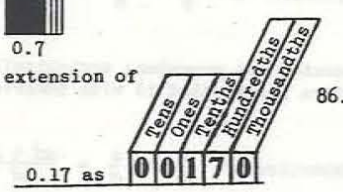
A decimal as a part of a region.

82. a b c 83. d e 84. f g h i j k l m 85. n o p q r s t u



A decimal as an extension of place value.

86. a b c 87. d e 88. f g h i j k l m 89. n o p q r s t u



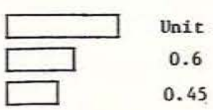
A decimal as a series.

90. a b c 91. d e 92. f g h i j k l m 93. n o p q r s t u

$0.245 = \frac{2}{10} + \frac{4}{100} + \frac{5}{1000}$

A decimal as a comparison.

94. a b c 95. d e 96. f g h i j k l m 97. n o p q r s t u



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Operations with decimals

Several techniques a teacher might use in teaching operations with decimals are listed below. Circle the appropriate response code to show whether for students in the target class the technique was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).
b. Used, but not emphasized.
c. Not used.

98. Relate operations with decimals to operations with fractions. a b c

Ex: $0.7 \times 0.6 = \square$

But $0.7 = \frac{7}{10}$ and $0.6 = \frac{6}{10}$

So $0.7 \times 0.6 = \frac{7}{10} \times \frac{6}{10}$

$= \frac{42}{100}$

Therefore $0.7 \times 0.6 = 0.42$

99. Relate operations with decimals to operations with whole numbers, teaching rules for placing the decimal point. a b c

Ex: $1.38 \times 5.2 = \square$

Since
$$\begin{array}{r} 1.38 \\ \times\ 5.2 \\ \hline 276 \\ 690\ \\ \hline 7176 \end{array}$$

$$\underbrace{1.38}_{\textit{2 places}} \times \underbrace{5.2}_{\textit{1 place}} = \underbrace{7.176}_{\textit{3 places}}$$

100. Use concrete materials to illustrate operations with decimals. a b c

Ex: $3.47 + 2.13 = \square$

Using rods or match sticks, I demonstrated that

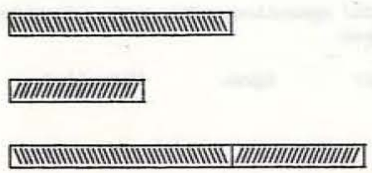
3.47 m

and

2.13 m

makes

5.60 m



PART IV TIME ALLOCATIONS

101. What was the average length (in minutes) of each of the target class mathematics periods?

Common Fractions

102. How many total class periods did you spend on teaching common fractions? (Combine partial periods when necessary.)

Indicate the amount of time spent on each of the following activities (that is, demonstrations, explanations, students doing computational exercises, using manipulatives, etc.) with your target class. Circle the estimated number of class periods. If more than 10 periods were spent on any topic, specify the number of periods on the blank.

103. Activities related to developing the concept of fractions.* 0 1 2 3 4 5 6 7 8 9 10 ____

104. Activities related to finding equivalent fractions--including reducing fractions.* 0 1 2 3 4 5 6 7 8 9 10 ____

105. Activities related to adding and subtracting--including finding common denominators.* 0 1 2 3 4 5 6 7 8 9 10 ____

106. Activities related to multiplying fractions.* 0 1 2 3 4 5 6 7 8 9 10 ____

107. Activities related to dividing fractions.* 0 1 2 3 4 5 6 7 8 9 10 ____

108. Activities related to ordering fractions.* 0 1 2 3 4 5 6 7 8 9 10 ____

109. Applications/problem solving activities related to fractions (textbook word problems, problems related to real world situations, recreational problems, challenging problems, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

*Where the primary purpose was conceptual understanding or computational skill, but not problem solving.

NOTE: THE SUM OF PERIODS GIVEN FOR ITEMS 103 TO 109 SHOULD NOT EXCEED THE NUMBER GIVEN FOR ITEM 102.

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Decimal Fractions

110. How many total class periods did you spend on teaching decimal fractions? (Combine partial periods when necessary.) [| |]

Indicate the amount of time spent on each of the following activities (that is, demonstrations, explanations, students doing computational exercises, using manipulatives, etc.) with your target class. Circle the estimated number of class periods. If more than 10 periods were spent on any topic, specify the number of periods on the blank.

111. Activities related to developing the concept of decimals.* 0 1 2 3 4 5 6 7 8 9 10 ____

112. Activities related to converting decimal fractions to common fractions, or vice versa.* 0 1 2 3 4 5 6 7 8 9 10 ____

113. Activities related to adding and subtracting decimals.* 0 1 2 3 4 5 6 7 8 9 10 ____

114. Activities related to multiplying decimals.* 0 1 2 3 4 5 6 7 8 9 10 ____

115. Activities related to dividing decimals.* 0 1 2 3 4 5 6 7 8 9 10 ____

116. Activities related to ordering decimals.* 0 1 2 3 4 5 6 7 8 9 10 ____

117. Application/problem solving activities related to decimals (textbook word problems, problems related to real world situations, recreational problems, challenging problems, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

* Where the primary purpose was conceptual understanding or computational skill, but not problem solving.

NOTE: THE SUM OF PERIODS GIVEN FOR ITEMS 111 TO 117 SHOULD NOT EXCEED THE NUMBER GIVEN FOR ITEM 110.

PART V OPINIONS

Indicate (circle) the extent to which you agree or disagree with each of the following statements relative to your target class.

118. Computation with common fractions should be taught.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

119. The degree to which the students are skilled in computing is an indicator of their understanding of fractions and/or decimals.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

120. Computations with common fractions should be delayed until students are at least 12-13 years of age.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

121. Computations with decimals and common fractions should be done with hand-held calculators.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

122. Only common fractions with small denominators should be taught (e.g., 1/2, 1/3, etc.).

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

123. It is important to drill on computation with common fractions and decimals until students are very good at computing.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

124. Rules for operations with common fractions and decimals should be memorized.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

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125. Emphasis should be placed on teaching applications involving common fractions and decimals.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

126. Problem solving activities and applications with common fractions and decimals should be emphasized more than computations with fractions and decimals.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

127. In teaching common fractions it is important that structural properties (distributivity, associativity, commutativity, identity, inverse elements) be emphasized.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

128. Estimation, approximation, and checking the reasonableness of an answer are more important than becoming skilled in computing with common fractions and decimals.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

129. Decimals and their operations should be emphasized more than common fractions and their operations.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

130. Mental calculation should be emphasized with common fractions and decimals.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

131. Instruction on common fractions should precede instruction on decimals.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

132. Instruction on addition of common fractions (like and unlike denominators) should precede instruction on multiplication of fractions.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

133. It is important for students to know how to find the least common multiple (LCM) of two whole numbers.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

134. It is important for students to know how to find the greatest common factor (GCF) of two whole numbers.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

135. When reducing fractions, students should first find the greatest common factor (GCF) of the numerator and denominator and then divide the numerator and the denominator by the GCF.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

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INTERNATIONAL ASSOCIATION for the
EVALUATION of EDUCATIONAL ACHIEVEMENT

SECOND

Study of

MATHEMATICS

GRADE 8

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

RATIO, PROPORTION AND PERCENT

BOOKLET 11L

For Evaluation Centre Use Only

[illegible] (11L)

Country	25	School	[illegible]
State	[illegible]	Class	[illegible]
Population	1	Teacher	[illegible]
Strata	[illegible]	Instrument	[illegible]

[illegible]

The Ontario Institute for
Studies in Education
Educational Evaluation Centre

POPULATION A

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

RATIO, PROPORTION AND PERCENT

☐ Check here if none of ratio, proportion, or percent is included in your program for the target class. Disregard the rest of this questionnaire and return it.

Circle the response which best describes the use you made of each of the following materials in your instruction on ratio, proportion, or percent.

RESPONSE CODE

a. Primary source, used frequently.
b. Secondary source, used occasionally.
c. Not used or rarely used.

1. Student textbook (containing explanations and exercises). a b c
2. Other published text materials (e.g., textbooks workbooks, or worksheets). a b c
3. Locally produced text materials (e.g., textbooks, workbooks, or worksheets). a b c
4. Commercially or locally produced individualized materials (e.g., programmed instruction or computer assisted instruction). a b c
5. Commercially or locally produced films, filmstrips, or teacher demonstration models. a b c
6. Commercially or locally produced laboratory materials for student use (e.g., games or manipulatives). a b c

PART I TEACHING TOPICS

The topics given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the topic was:

RESPONSE CODE

a. Taught as new content.
b. Reviewed and then extended.
c. Reviewed only.
d. Assumed as prerequisite knowledge and neither taught nor reviewed.
e. Not taught and not assumed as prerequisite knowledge.

7. The concept of ratio. a b c d e
8. The concept of proportion. a b c d e
9. Solving proportional equations. a b c d e
10. The concept of percent. a b c d e
11. Computing percents: Find a percent of given number or determine what percent one number is of another. a b c d e
12. Changing percents to common fractions. a b c d e
13. Changing percents to decimal fractions. a b c d e
14. Changing common fractions to percents. a b c d e
15. Changing decimal fractions to percents. a b c d e
16. Percents greater than 100%. a b c d e
17. Percents less than 1%. a b c d e

PART II TEACHING METHODS

The interpretations given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

Ratio

18. Ratio as a rate. a b c

Ex: i) 13 km/h.

ii) 72 heartbeat/min.

19. Ratio as a comparison. a b c

Ex: i) One part cleaner to ten parts water.

ii) Three pencils per student.

20. Ratio as a fraction. a b c

Ex: 3:5 means $\frac{3}{5}$ (three fifths)

21. Ratio as the quotient of two whole numbers. a b c

Ex: 3:5 means 3 ÷ 5

The interpretations given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

Percent

22. Percent as a fraction (i.e., a synonym for hundredths). a b c

Ex: 83% means $\frac{83}{100}$ or 0.83

23. Percent as a ratio with a second term of 100. a b c

Ex: 83% means 83:100

The interpretations of proportions given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used,but not emphasized.

c. Not used.

This interpretation was:

d. In students' text.

e. Not in students' text.

For those interpretations <u>emphasized</u>, the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations <u>not used</u>, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

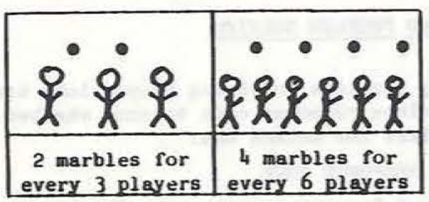
Proportions as equivalent ratios.

Ex: 12 heartbeats/10S is the same as 72 beats/min.

24. a b c 25. d e 26. f g h i j k l m 27. n o p q r s t u

Proportions as equivalent comparisons.

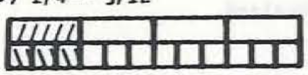
Ex:



28. a b c 29. d e 30. f g h i j k l m 31. n o p q r s t u

Proportions as equivalent fractions.

Ex: i) 1/4 = 3/12



ii)

$\frac{3}{2}$	$\frac{2 \times 3}{2 \times 2}$	$\frac{3 \times 3}{3 \times 2}$	$\frac{4 \times 3}{4 \times 2}$
$\frac{3}{2}$	$\frac{6}{4}$	$\frac{9}{6}$	$\frac{12}{8}$

32. a b c 33. d e 34. f g h i j k l m 35. n o p q r s t u

Proportions as equivalent quotients.

Ex: 3:4 and 9:12. Since 3:4 = 0.75 and 9:12 = 0.75, the quotients are equal. So 3:4 and 9:12 are equivalent.

36. a b c 37. d e 38. f g h i j k l m 39. n o p q r s t u

Procedures for Solving Proportions

The procedures for solving proportions given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the procedure was:

RESPONSE CODE

a. Emphasized (used as a primary procedure, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

40. Using multiplication or division to equate numerators and denominators. a b c

Ex: Given $\frac{3}{14} = \frac{6}{x}$

$$\frac{3 \times 2}{14 \times 2} = \frac{6}{x}$$

$$\frac{6}{28} = \frac{6}{x}$$

Hence $x = 28$

41. Finding the cross products and then solving the resulting equation. a b c

Ex: Given $\frac{3}{14} = \frac{6}{x}$

$$3 \times x = 14 \times 6$$

$$3 \times x = 84$$

Hence $x = 28$

42. Dividing the terms of one ratio and then solving the resulting equation. a b c

Ex: Given $\frac{x}{9} = \frac{17}{4}$

$$\frac{x}{9} = 4.25$$

$$x = 9 \times 4.25$$

Hence $x = 38.25$

Techniques for Solving Proportions

43. Which of the following best describes the technique you used in teaching a procedure for solving proportional equations? (Circle only one of a, b, or c.)

a. I presented only numerical examples demonstrating the procedure(s).

Ex: $\frac{3}{5} = \frac{6}{n}$

b. I first used numerical examples and then presented the procedure symbolically (i.e., the general case).

Ex: Numerically $\frac{3}{5} = \frac{6}{n}$ Symbolically $\frac{a}{b} = \frac{c}{n}$

c. I first presented the procedure symbolically (i.e., the general case) and then illustrated it with numerical examples.

Ex: Symbolically $\frac{a}{b} = \frac{c}{n}$ Numerically $\frac{3}{5} = \frac{6}{n}$

PART III APPLICATIONS AND PROBLEM SOLVING

Several methods of solving problems involving proportions are listed below. Circle the appropriate response code to show whether for students in your target class the method was:

RESPONSE CODE

a. Emphasized (used as a primary method, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

Sample Problem

Four neckties cost \$20.00.
How much do 12 neckties cost?

44. Use proportional reasoning without an equation. a b c

For example: 12 neckties are three times as many as four neckties, so they would cost three times as much, or \$60.00.

RESPONSE CODE

a. Emphasized (used as a primary method, referred to extensively or frequently).
b. Used, but not emphasized.
c. Not used.

45. Use a proportional equation. a (b) c

For example: $\frac{4}{20} = \frac{12}{x}$ where x is the cost of 12 neckties. Solve for x.

46. Use the unit method without an equation. a (b) c

For example: One necktie costs $20 ÷ 4 or $5.00, therefore 12 neckties cost 12 × $5.00 = $60.00.

Applications and Problems

Several applications of ratio and proportions are listed below. Circle the appropriate response code to show whether for students in the target class this type of application/problem was:

RESPONSE CODE

a. Emphasized (used as a primary type of application, used extensively or frequently).
b. Used, but not emphasized.
c. Not used.

47. Scale models (airplanes, automobiles). a (b) c
48. Finding distances from maps. a (b) c
49. Scale drawings. a (b) c
50. Calculating the size of a population from a sample estimate. a (b) c
51. Problems involving buying decisions based on cost rates. a (b) c
    Ex: Pay $1.00 for 3 items or 35¢ for each?
52. Mixture or recipe problems. a (b) c
53. Real world problems using similar triangles. a (b) c
    Ex: A 12 m tree casts a shadow of 4 m. A building has a shadow of 25 m. How tall is the building?

Applications and Problems (cont.)

54. Commission. (a) b c
55. Discount. (a) b c
56. General word problems. a (b) c
    Ex: John bought 25 toys. 40% were defective. How many were defective?
57. Simple or compound interest. a (b) c
58. Percent of increase or decrease. a (b) c
59. Circle or bar graphs. (a) b c

Sources of Applications and Problems

Several sources of applications/problems of ratio, proportion, and percent are listed below. Circle the appropriate response code to show whether for the target class each source was:

RESPONSE CODE

a. Used extensively or frequently.
b. Used occasionally.
c. Not used.

60. Students' textbooks. (a) b c
61. Supplementary textbooks or workbooks. a (b) c
62. Worksheets or exercises designed by myself or local teachers. a (b) c
63. The curriculum guide or syllabus. a b (c)
64. Publications of professional associations. a b (c)
65. Applications or problems suggested by my students. a b (c)
66. Applications or problems from real world sources, such as newspapers or individuals involved in the use of mathematics. a (b) c

Methods of Solving Percent Problems

Four methods of solving percent problems are listed below for each of three types of percent problems. Indicate for each type whether the method was:

RESPONSE CODE

a. Emphasized (used as primary procedure for this type of problem).
b. Taught, but not as a primary procedure for this type of problem.
c. Not taught.

Type I: Given the base and percent, find the percentage.

Ex: Sara bought a new dress priced at $150.00. The sales tax was 3% of the price. What was the sales tax?

67. The equation method. a b c

Ex: $0.03 \times 150 = x$
Solve for x.

68. The proportion method. a b c

Ex: Let x be the sales tax. Then:

$$\frac{x}{150} = \frac{3}{100}$$

Solve for x.

69. The arithmetic method. a b c

Ex: Multiply the percent (in decimal or fractional form) times the base to get the precentage, using only arithmetic.

$$\begin{array}{r} 150 \\ \underline{\times 0.03} \end{array}$$

70. The unit method. a b c

Ex: 1% of $150 is $1.50.

Therefore 3% of $150 is 3 × $1.50 = $4.50.

Type II: Given the base and percentage, find the percent.

Ex: The Mathematics Club has 40 members. Twenty-eight of the members were at a meeting to elect officers. What percent of the members attended the meeting?

71. The equation method. a b c

Ex: $100\ (28 \div 40) = x$
Solve for x.

72. The proportion method. a b c

Ex: $\frac{28}{40} = \frac{x}{100}$

Then solve for x.

73. The arithmetic method. a b c

Ex: Divide the base into the percentage and multiply by 100 to find the percent using only arithmetic.

$$\bigcirc \times 100 = \square$$

$$40\overline{)28}$$

74. The unit method. a b c

Ex: 40 students represents 100%, 0.4 students represent 1%. Therefore 28 ÷ 0.4 students represents the desired percent.

Type III: Given percent and percentage, find the base.

Ex: On a certain school day, there were 30 students absent. That was 5% of the total. How many students were there?

75. The equation method. a b c

Ex: $0.05\,x = 30$
Solve for x.

76. The proportion method. a b c

Ex: $\frac{30}{x} = \frac{5}{100}$

Solve for x.

77. The arithmetic method. a b c

Ex: Divide the percent (in decimal or fractional form) into the percentage to get the base.

$$0.05\overline{)30}$$

78. The unit method. a b c

Ex: 30 students represent 5%
6 students represent 1%

Therefore,
100 × 6 = total students.

PART IV TIME ALLOCATIONS

79. What was the average length (in minutes) of each of the target class mathematics periods? | 4 | 0 |

80. How many total class periods did you spend on teaching ratio, proportion, and percent? (Combine partial periods when necessary). | | 1 | 8 |

Indicate the amount of time spent on each of the following activities (that is, demonstrations, explanations, students doing computational exercises, using manipulatives, etc.) with your target class. Circle the estimated number of class periods. If more than 10 class periods were spent on any topic, specify the number of periods on the blank.

81. Activities related to developing the concept of ratio.* 0 1 2 3 4 5 6 7 8 9 10 ____

82. Activities related to developing the concept of proportion.* 0 1 2 3 4 5 6 7 8 9 10 ____

83. Activities related to solving proportional equations.* 0 1 2 3 4 5 6 7 8 9 10 ____

84. Application/problem solving activities related to ratio and proportions (textbook word problems, problems related to real world situations, recreational problems, challenging problems, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

* Where the primary purpose was conceptual understanding or computational skill, but not problem solving.

85. Activities related to developing the concept of percent.* 0 1 2 3 4 5 6 7 8 9 10 ____

86. Activities related to computing with percents.* 0 1 2 3 4 5 6 7 8 9 10 ____

87. Activities related to changing percents to common fractions.* 0 1 2 3 4 5 6 7 8 9 10 ____

88. Activities related to changing percents to decimal fractions.* 0 1 2 3 4 5 6 7 8 9 10 ____

89. Activities related to changing common fractions to percents.* 0 1 2 3 4 5 6 7 8 9 10 ____

90. Activities related to changing decimal fractions to percents.* 0 1 2 3 4 5 6 7 8 9 10 ____

91. Application/problem solving activities related to percents (textbook word problems, problems related to real world situations, recreational problems, challenging problems, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

*Where the primary purpose was conceptual understanding or computational skill, but not problem-solving.

NOTE: THE SUM OF THE PERIODS GIVEN FOR ITEMS 81-91 SHOULD NOT EXCEED THE NUMBER GIVEN FOR ITEM 80.

PART V OPINIONS

Indicate (circle) the extent to which you agree or disagree with each of the following statements relative to your target class.

92. The study of percent should be related to the study of proportion.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

93. The study of percent should precede the study of ratio and proportion.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

94. The study of proportion should be delayed until the students learn how to solve linear equations.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

95. The study of proportion should be delayed beyond this grade level.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

96. The students should initially learn how to solve proportional problems using arithmetical methods (without setting up proportional equations).

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

97. The degree to which the students are skilled at computing when solving proportions is an indicator of their understanding of proportions.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

98. Students should be taught to identify each of the three types of percent problems before solving them.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

99. Students should be given a specific procedure for each of the three types of percent problems.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

100. Computation with percent should be done with hand-held calculators.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

101. Applications with proportion should be emphasized more than solving proportional equations.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

102. Applications involving consumer arithmetic (discount, interest, etc.) should be emphasized when students study percent.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

103. Ratio should be taught as fractions or quotients rather than as rates or comparisons of collections.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

INTERNATIONAL ASSOCIATION for the
EVALUATION of EDUCATIONAL ACHIEVEMENT

SECOND

Study of

MATHEMATICS

GRADE 8

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

MEASUREMENT

BOOKLET 12L

For Evaluation Centre Use Only

**The Ontario Institute for
Studies in Education
Educational Evaluation Centre**

POPULATION A

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

MEASUREMENT

☐ Check here if measurement is not included in your program for the target class. Disregard the remainder of this questionnaire and return it.

Circle the response which best describes the use you made of each of the following materials in your instruction on measurement.

RESPONSE CODE

a. Primary source, used frequently.
b. Secondary source, used occasionally.
c. Not used or rarely used.

1. Student textbook (containing explanations and exercises). a b c
2. Other published text materials (e.g., textbooks, workbooks, or worksheets). a b c
3. Locally produced text materials (e.g., textbooks, workbooks, or worksheets). a b c
4. Commercially or locally produced individualized materials (e.g., programmed instruction or computer assisted instruction). a b c
5. Commercially or locally produced films, filmstrips, or teacher demonstration models. a b c
6. Commercially or locally produced laboratory materials for student use (e.g., games or manipulatives). a b c

PART I TEACHING TOPICS

The topics given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the topic was:

RESPONSE CODE

a. Taught as new content.
b. Reviewed and then extended.
c. Reviewed only.
d. Assumed as prerequisite knowledge and neither taught nor reviewed.
e. Not taught and not assumed as prerequisite knowledge.

7. Concept of measurement (including selection of unit and use of unit to assign a number). a b c d e
8. Names of units of measures in the metric system (SI). a b c d e
9. Names of units of measures in the English system (such as pounds, miles, gallons, etc.). a b c d e
10. Conversion of units within a system. a b c d e

    Ex: 5 cm = 50 mm.

    24 inches = 2 feet.

11. Conversion of units between systems. a b c d e

    Ex: Convert 5 inches to centimetres.

    How many miles in 60 km.

The topics given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the topic was:

RESPONSE CODE

a. Taught as new content.

b. Reviewed and then extended.

c. Reviewed only.

d. Assumed as prerequisite knowledge and neither taught nor reviewed.

e. Not taught <u>and</u> not assumed as prerequisite knowledge.

12. Estimating measurements. a b c d e

Ex: Find a stick 15 cm long.

How many metres high is the ceiling?

13. Operations with measurements. a b c d e

Ex:
```
    4 yards 2 feet  8 inches
  + 2 yards 1 foot 10 inches
```

2.5 m + 67 cm = □

14. Precision, accuracy, percent error and relative error. a b c d e

15. Concept of π. a b c d e

16. Linear measurement. a b c d e

Ex: Find the length of segment *AB*.

17. Perimeter of polygons (including triangles, quadrilaterals, and other polygons). a b c d e

18. Circumference of a circle. a b c d e

19. Area of a triangle. a b c d e

20. Area of rectangles (including squares). a b c d e

21. Area of parallelograms other than rectangles. a b c d e

22. Area of a trapezoid. a b c d e

23. Area of a circle. a b c d e

24. Surface area of rectangular solids (including cubes). a b c d e

25. Surface area of cylinders. a b c d e

26. Surface area of spheres. a b c d e

27. Volume of rectangular solids (including cubes). a b c d e

28. Volume of cylinders and prisms. a b c d e

29. Volume of spheres. a b c d e

30. Volume of cones and pyramids. a b c d e

PART II INSTRUCTIONAL AIDS

Several aids which might be used in teaching measurement are given below. Circle the appropriate response code to indicate the degree to which you and the students in the target class used each aid.

RESPONSE CODE

a. Used extensively or frequently.
b. Used occasionally.
c. Not used.

31. Rulers (metrestick, yardstick, 12 inch ruler, etc.). a b c

32. Measuring tape. a b c

33. Trundle wheel. a b c

34. Aids representing non-standard units of measurement (paper clips, hand spans, foot lengths, popsicle sticks, sugar cubes, matchboxes, etc.). a b c

35. Geoboards, graph paper, or grids. a b c

36. Aids representing standard units for area (centimetre squares, centimetre cubes or rods, etc.). a b c

37. Graduated cylinders. a b c

38. Containers (litre, gallon, etc.) a b c

39. Fillable models of geometric solids. a b c

PART III TEACHING METHODS

The methods used to introduce the use of units of measurement given below may have been included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary method, referred to extensively or frequently).
b. Used, but not emphasized.
c. Not used.

40. I have my students use non-standard units of measurement. a b c

Ex: Measure the length of a desk using paper clips.

41. I have my students use standard units in measuring objects. a b c

Ex: Measure the length of the room in metres.

42. I have my students estimate the size of real world objects. a b c

Ex: Estimate how many sugar cubes will fit into a given container.
Estimate the length of the hallway.

43. I have my students identify objects whose measurement is as close as possible to a given number of units. a b c

Ex: Which of these four containers has a capacity closest to two litres?
Cut a long piece of string about 10 cm long without using a ruler.

44. I have my students measure a given object using different units of measure. a b c

Ex: Measure the width of the paper in millimetres and centimetres.
Find the height of the table in centimetres and inches.

45. I have my students increase the precision of their measurements by means of smaller units. a b c

Ex:

The length of the stick is between 5 cm and 6 cm.
More precisely, it is between 53 mm and 54 mm.

The interpretations of the number π given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This interpretation was:

d. In students' text.

e. Not in students' text.

For those interpretations emphasized, the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations not used, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

I had my students measure and find the ratio of the circumference to the diameter of a number of circular objects, and approximate $\frac{c}{d}$ for any circle.

46. a b c 47. d e 48. f g h i j k l m 49. n o p q r s t u

I told my students that $\pi \doteq \frac{22}{7}$ or 3.14.

50. a b c 51. d e 52. f g h i j k l m 53. n o p q r s t u

My students estimated the value of π using Buffon's Needle Problem.

54. a b c 55. d e 56. f g h i j k l m 57. n o p q r s t u

I presented a chart relating the values of the circumference to that of the diameter of various circles like the following:

Circle	Circumference	Diameter
1	18.84 cm	6 cm
2	6.908 m	2.2 m
3	1.57 in	.5 in
4	31.4 ft	10 ft
5	16.642 m	5.3 m

I asked the students to find the ratio of the circumference to the diameter for each circle and generalized that $\frac{c}{d} \doteq 3.14$

58. a b c 59. d e 60. f g h i j k l m 61. n o p q r s t u

The interpretations of the number π given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).
b. Used, but not emphasized.
c. Not used.

This interpretation was:

d. In students' text.
e. Not in students' text.

For those interpretations <u>emphasized</u>, the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations <u>not used</u>, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

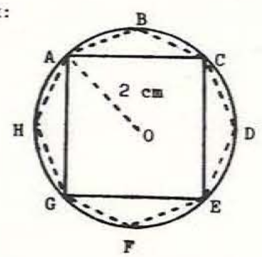
I told my students that π is an irrational number which equals the ratio of the circumference of any circle to its diameter.

62. a b c 63. d e 64. f g h i j k l m 65. n o p q r s t u

I had my students use regular polygons inscribed in a circle to obtain successive approximations to π.

66. a b c 67. d e 68. f g h i j k l m 69. n o p q r s t u

Ex:



Since $C = \pi r^2$ and $r = 2$, then $\pi = C/4$. Measuring any side of square *ACEG* to be 2.8 cm, C is estimated by 4×2.8 cm, so $\pi \doteq 2.8$. Measuring any side of octagon *ABCDEFGH* to be 1.5 cm, C is estimated by 8×1.5 cm, so $\pi \doteq 3$. By continuing this procedure, it is seen that as the number of sides of the polygons increase, the estimate of π approaches 3.14.

The interpretations of the number π given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This interpretation was:

d. In students' text.

e. Not in students' text.

For those interpretations emphasized, the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations not used, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

I introduced π as the area of a circle of radius 1.

70. a b c   71. d e   72. f g h i j k l m   73. n o p q r s t u

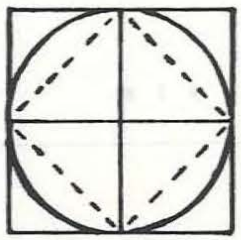
Ex:

i. Using successive approximations to the area of the unit circle, I showed that:

$2 <$ area of circle < 4

or

$2 < \pi < 4$

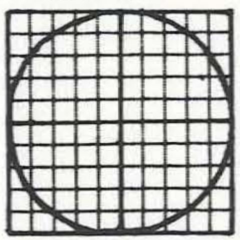


ii. Using a finer grid, I showed that:

$\frac{68}{25} <$ area of circle $< \frac{88}{25}$

or

$2.72 < \pi < 3.52$

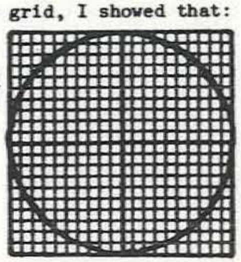


iii. Using still a finer grid, I showed that:

$\frac{288}{100} <$ area of circle $< \frac{344}{100}$

or

$2.88 < \pi < 3.44$



and so on.

Several methods for teaching the formula for the area of a parallelogram are given below. Circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This interpretation was:

d. In students' text.

e. Not in students' text.

For those interpretations emphasized, the primary reason(s) was (were):

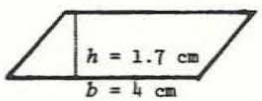
f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations not used, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

I presented the formula $A = b \times h$ and demonstrated how to apply it by means of examples.

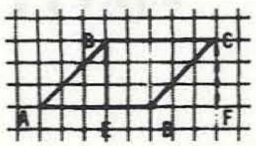
Ex:



$A = 4\text{ cm} \times 1.7\text{ cm} = 6.8\text{ cm}^2$

74. a b c 75. d e 76. f g h i j k l m 77. n o p q r s t u

I presented a parallelogram on a grid (or a geoboard) like the one below, and had the students relate the number of square units inside parallelogram *ABCD* to the base and altitude.



78. a b c 79. d e 80. f g h i j k l m 81. n o p q r s t u

I presented a parallelogram on a grid (or a geoboard) like the one above, and had the students count the square units inside triangles *ABE* and *DCF*. Then I had them related the area of *ABCD* to that of rectangle *BEFC* based on the congruence of Δ *ABE* and Δ *DCF*.

82. a b c 83. d e 84. f g h i j k l m 85. n o p q r s t u

I developed the formula $A = b \times h$ by comparing the area of a parallelogram to that of a related rectangle of equal base and height

86. a b c 87. d e 88. f g h i j k l m 89. n o p q r s t u

Several methods for teaching the formula for the area of a parallelogram are given below. Circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).
b. Used, but not emphasized.
c. Not used.

This interpretation was:

d. In students' text.
e. Not in students' text.

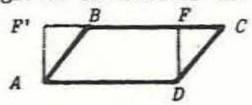
For those interpretations emphasized, the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations not used, the primary reason(s) was (were):

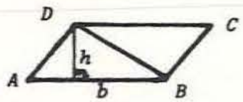
n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

I gave the students a parallelogram like the one below, and asked them to cut off triangle *FDC* and to use this to form a rectangle (*AF'FD*). The students then related the formula for the area of the rectangle to the area of the parallelogram.



90. a b c   91. d e   92. f g h i j k l m   93. n o p q r s t u

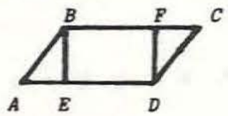
I partitioned the parallelogram by a diagonal into two congruent triangles.



Then the area of ΔABD is $\frac{1}{2} bh$ and the area of the parallelogram is $2(\frac{1}{2} bh)$ or bh.

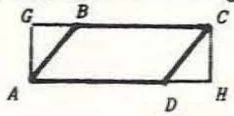
94. a b c   95. d e   96. f g h i j k l m   97. n o p q r s t u

I partitioned the parallelogram *ABCD* into ΔABE, ΔCDF, and rectangle *BFDE* so that the area of the parallelogram is obtained by adding the areas of the two triangles and the rectangle.



98. a b c   99. d e   100. f g h i j k l m   101. n o p q r s t u

I obtained the area of the parallelogram by subtracting the areas of ΔABG and ΔDCH from the area of rectangle *AGCH*.



102. a b c   103. d e   104. f g h i j k l m   105. n o p q r s t u

Several methods for teaching the formula for the volume of a rectangular prism are given below. Circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

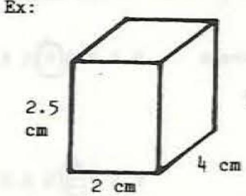
a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

106. I presented the formula $V = l \times w \times h$ or V = (area of base) × (height) and demonstrated how to apply it by means of examples. a b c

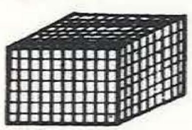
Ex:



$V = 2\text{ cm} \times 4\text{ cm} \times 2.5\text{ cm}$

$= 20\text{ cm}^3$

107. I presented a physical model of a right prism (box) with its faces marked off in square units, as illustrated below. I had students generate the formula by relating the number of cubic units contained in the prism to the dimensions of the box, giving hints only if necessary. a b c



108. I provided my students with unit cubes and asked them to build rectangular prisms of specified dimensions. I asked them to relate the number of unit cubes required to build the prisms to the given dimensions, giving hints only if necessary. a b c

Several techniques a teacher might use in teaching the relationships among various metric (SI) units are listed below. Circle the appropriate response code to show whether for students in the target class the technique was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

109. I established the analogy between the decimal numeration system and the basic metric units of measurement. a b c

Ex: One kilolitre is 1000 L, and 121 cm is 1.21 m.

110. I taught my students rules to change from one metric unit to another. a b c

Ex: To convert from a unit to a smaller unit, multiply. To convert from a unit to a larget unit, divide.

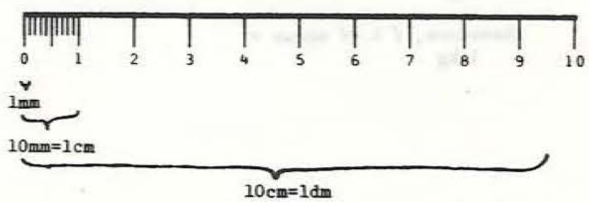
111. I presented a table showing definitions and adjacent relationships between units. a b c

Ex:

kilometre	hectometre	dekametre	metre	decimetre	centimetre	millimetre
1000 m	100 m	10 m	1 m	0.1 m	0.01 m	0.001 m

1km=10hm 1hm=10dam 1dam=10m 1m=10dm 1dm=10cm 1cm=10mm

112. I used a number line or a metrestick (graduated in centimetres and millimetres) to describe interrelationships among units. a b c



Hence 100 mm = 1 dm

Several techniques a teacher might use in teaching the relationships among various metric (SI) units are listed below. Circle the appropriate response code to show whether for students in the target class the technique was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

113. I used centimetre cubes and decimetre cubes to establish relationships among units. a b c

114. I demonstrated the relationship between metric units of length, metric units of capacity, and metric units of mass (weight). a b c

Ex: $1000\ cm^3 = 1\ L$

$1\ cm^3$ of water = 1 g

therefore, 1 L of water = 1 kg

PART IV TIME ALLOCATIONS

115. What was the average length (in minutes) of each of the target class mathematics periods? | | 3 | 5 |

116. How many total class periods did you spend on measurement? (Combine partial periods when necessary.) | | 4 | 0 |

Indicate the amount of time spent on each of the following activities (that is, demonstrations, explanations, students doing computations, using manipulatives, etc.) with your target class. Circle the estimated number of class periods. If more than 10 periods were spent on any topic, specify the number of periods on the blank.

117. Activities related to the concept of measurement (including selection of units and use of units to assign a number). 0 1 2 3 4 5 6 7 8 9 10 ____

118. Teaching units in the metric system (SI). 0 1 2 3 4 5 6 7 8 9 10 ____

119. Teaching units in the English system. 0 1 2 3 4 5 6 7 8 9 10 ____

120. Activities related to conversion of units within a system. 0 1 2 3 4 5 6 7 8 9 10 ____

Ex: 5 cm = 50 mm

24 inches = 2 feet

121. Activities related to conversion of units between systems. 0 1 2 3 4 5 6 7 8 9 10 ____

Ex: Convert 5 inches to centimeters.

How many miles in 60 km?

122. Activities related to estimating measurements. 0 1 2 3 4 5 6 7 8 9 10 ____

Ex: Find a stick 15 cm long.

How many metres high is the ceiling?

Indicate the amount of time spent on each of the following activities (that is, demonstrations, explanations, students doing computations, using manipulatives, etc.) with your target class. Circle the estimated number of class periods. If more than 10 periods were spent on any topic, specify the number of periods on the blank.

123. Activities related to determining precision, accuracy, percent error and relative error. 0 1 2 3 4 5 6 7 8 9 10 ___

124. Activities related to operations with measurements. 0 1 2 3 4 5 6 7 8 9 10 ___

Ex: 4 yards 2 feet 8 inches
+ 2 yards 1 foot 12 inches

2.5 m + 67 cm = □

125. Activities related to the concept of π. 0 1 2 3 4 5 6 7 8 9 10 ___

126. Activities related to linear measurement. 0 1 2 3 4 5 6 7 8 9 10 ___

Ex: Find the length of segment $\overline{AB}$.

127. Activities related to finding perimeters of polygons (including triangles, quadrilaterals, and other polygons). 0 1 2 3 4 5 6 7 8 9 10 ___

128. Activities related to finding the circumference of circles. 0 1 2 3 4 5 6 7 8 9 10 ___

129. Activities related to finding the area of triangles. 0 1 2 3 4 5 6 7 8 9 10 ___

130. Activities related to finding the area of rectangles (including squares). 0 1 2 3 4 5 6 7 8 9 10 ___

131. Activities related to finding the area of parallelograms other than rectangles. 0 1 2 3 4 5 6 7 8 9 10 ___

132. Activities related to finding the area of trapezoids. 0 1 2 3 4 5 6 7 8 9 10 ___

133. Activities related to finding the area of circles. 0 1 2 3 4 5 6 7 8 9 10 ___

134. Activities related to finding the surface area of solids (including cubes, cylinders, and spheres). 0 1 2 3 4 5 6 7 8 9 10 ___

135. Activities related to finding the volume of solids (including cubes, cylinders, prisms, spheres, cones, and pyramids). 0 1 2 3 4 5 6 7 8 9 10 ___

136. Application/problem solving activities related to measurement (textbook word problems, problems related to real world situations, recreational problems, challenging problems, etc.). 0 1 2 3 4 5 6 7 8 9 10 ___

NOTE: THE SUM OF THE PERIODS GIVEN FOR ITEMS 117 TO 136 SHOULD NOT EXCEED THE NUMBER GIVEN FOR ITEM 116.

PART V OPINIONS

Indicate (circle) the extent to which you agree or disagree with each of the following statements relative to your target class.

137. Estimation and approximation should be emphasized in the teaching of measurement.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

138. Students' use of standard instruments for measuring should be emphasized in the mathematics program.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

139. Measurements other than length, area, or volume should be taught as part of the school science program and not as a part of the school mathematics program.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

140. Work with non-standard units is essential for increasing students' understanding of the concept of measurement.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

141. Measurement of time, temperature, mass, and weight should be taught as part of the mathematics program at this grade level.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

142. Work with formulae for finding the perimeter, area, and volume of common geometric shapes should be emphasized.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

143. Computations involving standard units should be done with hand-held calculators.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

144. The best way students learn about measurement is by actually measuring things.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

145. Students should be expected to know and apply standard area and volume formulae.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

INTERNATIONAL ASSOCIATION FOR THE
EVALUATION OF EDUCATIONAL ACHIEVEMENT

SECOND STUDY OF MATHEMATICS

GRADE 8

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

GEOMETRY

BOOKLET 13L

POPULATION A

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

Please write your seven digit teacher code number in the space above.

☐ Check here if geometry is not included in your program for the target class. Disregard the remainder of the questionnaire and return it.

Circle the response which best describes the use you made of each of the following materials in your instruction on geometry.

RESPONSE CODE

a. Primary source, used frequently.

b. Secondary source, used occasionally.

c. Not used or rarely used.

1. Student textbook (containing explanations and exercises). a b c

2. Other published text materials (e.g., textbooks, workbooks, or worksheets). a b c

3. Locally produced text materials (e.g., textbooks, workbooks, or worksheets). a b c

4. Commercially or locally produced individualized materials (e.g., programmed instruction or computer assisted instruction). a b c

5. Commercially or locally produced films, filmstrips, or teacher demonstration models. a b c

6. Commercially or locally produced laboratory materials for student use (e.g., games or manipulatives). a b c

PART I TEACHING TOPICS

The topics given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the topic was:

RESPONSE CODE

a. Taught as new content.

b. Reviewed and then extended.

c. Reviewed only.

d. Assumed as prerequisite knowledge and neither taught nor reviewed.

e. Not taught and not assumed as prerequisite knowledge.

7. Angles (acute, right, supplementary, etc.). a b c d e

8. Transformations (translations, rotations, reflections). a b c d e

9. Vectors. a b c d e

10. The Pythagorean Theorem. a b c d e

11. Triangles and their properties (excluding congruent triangles). a b c d e

12. Polygons and their properties (excluding properties related to congruent or similar polygons). a b c d e

13. Circles and their properties. a b c d e

14. Congruence of geometric figures (including congruent triangles). a b c d e

The topics given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the topic was:

RESPONSE CODE

a. Taught as new content.
b. Reviewed and then extended.
c. Reviewed only.
d. Assumed as prerequisite knowledge and neither taught nor reviewed.
e. Not taught and not assumed as prerequisite knowledge.

15. Similarity of geometric figures (including similar triangles). a b c d e

16. Parallel lines. a b c d e

17. Spatial relations. a b c d e

18. Geometric solids and their properties. a b c d e

19. Geometric constructions with ruler and compass. a b c d e

20. Proofs (formal deductive demonstrations). a b c d e

21. Tessellations. a b c d e

22. Coordinate geometry. a b c d e

PART II INSTRUCTIONAL APPROACHES

Several approaches to teaching geometry are given below. Circle the appropriate response code to show whether for students in the target class the approach was:

RESPONSE CODE

a. Emphasized (used as a primary means of developing geometric content, used extensively or frequently).
b. Used, but not emphasized.
c. Not used.

23. An informal Euclidean approach based on inductive reasoning, measurement, or students' intuitions. a b c

24. A formal Euclidean approach based on an axiomatic system used to prove theorems. a b c

25. An informal transformational approach based on inductive reasoning or students' intuitions. a b c

26. A formal transformational approach based on an axiomatic system used to prove theorems. a b c

27. A coordinate approach (either informal or formal) using coordinates of points, equations, etc. a b c

28. A vector approach (either informal or formal) using addition of ordered pairs, a scalar times an ordered pair, etc. a b c

PART III INSTRUCTIONAL AIDS

Several aids which might be used in teaching geometry are given below. Circle the appropriate response code to indicate the degree to which you and the students in the target class used each aid.

RESPONSE CODE

a. Used extensively or frequently.

b. Used occasionally.

c. Not used.

29. Ruler and compass. a b c

30. Protractor. a b c

31. Set squares (draftman's triangles). a b c

32. Geoboards. a b c

33. Paper cutouts or patterns. a b c

34. Models of solids (cones, pyramids, cylinders, etc.). a b c

35. Paper folding. a b c

36. Tracing paper. a b c

37. Graph paper. a b c

38. Mirrors or translucent reflectors. a b c

39. Filmstrips and films. a b c

40. Computer graphics. a b c

41. Kits for constructing plane or solid figures. a b c

PART IV TEACHING METHODS

Several interpretations of translations are given below. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary interpretation, referred to extensively or frequently).

b. Useu, but not emphasized.

c. Not used.

42. I used an informal approach without a formal definition of translations. a b c

43. I defined the vector $\overrightarrow{AB}$ as the set of equivalent pairs of points: a b c

$$\overrightarrow{AB} = \{(M,N) \mid M \in P,\ N \in P,\ (M,N) \sim (A,B)\}$$

where $(M,N) \sim (A,B) \Leftrightarrow$ segment $\overline{AN}$ and segment $\overline{BM}$ have the same midpoint.

Then the translation along the vector $\vec{V}$ was defined as the map of the plane P onto P which associates to each point M a point N such that $\overrightarrow{MN} = \vec{V}$ (or $(M,N) \in \vec{V}$).

44. Given (A,B) a pair of points on the plane P, I defined the translation associated with the pair as the map of P onto itself which makes each point M correspond to a point N such that $ABNM$ is a parallelogram. a b c

Several interpretations of translations are given below. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary interpretation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

45. I defined a translation as the composition of two central symmetries. a b c

46. A translation of the plane P was defined as the map a b c

$$\tau_{(a,b)} : P \to P$$

which associates to each point M with coordinates (a,b) a point M' with coordinates (a',b') such that

$$x' = x + a$$
$$y' = y + b$$

47. I presented the axioms of incidence and defined the translation on the plane P as a bijection of P satisfying the following axioms: a b c

i. The identity map I of P is a translation.

ii. The image of any line ℓ under a translation is a line ℓ' parallel to ℓ.

iii. For every translation (other than the identity), there exists one and only one direction $\underline{d}$, such that any line ℓ with orientation $\underline{d}$ has itself as an image.

iv. For every A and for every B, there exists one and only one translation t such that $t(A) = B$.

Several interpretations of vectors are given below. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

a. Emphasized (used as a primary interpretation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

48. I used an informal approach without a formal definition of vectors. a b c

49. After choosing the axes, the vector $\vec{t}$ associated with the translation $\tau_{(a,b)}$ is defined as the pair (a,b). a b c

Addition of vectors is then defined in terms of the composition of translations.

50. A vector $\vec{t}$ is defined as the set of pairs $(M,\tau(M))$ where M is a point and τ is a given translation. a b c

51. A vector is defined as an equivalence class of pairs of points. The pairs $\overrightarrow{AB}$ and $\overrightarrow{MN}$ are equivalent if there exists a translation that transforms A into B and M into N. a b c

52. A vector $\overrightarrow{AB}$ is defined by a b c

-- its orientation (that of line $\overleftrightarrow{AB}$).

-- its direction (from A to B).

-- its length (the distance from A to B).

53. A vector is defined as an equivalence class of pairs of points. The pairs $\overrightarrow{AB}$ and $\overrightarrow{MN}$ are equivalent if and only if $\overline{AN}$ and $\overline{BM}$ have the same midpoint. a b c

Several methods for teaching that the sum of the measures of the angles of a triangle is 180° are given below. Circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Used as a primary method of explanation.

b. Used, but not as a primary means of explanation.

c. Not used.

This method was:

d. In students' text.

e. Not in students' text.

For those methods used as a primary explanations the main reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those methods not used the primary reason(s) was (were):

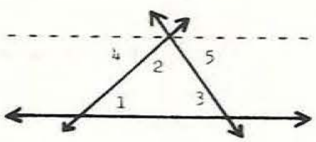
n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not related to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

My students measured the angles of a triangle and added the measures to discover that the sum of the measures is 180°.

54. a b c   55. d e   56. f g h i j k l m   57. n o p q r s t u

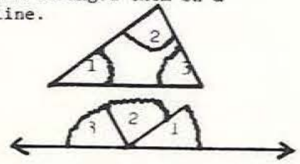
I drew a line through a vertex parallel to the opposite side and used alternate interior angles to show that the sum of the angles of a triangle is 180°.

Ex: In the figure, $\measuredangle 1 = \measuredangle 4$ and $\measuredangle 3 = \measuredangle 5$.
Thus $\measuredangle 1 + \measuredangle 2 + \measuredangle 3 = \measuredangle 4 + \measuredangle 2 + \measuredangle 5$
$\measuredangle 1 + \measuredangle 2 + \measuredangle 3 = 180°$



58. a b c   59. d e   60. f g h i j k l m   61. n o p q r s t u

My students cut the angles off a triangle and arranged them on a straight line.



62. a b c   63. d e   64. f g h i j k l m   65. n o p q r s t u

Several methods for teaching that the sum of the measures of the angles of a triangle is 180° are given below. Circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Used as a primary method of explanation.
b. Used, but not as a primary means of explanation.
c. Not used.

This method was:

d. In students' text.
e. Not in students' text.

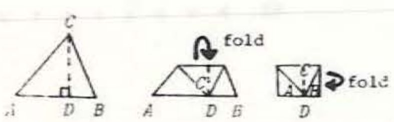
For those methods <u>used</u> as primary explanations the main reason(s) was (were):

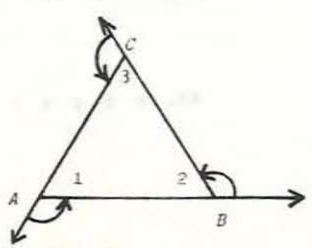
f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those methods <u>not used</u> the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

I told my students that the sum of the measures of the angles of a triangle is 180° and had them verify it by measuring the angles and adding up the measures.	66. a b c	67. d e	68. f g h i j k l m	69. n o p q r s t u
I had my students verify the relationship by paper folding.	70. a b c	71. d e	72. f g h i j k l m	73. n o p q r s t u
I used the fact that (as illustrated in the figure) in traveling A to B, B to C, C to A, a complete revolution (360°) is swept.	74. a b c	75. d e	76. f g h i j k l m	77. n o p q r s t u





Using this and angle supplements, $\angle 1 + \angle 2 + \angle 3 = 180°$.

Several methods for teaching that the sum of the measures of the angles of a triangle is 180° are given below. Circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Used as a primary method of explanation.

b. Used, but not as a primary means of explanation.

c. Not used.

This method was

d. In students' text.

e. Not in students' text.

For those methods used as primary explanations the main reason(s) was (were):

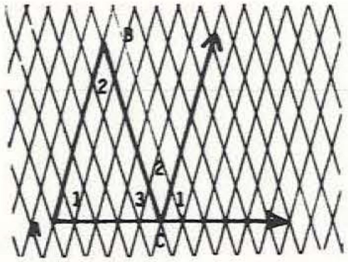
f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those methods not used the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

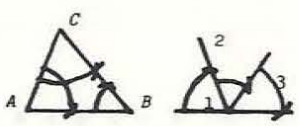
Using tessellations, perhaps from the real world, I identified three angles at a point C congruent with three angles in a triangle ABC embedded in the tessellation.

78. a b c 79. d e 80. f g h i j k l m 81. n o p q r s t u



A ruler and compass construction was used to show the relationship.

82. a b c 83. d e 84. f g h i j k l m 85. n o p q r s t u



$\measuredangle A = \measuredangle 1$, $\measuredangle B = \measuredangle 2$, $\measuredangle C = \measuredangle 3$

Several methods for teaching the Pythagorean Theorem are given below. Circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Used as a primary method of explanation.
b. Used, but not as a primary means of explanation.
c. Not used.

This method was:

d. In students' text.
e. Not in students' text.

For those methods <u>used</u> as primary explanations the main reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those methods <u>not used</u> the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

I presented my students with a variety of right triangles and had them measure and record the lengths of the legs and hypotenuse. The pattern was discussed and then we stated the property.

86. a b c   87. d e   88. f g h i j k l m   89. n o p q r s t u

Ex:

leg	leg	hypotenuse
3	4	5
5	12	13

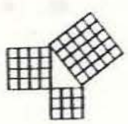
$3^2 + 4^2 = 5^2$

$5^2 + 12^2 = 13^2$

$\therefore a^2 + b^2 = c^2$

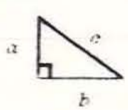
I used diagrams like the following to show that, in a right triangle, $a^2 + b^2 = c^2$.

90. a b c   91. d e   92. f g h i j k l m   93. n o p q r s t u



I gave my students the formula $a^2 + b^2 = c^2$ and had them use it in working examples.

94. a b c   95. d e   96. f g h i j k l m   97. n o p q r s t u



Several methods for teaching the Pythagorean Theorem are given below. Circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Used as a primary method of explanation.
b. Used, but not as a primary means of explanation.
c. Not used.

This method was:

d. In students' text.
e. Not in students' text.

For those methods <u>used</u> as primary explanations the main reason(s) was (were):

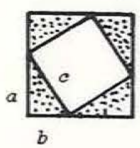
f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

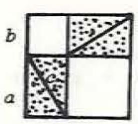
For those methods <u>not used</u> the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

The Theorem was presented in an historical context (e.g., an account of Pythagoras and Euclid).	98. a b c	99. d e	100. f g h i j k l m	101. n o p q r s t u
I presented an informal area argument using physical models (e.g., geoboards and/or pictoral models).	102. a b c	103. d e	104. f g h i j k l m	105. n o p q r s t u

Ex: I divided two squares into parts and examined relationships between their areas.





Since $a^2 + b^2 + 4(\frac{1}{2}ab) = c^2 + 4(\frac{1}{2}ab)$,

then $a^2 + b^2 = c^2$

Several methods for teaching the Pythagorean Theorem are given below. Circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Used as a primary method of explanation.

b. Used, but not as a primary means of explanation.

c. Not used.

This method was:

d. In students' text.

e. Not in students' text.

For those methods used as primary explanations the main reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

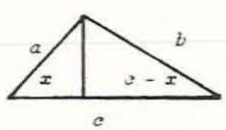
For those methods not used the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

I presented a formal deductive "algebraic" argument.

106. a b c   107. d e   108. f g h i j k l m   n o p q r s t u

Ex: Using similar right triangles, I set up proportions to yield $a^2 + b^2 = c^2$.



$\frac{a}{x} = \frac{c}{a}$ and $\frac{b}{c - x} = \frac{c}{b}$

$a^2 = cx$ and $b^2 = c^2 - cx$

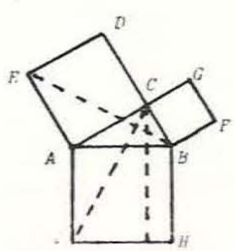
then $b^2 = c^2 - a^2$

$\therefore a^2 + b^2 = c^2$

I presented a formal deductive argument using area.

110. a b c   111. d e   112. f g h i j k l m   113. n o p q r s t u

Ex: This figure is sometimes used to present a formal proof.



Techniques for Teaching Congruent Triangles

Several techniques for teaching congruent triangles are given below. Circle the appropriate response code to show whether for students in the target class the technique was:

RESPONSE CODE

a. Used extensively or frequently.

b. Used occasionally.

c. Not used.

114. State definitions and properties. a b c

Students were given a definition and conditions under which two triangles are congruent, e.g., SSS, SAS, or ASA.

115. Graph paper or tracing paper. a b c

Congruent triangles were constructed using graph paper or tracing paper.

116. Measurement. a b c

Measurement activities were used to study properties of congruent triangles, e.g., congruence of corresponding sides and angles.

117. Constructions with rulers and compass. a b c

Students constructed congruent triangles using a ruler and compass.

118. Geoboard. a b c

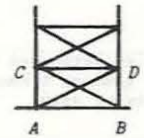
Students used the geoboard to make congruent triangles and study their properties.

119. Environment. a b c

Examples of congruent triangles from the environment were discussed.

Ex: Scaffolding.

$\Delta ABC \cong \Delta BAD$



120. Transformations. a b c

Students formed congruent triangles by finding images of triangles using reflections, rotations, or translations.

Techniques for Teaching Similar Triangles.

Several techniques for teaching similar triangles are given below. Circle the appropriate response code to show whether for students in the target class the technique was:

RESPONSE CODE

a. Used extensively or frequently.

b. Used occasionally.

c. Not used.

121. State definition and properties. a b c

Students were given a definition and conditions under which two triangles are similar, e.g., AAA, SAS, or SSS.

122. Graph paper or tracing paper. a b c

Similar triangles were constructed using graph paper or tracing paper.

Several techniques for teaching similar triangles are given below. Circle the appropriate response code to show whether for students in the target class the technique was:

RESPONSE CODE

a. Used extensively or frequently.

b. Used occasionally.

c. Not used.

123. Measurement. a b c

Measurement activities were used to study properties of similar triangles, e.g., proportionality of sides.

124. Constructions with ruler and compass. a b c

Students constructed similar triangles using a ruler and compass.

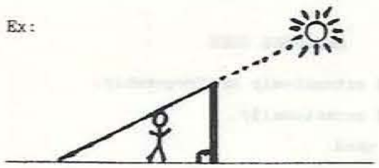
125. Geoboard. a b c

Students used the geoboard to make similar triangles and study their properties.

126. Environment. a b c

Examples of similar triangles from the environment were discussed.

Ex:



127. Dilations (stretching or shrinking). a b c

Students constructed the image of triangles under an enlargement or dilation (stretching or shrinking).

Techniques for Teaching Parallel Lines

Several techniques for teaching parallel lines are given below. Circle the appropriate response code to show whether for students in the target class the technique was:

RESPONSE CODE

a. Used extensively or frequently.

b. Used occasionally.

c. Not used.

128. Definitions and examples. a b c

Students were given a definition and examples of parallel and nonparallel lines were illustrated.

129. Paper folding a b

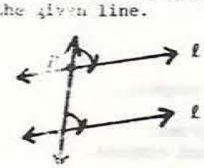
Paper folding activities were used to present and study parallel lines.

130. Measurement. a b c

Measurement activities were used to study such properties as: parallel lines are everywhere equidistant, parallel lines form congruent corresponding angles with a transversal, etc.

131. Construction with ruler and compass. a b

Ex: Given a line ℓ and a point P not on ℓ, students constructed a line ℓ' through the point parallel to the given line.



132. Tessellations. a b c

Given tessellations of the plane, such as floor or ceiling tiles, students inspected the tessellations for parallel lines and their properties.

Several techniques for teaching parallel lines are given below. Circle the appropriate response code to show whether for students in the target class the technique was:

RESPONSE CODE

a. Used extensively or frequently.

b. Used occasionally.

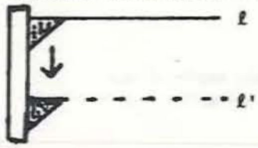
c. Not used.

133. Geoboards. a b c

Given a geoboard, students inspected lines on the board to determine parallel lines and study their properties.

134. Construction with straightedge and set squares (draftsman's triangles). a b c

Ex: Students constructed ℓ' parallel to ℓ.



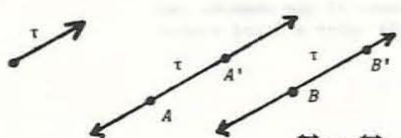
135. Environment. a b c

Examples of "parallel lines" from the environment (e.g., railroad tracks or telephone lines) were discussed.

136. Translations. a b c

Parallel lines were studied through the use of translations.

Ex: Given the translation τ, points A and B and their image points A' and B', then $\overleftrightarrow{AA'} \parallel \overleftrightarrow{BB'}$.



$\overleftrightarrow{AA'} \parallel \overleftrightarrow{BB'}$

137. Reflections. a b c

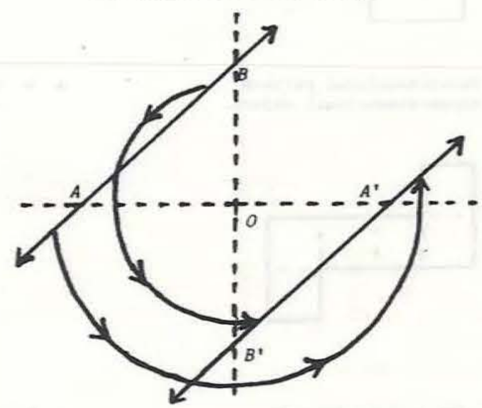
Parallel lines were studied through the use of reflections.

Ex: Given two lines, students used translucent materials (e.g., miras) to determine wheth r the lines were parallel.

138. Rotations. a b c

Parallel lines were studied through the use of rotations.

Ex: Given a line, students determined its image under a half-turn (180° rotation).



Teaching Spatial Relations

Several techniques for teaching spatial relations are given below. Circle the appropriate response code to show whether for students in the target class the technique was:

RESPONSE CODE

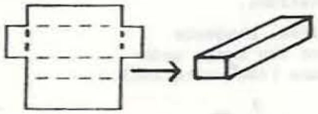
a. Used extensively or frequently.

b. Used occasionally.

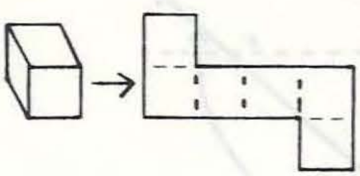
c. Not used.

139. Using ready-made two-dimensional patterns (nets) to build three dimensional figures. a b c

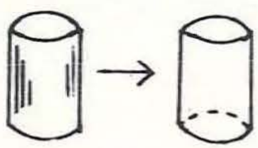
Ex:



140. Designing a two-dimensional pattern for a given three-dimensional object. a b c

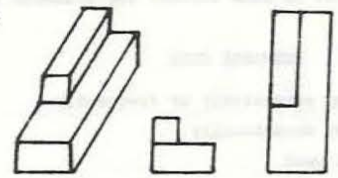


141. Making a two-dimensional drawing for a given three-dimensional object. a b c



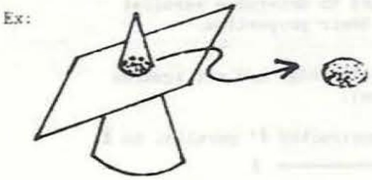
142. Drawing plans and elevations (orthogonal projections) of geometric solids. a b c

Ex:



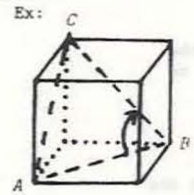
143. Representing the intersection of a plane and a solid by a two-dimensional drawing. a b c

Ex:



144. Finding numerical or algebraic expressions that describe relationships among the parts of a geometric figure. a b c

Ex:



$\measuredangle B = 60^\circ$ because ΔABC is equilateral since its sides are the diagonals of the faces of the cube.

145. Building models of intersecting planes in space. a b c

146. Predicting the shape of the shadows cast by various objects under a fixed source of light. a b c

PART V TIME ALLOCATIONS

147. What was the average length (in minutes) of each of the target class mathematics periods?

148. How many total class periods did you spend on geometry? (Combine partial periods when necessary.)

Indicate the amount of time spent on each of the following activities (that is, demonstrations, explanations, students doing computational exercises, using manipulatives, etc.) with your target class. Circle the estimated number of class periods. If more than 10 periods were spent on any topic, specify the number of periods in the blank.

149. Activities related to the development of the concept of angles (acute, right, supplementary, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

150. Activities related to transformations (translations, rotations, reflections). 1 2 3 4 5 6 7 8 9 10 ____

151. Activities related to vectors. 0 1 2 3 4 5 6 7 8 9 10 ____

152. Activities related to the Pythagorean Theorem. 0 1 2 3 4 5 6 7 8 9 10 ____

153. Activities related to triangles and their properties (<u>excluding</u> congruent triangles). 0 1 2 3 4 5 6 7 8 9 10 ____

154. Activities related to polygons and their properties (<u>excluding</u> properties related to congruent or similar polygons). 0 1 2 3 4 5 6 7 8 9 10 ____

155. Activities related to circles and their properties. 0 1 2 3 4 5 6 7 8 9 10 ____

156. Activities related to congruence of geometric figures (<u>including</u> congruent triangles). 0 1 2 3 4 5 6 7 8 9 10 ____

157. Activities related to similarity of geometric figures (<u>including</u> similar triangles). 0 1 2 3 4 5 6 7 8 9 10 ____

158. Activities related to parallel lines. 0 1 2 3 4 5 6 7 8 9 10 ____

159. Activities related to spatial relations. 0 1 2 3 4 5 6 7 8 9 10 ____

160. Activities related to geometric solids and their properties. 0 1 2 3 4 5 6 7 8 9 10 ____

161. Activities related to geometric constructions with ruler and compass. 0 1 2 3 4 5 6 7 8 9 10 ____

162. Activities related to proofs (formal deductive demonstrations). 0 1 2 3 4 5 6 7 8 9 10 ____

163. Activities related to tessellations. 0 1 2 3 4 5 6 7 8 9 10 ____

164. Activities related to coordinate geometry. 0 1 2 3 4 5 6 7 8 9 10 ____

165. Application/problem solving activities related to geometry (textbook word problems, problems related to real world situations, recreational problems, challenging problems, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

<u>NOTE</u>: THE SUM OF THE PERIODS GIVEN FOR ITEMS 149 TO 165 SHOULD NOT EXCEED THE NUMBER GIVEN FOR ITEM 148.

PART VI OPINIONS

Indicate (circle) the extent to which you agree or disagree with each of the following statements relative to your target class.

166. The main objective of teaching geometry at this grade level is that of constructing a mathematical model of real situations.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

167. Mastery of deductive procedures (e.g., proving theorems) is the goal of teaching geometry at this grade level.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

168. The objective of teaching geometry at this grade level is to present the students with situations in which he has to formally demonstrate something about which he has an intuitive notion.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

169. It is desirable that the presentation of geometric concepts follow an order determined by an axiomatic approach.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

170. An intuitive approach to geometry is more meaningful to students at this grade level than a formal approach.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

171. Geometry should be taught mainly through transformations (flips, turns, stretches).

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

172. The use of concrete models and instructional aids is essential in teaching geometry.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

173. Three dimensional geometry should be taught only in the context of measurement (volume, surface area, etc.) for these students.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

174. The concept of translation should be part of the knowledge of students at this grade level.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

175. The concept of vector should be part of the knowledge of students at this grade level.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

176. It is preferable to delay the study of vectors to a later time.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

177. Activities to improve students' ability to visualize spatial figures should be included in the instructional program.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

178. The study of polygons and their properties should be limited only to triangles and quadrilaterals.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

179. The students should be skilled in geometric constructions using ruler (or straightedge) and compass.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

180. Demonstrations of proofs of theorems by the teacher should be an essential part of an instructional program in geometry for these students.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

181. Geometric topics should be taught only to those students who will pursue higher education.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

182. Proof of theorems should be delayed until these students are at least 15 years of age.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

INTERNATIONAL ASSOCIATION FOR THE
EVALUATION OF EDUCATIONAL ACHIEVEMENT

SECOND

STUDY OF

MATHEMATICS

GRADE 8

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

ALGEBRA

(INTEGERS, FORMULAE AND EQUATIONS)

BOOKLET 14L

POPULATION A

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

Please write your seven digit teacher code number in the space above

☐ Check here if <u>none</u> of integers (positive and negative whole numbers), formulae or equations are included in your program for the target class. Disregard the remainder of the questionnaire and return it.

Circle the response which best describes the use you made of each of the following materials in your instruction on integers, formulae and equations.

RESPONSE CODE

a. Primary source, used frequently.
b. Secondary source, used occasionally.
c. Not used or rarely used.

1.	Student textbook (containing explanations and exercises).	a b c
2.	Other published text materials (e.g., textbooks, workbooks, or worksheets).	a b c
3.	Locally produced text materials (e.g., textbooks, workbooks, or worksheets).	a b c
4.	Commercially or locally produced individualized materials (e.g., programmed instruction or computer assisted instruction).	a b c
5.	Commercially or locally produced films, filmstrips, or teacher demonstration models.	a b c
6.	Commercially or locally produced laboratory materials for student use (e.g., games or manipulatives).	a b c

PART I TEACHING TOPICS

The topics given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the topic was:

RESPONSE CODE

a. Taught as new content.
b. Reviewed and then extended.
c. Reviewed only.
d. Assumed as prerequisite knowledge and neither taught nor reviewed.
e. Not taught <u>and</u> not assumed as prerequisite knowledge.

Integers

7.	The concept of positive and negative integers.	a b c d e
8.	Addition of integers (positive and negative).	a b c d e
9.	Subtraction of integers (positive and negative).	a b c d e
10.	Multiplication of integers (positive and negative).	a b c d e
11.	Division of integers (positive and negative).	a b c d e
12.	Structural properties of the set of integers (e.g., commutativity, associativity, distributivity, etc.).	a b c d e
13.	Order relations in the set of integers.	a b c d e

Formulae and Equations

14. Evaluations of formulae for given values of the variables. a b c d e

Ex: Given $A = l \times w$. If $l = 4$ and $w = 5$, substitute for l and w and find the value of A.

15. Deriving formulae or equations. a b c d e

Ex: Each weight stretches a spring 3 cm. What formula gives the stretch (total) for n weights?

16. Solving literal equations. a b c d e

Ex: Solve $y = \frac{2x + r}{z}$ for r.

17. Solving linear equations. a b c d e

Ex: Solve $4x - 3 = 19$.

PART II TEACHING METHODS

The interpretations of integers given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESPONSE CODE

- a. Emphasized (used as a primary explanation, referred to extensively or frequently).
- b. Used, but not emphasized.
- c. Not used.

This interpretation was:

- d. In students' text.
- e. Not in students' text.

For those interpretations emphasized, the primary reason(s) was (were):

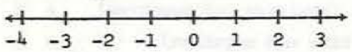
- f. Well known to me.
- g. Emphasized in syllabus or external exam.
- h. Easy for students to understand.
- i. Enjoyed by students.
- j. Related to math in prior grades.
- k. Useful for math in subsequent grades.
- l. Easy to teach.
- m. Emphasized in students' text.

For those interpretations not used, the primary reason(s) was (were):

- n. Never considered using it.
- o. Not in syllabus or external exam.
- p. Difficult for students to understand.
- q. Disliked by students.
- r. Does not relate to previous study of math.
- s. Not useful for future study.
- t. Hard to teach.
- u. Not emphasized in students' text.

Extending the number ray to the number line.

I extended the number ray (0 and positive numbers) to the left by introducing direction as well as magnitude.

Ex: 

-3 means 3 units to the left of 0.

18. a b c 19. d e 20. f g h i j k l m 21. n o p q r s t u

Presenting integers as solutions to equations.

I presented integers as solutions to equations such as

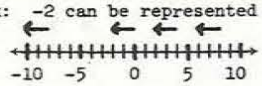
$\square + 7 = 5$.

22. a b c 23. d e 24. f g h i j k l m 25. n o p q r s t u

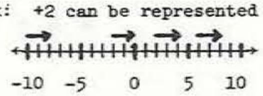
Using vectors or directed segments on the number line.

I defined an integer as a set of vectors (directed line segments on the number line.

Ex: -2 can be represented by any of:



Ex: +2 can be represented by any of:



26. a b c 27. d e 28. f g h i j k l m 29. n o p q r s t u

The interpretations of integers given below may be included in your instructional program. Circle the appropriate response code to show whether for students in the target class the interpretation was:

RESONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This interpretation was:

d. In students' text.

e. Not in students' text.

For those interpretations <u>emphasized</u>, the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those interpretations <u>not used</u>, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

Defining integers as equivalence classes of whole numbers.

30. a b c   31. d e   32. f g h i j k l m   33. n o p q r s t u

I developed the integers as equivalence classes of ordered pairs of whole numbers.

Ex:

$\{(0,2),(1,3),(2,4),\ldots\} = -2$

or

$\{(a,b) \in W \times W \mid b = a + 2\} = -2$

Using examples of physical situations.

34. a b c   35. d e   36. f g h i j k l m   37. n o p q r s t u

I developed integers by referring to different physical situations which can be described with integers.

Ex: thermometer, elevation, money (credit/debit), sports (scoring), time (before/after), etc.

The procedures given below deal with the topic of addition of integers. For each procedure circle the appropriate response code to show whether for students in the target class the procedure was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This procedure was:

d. In students' text.

e. Not in students' text.

For those procedures emphasized the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those procedures not used, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

Addition by number line.

I used the number line to add integers.

38. a b c   39. d e   40. f g h i j k l m   41. n o p q r s t u

Addition by rules.

I used rules to add integers.

Ex: If both addends have the same sign, the sum is found by adding their numerical (absolute) values and adjoining the common sign.

42. a b c   43. d e   44. f g h i j k l m   45. n o p q r s t u

Use of physical situations.

I used physical situations to add integers.

Ex: In climbing out of the Dead Sea Valley, the car started at an elevation of -463 feet and climbed 432 feet to an elevation of $\square$ feet.

46. a b c   47. d e   48. f g h i j k l m   49. n o p q r s t u

The procedures given below deal with the topic of subtraction of integers. For each procedure circle the appropriate response code to show whether for students in the target class the procedure was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This procedure was:

d. In students' text.

e. Not in students' text.

For those procedures emphasized the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those procedures not used, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

Subtraction as addition of opposites on the number line.

I used the number line to subtract integers by starting at the minuend and going the number of units indicated by the subtrahend but in the direction opposite of its sign.

50. a b c 51. d e 52. f g h i j k l m 53. n o p q r s t u

Subtraction as inverse of addition.

I used the inverse relation between addition and subtraction to subtract integers.

Ex: $^+4 - ^-3 = \square$

Solve $^+4 = \square + ^-3$

54. a b c 55. d e 56. f g h i j k l m 57. n o p q r s t u

Subtraction by rules.

I used rules to subtract integers.

Ex: To subtract an integer, add its opposite.

To solve $^+4 - ^-3 = \square$

Solve: $^+4 + ^+3 = \square$

58. a b c 59. d e 60. f g h i j k l m 61. n o p q r s t u

The procedures given below deal with the topic of subtraction of integers. For each procedure circle the appropriate response code to show whether for students in the target class the procedure was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This procedure was:

d. In students' text.

e. Not in students' text.

For those procedures emphasized the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those procedures not used, the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

Subtraction as a number of units.

I used the number line to subtract integers by finding the number of units (or distance) from the subtrahend to the minuend.

Ex: $^{+}4 - {}^{-}3$ means the number of units (or distance) from $^{-}3$ to $^{+}4$.

62. a b c   63. d e   64. f g h i j k l m   65. n o p q r s t u

Subtraction as "what must be added".

I interpreted subtraction to mean "what must be added" to the subtrahend to get the minuend.

Ex: $^{+}4 - {}^{-}3 = \square$ means "What must be added to $^{-}3$ to get $^{+}4$?"

66. a b c   67. d e   68. f g h i j k l m   69. n o p q r s t u

The following statements describe methods by which a teacher might develop the concept of the produce to integers. Circle the appropriate response code to indicate the extent to which that method of developing the concept was used with the target class.

RESPONSE CODE

a. Emphasized (used as a primary method of development, referred to extensively or frequently.)

b. Used, but not emphasized.

c. Not used.

70. Development by use of repeated addition. a b c

I developed the concept of multiplication by appealing to repeated addition, e.g.,

$4 \times {}^-3 = {}^-3 + {}^-3 + {}^-3 + {}^-3 = {}^-12$

71. Development by the extension of properties of the whole number system. a b c

I developed the concept of multiplication by using the commutative, associative, and distributive properties to justify the products, e.g.,

${}^-4 \times {}^-3 = \square$

$0 = 0 \times {}^-3$

$0 = ({}^-4 + {}^+4) \times {}^-3$

$0 = ({}^-4 \times {}^-3) + ({}^+4 \times {}^-3)$

$0 = ({}^-4 \times {}^-3) + {}^-12$

Hence $({}^-4 \times {}^-3)$ is the additive inverse of ${}^-12$.

$\therefore ({}^-4 \times {}^-3) = {}^+12$

72. Development by use of physical situations. a b c

I developed the concept of multiplication of integers by appealing to physical situations that might illustrate the product of positive and negative numbers.

Ex: A refrigerator is cooling at a rate of 4° per minute. Its thermometer is currently at 0°. What will be its temperature 4 minutes from now?

73. Development by use of patterns. a b c

I developed the concept of multiplication of integers by appealing to patterns of products.

Ex: ${}^+4 \times {}^-3 = {}^-12$

${}^+3 \times {}^-3 = {}^-9$

${}^+2 \times {}^-3 = {}^-6$

${}^+1 \times {}^-3 = {}^-3$

$0 \times {}^-3 = 0$

${}^-1 \times {}^-3 = {}^+3$

${}^-2 \times {}^-3 = {}^+6$

74. No development--students were given rules. a b c

I did not develop the concept of multiplication of integers by using any of the above methods. Instead, I gave the students rules similar to the following:

If the signs are alike, the answer is positive.
If the signs are different, the answer is negative.
If either factor is zero, the answer is zero.

The procedures given below deal with methods for solving linear equations. For each method circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This procedure was:

d. In students' text.

e. Not in students' text.

For those procedures <u>emphasized</u> the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those procedures <u>not used</u> the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

Using properties of equality with operations with numbers.

75. a b c   76. d e   77. f g h i j k l m   78. n o p q r s t u

Ex: $7x + 5 = 40$

$7x + 5 - 5 = 40 - 5$
(subtract 5 from both sides)

$7x = 35$
(arithmetic fact)

$\frac{7x}{7} = \frac{35}{7}$
(divide both sides by 7)

$x = 5$

Using inverse operations with numbers.

79. a b c   80. d e   81. f g h i j k l m   82. n o p q r s t u

Ex: $7x + 5 = 40$

$7x + 5 + {}^{-}5 = 40 + {}^{-}5$
(add the inverse of 5 to both sides)

$7x = 35$

$\frac{1}{7} \times (7x) = \frac{1}{7} \times 35$
(multiply both sides by the reciprocal of 7)

$x = 5$

The procedures given below deal with methods for solving linear equations. For each method circle the appropriate response code to show whether for students in the target class the method was:

RESPONSE CODE

a. Emphasized (used as a primary explanation, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

This procedure was:

d. In students' text.

e. Not in students' text.

For those procedures emphasized the primary reason(s) was (were):

f. Well known to me.
g. Emphasized in syllabus or external exam.
h. Easy for students to understand.
i. Enjoyed by students.
j. Related to math in prior grades.
k. Useful for math in subsequent grades.
l. Easy to teach.
m. Emphasized in students' text.

For those procedures not used the primary reason(s) was (were):

n. Never considered using it.
o. Not in syllabus or external exam.
p. Difficult for students to understand.
q. Disliked by students.
r. Does not relate to previous study of math.
s. Not useful for future study.
t. Hard to teach.
u. Not emphasized in students' text.

Using arithmetical reasoning. 83. a b c 84. d e 85. f g h i j k l m 86. n o p q r s t u

Ex: Given $7x + 5 = 40$.
What number increased by 5 is 40 ($\square + 5 = 40$)?
Since the number is 35, then 7 times what number gives 35 ($7 \times \square = 35$).
The solution is 5.

Using trial and error. 87. a b c 88. d e 89. f g h i j k l m 90. n o p q r s t u

Ex: Given $7x + 5 = 40$.
Try $x = 4$.
But $7(4) + 5 = 33$.
So try $x = 5$, as x needs to be larger.
$7(5) + 5 = 40$.
So, $x = 5$.

Using rules. 91. a b c 92. d e 93. f g h i j k l m 94. n o p q r s t u

Example rules

-- Collect all constant terms on one side of the equation and all variable terms on the other.
$7x = 40 - 5$

-- Combine like terms.
$7x = 35$

-- Divide by the coefficient of x.
$x = 5$

Teaching Techniques

The following statements describe techniques a teacher might use in teaching formulae. Circle the appropriate response code to indicate whether for students in your target class the technique was:

RESPONSE CODE

a. Emphasized (used as a primary technique, referred to extensively or frequently).

b. Used, but not emphasized.

c. Not used.

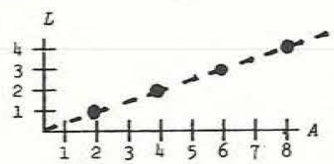
95. Presenting formulae and explaining the meaning of the terms in the formula. a b c

Ex: Formula: $A = \frac{1}{2} bh$

A stands for *the area of a triangle.*
b stands for *the base of a triangle.*
h stands for *the height of a triangle.*

96. Having the students inspect graphs and find formulae to express the relationships portrayed by the graph. a b c

Ex:



$A = 2 \times L$

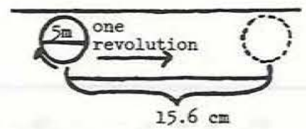
97. Providing data from which formulae or equations are developed. a b c

x	y
0	0
1	3
2	5
3	7
4	9
5	11

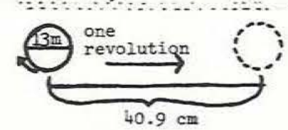
Hence $y = 2x + 1$

98. Having students collect data on related variables and formulate the relationship between the variables. a b c

Ex:



Ratio: $\frac{15.6}{5} \doteq 3.12$

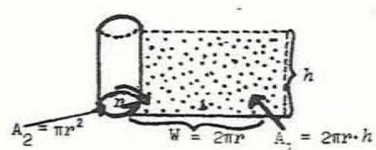


Ratio: $\frac{40.9}{13} \doteq 3.15$

Hence $\frac{C}{d} \doteq 3.1$, so $C \doteq 3.1d$

99. Having students create new formulae based on known, simpler formulae. a b c

Ex: Create formula for surface area of a cylinder based on formulae for area of the rectangle and the circle.



So, surface area $= 2\pi rh + 2\pi r^2$

$SA = 2\pi r(h + r)$

PART III APPLICATIONS AND PROBLEMS

Several types of problems are listed below which may have been included in your instructional program. Circle the appropriate response code to indicate the degree to which a particular type of problem was studied by the target class.

RESPONSE CODE

a. Emphasized (used as a primary type of problem, used extensively or frequently).
b. Used, but not emphasized.
c. Not used.

100. Age problems. a b c

Roberta is now 15 years older than Stan. In 3 more years Roberta will be 8 times as old as Stan was 3 years ago. How old is Roberta now?

101. Digit problems. a b c

If 4/5 of a number is added to 3/5 of that number, the result is the same as if 10 is added to the number. What is the number?

102. Mixture problems. a b c

A feed dealer plans to mix corn (at $1.12 a bushel) with wheat (at $1.74 a bushel) to get a mixture that sells at $1.50 per bushel. How many bushels of corn are needed to make 200 bushels of the mixture?

103. Percent problems. a b c

In 1980 about 4/7 of the telephones in Georgia had direct distance dialing capabilities. What percent was this?

104. Distance-Rate-Time problems. a b c

How long does it take a rainstorm to travel 360 km at a rate of 45 km per hour?

105. Interest problems. a b c

Les borrowed $3000 from the bank at 11% interest per year. How much interest would he have to pay at the end of 9 months?

106. Area-Volume problems. a b c

The Great Pyramid in Egypt has a square base measuring 240 m on a side. Its altitude is 160 m. What is its volume?

107. Physical-Natural Science problems (lever problems, Hooke's Law, etc.).

If Sue has a mass of 56 kg and Sara has a mass of 42 kg, how far will Sue have to sit from the middle of the teeter-totter to balance with Sara, if Sara is 1.2 m from the middle? a b c

108. Energy or Ecological problems. a b c

An adult guppy requires 60 cm of air surface to live in an aquarium. How many adult guppies can live in a rectangular aquarium that is 45 cm long and 30 cm wide?

Sources of Applications and Problems

Several sources of applications/problems of integers, formulae, and equations are listed below. Circle the appropriate response code to show whether the source was:

RESPONSE CODE

a. Used extensively or frequently.

b. Used occasionally.

c. Not used.

109. Students' textbooks. a b c

110. Supplementary textbooks or workbooks. a b c

111. Worksheets or exercises designed by myself or local teachers. a b c

112. The curriculum guide or syllabus. a b c

113. Publications of professional associations. a b c

114. Applications or problems suggested by my students. a b c

115. Applications or problems from real world sources such as newspapers or individuals involved in the use of mathematics. a b c

PART IV TIME ALLOCATIONS

116. What was the average length (in minutes) of each of the target class mathematics periods? [| |]

Integers

117. How many total class periods did you spend on the development of the integers and operations with integers? (Combine partial periods when necessary.) [| |]

Indicate the amount of time spent on each of the following activities (that is, demonstrations, explanations, students doing computational exercises, using manipulatives, etc.) with your target class. Circle the estimated number of class periods. If more than 10 periods were spent on any topic, specify the number of periods on the blank.

118. Activities related to the development of the concept of positive and negative integers. 0 1 2 3 4 5 6 7 8 9 10 ____

119. Activities related to the addition of integers (positive and negative). 0 1 2 3 4 5 6 7 8 9 10 ____

120. Activities related to the subtraction of integers (positive and negative). 0 1 2 3 4 5 6 7 8 9 10 ____

121. Activities related to the multiplication of integers (positive and negative). 0 1 2 3 4 5 6 7 8 9 10 ____

122. Activities related to the division of integers (positive and negative). 0 1 2 3 4 5 6 7 8 9 10 ____

123. Activities related to the structural properties of the set of integers (commutativity, associativity, distributivity, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

124. Activities related to order relations with the set of integers. 0 1 2 3 4 5 6 7 8 9 10 ____

125. Application/problem solving activities related to integers (textbook word problems, problems related to real world situations, recreational problems, challenging problems, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

NOTE: THE SUM OF THE PERIODS GIVEN FOR ITEMS 118 TO 125 SHOULD NOT EXCEED THE NUMBER GIVEN FOR ITEM 117.

Formulae and Equations

126. How many total class periods did you spend on teaching formulae and equations? (Combine partial periods when necessary.) [| |]

Indicate the amount of time spent on each of the following activities (that is, demonstrations, explanations, students doing computational exercises, using manipulatives, etc.) with your target class. Circle the estimated number of class periods. If more than 10 periods were spent on any topic, specify the number of periods on the blank.

127. Activities related to evaluation of formulae (for given values of the variables). 0 1 2 3 4 5 6 7 8 9 10 ____

128. Activities related to deriving formulae or equations (where data is derived from experiments or given to students). 0 1 2 3 4 5 6 7 8 9 10 ____

129. Application/problem solving activities related to use of formulae (textbook word problems, problems related to real world situations, recreational problems, challenging problems, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

130. Activities related to solving literal equations. 0 1 2 3 4 5 6 7 8 9 10 ____

131. Activities related to solving linear equations. 0 1 2 3 4 5 6 7 8 9 10 ____

132. Application/problem solving activities related to use of equations (textbook word problems, problems related to real world situations, recreational problems, challenging problems, etc.). 0 1 2 3 4 5 6 7 8 9 10 ____

NOTE: THE SUM OF THE PERIODS GIVEN FOR ITEMS 127 TO 132 SHOULD NOT EXCEED THE NUMBER GIVEN FOR ITEM 126.

PART V OPINIONS

Indicate (circle) the extent to which you agree or disagree with each of the following statements relative to your target class.

133. The use of the number line adds a lot to the teaching of integers.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

134. It is very important to justify the rules for multiplying integers.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

135. A great deal of practice is required in order for students to acquire competence in performing operations with directed numbers.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

136. It is important for students to understand how integers obey general laws like the distributive law, the associative law, etc.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

137. Average students are usually not satisfied with knowing only the rules for performing operations with integers; they want to know why the rules work.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

138. Most students find it difficult to appreciate the significance of studying the structural properties (additive inverse, order relation, distributive law, etc.) of the set of integers.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

139. Most students cannot be expected to master the use of letters for unknowns quickly; they have to become accustomed to this usage slowly over a long period of time.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

140. Linear equations whose solution is a fraction (like $5x - 2 = 1$) are generally more difficult for students to solve than linear equations whose solution is an integer (like $6x - 3 = 15$).

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

141. In solving equations, it is important that students be able to justify each step in their solution procedure.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

142. Solving linear equations by trial and error helps students understand the meaning of a solution.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

143. The notion "solution set" (those values of the unknown which make the relation true) aids the students' comprehension of linear equations.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

144. Average students have difficulty in solving word problems involving linear equations.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

145. Average students have difficulty in translating verbal and written sentences into mathematical sentences, and vice versa.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

146. Average students have difficulty with applications involving linear equations.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

147. When solving problems, it is important for students to first identify the type of problem (age, digit, mixture, etc.) being solved.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

148. Solving equations requiring students to justify the steps in the solution procedure has a detrimental effect on learning how to solve equations.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

149. The notion of equivalent equations is useful in helping students understand solutions.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

150. Formulae taught should be memorized by students.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

151. Formulae should be used mainly to aid students in solving classes of story problems.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

152. Formulae should be used mainly to find volumes, areas, and perimeters of geometric figures.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

153. Formulae should be used mainly in applications to practical situations.

Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree

INTERNATIONAL ASSOCIATION for the
EVALUATION of EDUCATIONAL ACHIEVEMENT

SECOND

Study of

MATHEMATICS

TEACHER GENERAL CLASSROOM PROCESSES QUESTIONNAIRE

BOOKLET 15L

For Evaluation Centre Use Only

TEACHER GEN. [illegible] (15L)

Country	25	School	[illegible]
Study	02	Class	[illegible]
Population	1	Teacher	[illegible]
Stratum	11	[illegible]	[illegible]

[illegible]

[illegible]

The Ontario Institute for
Studies in Education
Educational Evaluation Centre

1

TEACHER CLASSROOM PROCESSES QUESTIONNAIRE

IN TEACHING THE TARGET CLASS THIS YEAR, HOW MUCH EMPHASIS ARE YOU GIVING TO EACH OF THE FOLLOWING OBJECTIVES?

Indicate the appropriate number as follows:

1. Relatively more emphasis than most of the objectives listed.
2. About equal emphasis to most of the objectives listed.
3. Relatively less emphasis than most of the objectives listed.

1.	Understand the logical structure of mathematics.	1
2.	Understand the nature of proof.	2
3.	Become interested in mathematics.	2
4.	Know mathematical facts, principles, and algorithms.	2
5.	Develop an attitude of inquiry.	1
6.	Develop an awareness of the importance of mathematics in everyday life.	1
7.	Perform computations with speed and accuracy.	3
8.	Develop an awareness of the importance of mathematics in the basic and applied sciences.	2
9.	Develop a systematic approach to solving problems.	2

THE FOLLOWING GRID LISTS SOURCES OF INFORMATION THAT MIGHT BE USED IN MAKING CERTAIN TEACHING DECISIONS. PLEASE INDICATE HOW OFTEN, IN PREPARING FOR THE TARGET CLASS, YOU USED EACH SOURCE TO MAKE A PARTICULAR TYPE OF DECISION.

Fill in each box as follows:

2 Frequently used.

1 Occasionally used.

0 Never used.

For example, if you frequently used published textbooks in deciding what topics to teach, put a "2" in box 10a.

SOURCES OF INFORMATION

DECISIONS	a. Textbook(s) used by students in the target class.	b. Syllabus or curriculum guide (other than minimal competency statement).	c. Statement of minimal competencies.	d. External examinations (tests other than those you give as part of the course).	e. Journals, books (including textbooks not used by your students), and other published materials.	f. Materials previously prepared by yourself.	g. Materials or advice from other teachers.	h. Professional meetings, in-service workshops, etc.
10. Deciding goals and what topics to teach.	1	2	1	0	0	1	1	0
11. Deciding how to present a topic.	1	1	1	1	2	2	2	2
12. Selecting drill and practice exercises.	2	1	1	[illegible]	2	2	2	2
13. Selecting problems (e.g. applications) which go beyond drill and practice.	2	1	1	0	2	2	1	1

HOW DIFFICULT WOULD IT BE FOR YOU TO TEACH THE TARGET CLASS SATISFACTORILY UNDER EACH OF THE FOLLOWING CIRCUMSTANCES?

Circle the appropriate number as follows for resources you use:

- 4 Very Difficult.
- 3 Fairly Difficult.
- 2 Fairly Easy.
- 1 Very Easy.

For resources you do not now use:

- 0 Not applicable (I do without this resource now)

14.	Doing without published visuals (slides transparencies, or posters).	4	3	2	1	0
15.	Doing without visuals (slides, transparencies, or posters) that you have made yourself.	4	3	2	1	0
16.	Doing without problem sets you have written yourself.	4	3	2	1	0
17.	Doing without published tests.	4	3	2	1	0
18.	Doing without the advice you have received in the past year from administrators (e.g. department head, principal, curriculum supervisor).	4	3	2	1	0
19.	Doing without tests you have written yourself.	4	3	2	1	0
20.	Doing without published textbooks (containing both explanations and exercises).	4	3	2	1	0
21.	Doing without published workbooks or published problem sets (containing exercises only).	4	3	2	1	0
22.	Doing without examples to talk about that you have made up yourself.	4	3	2	1	0
23.	Doing without the official syllabus.	4	3	2	1	0
24.	Doing without what you remember from mathematics courses you have taken.	4	3	2	1	0
25.	Doing without what you remember from education courses you have taken.	4	3	2	1	0
26.	Doing without the advice you have received in the past year from other teachers.	4	3	2	1	0
27.	Doing without knowledge of what is on external exams (not selected by you) taken by your students.	4	3	2	1	0

ESTIMATE THE AMOUNT OF TARGET CLASS TIME IN A TYPICAL WEEK WHICH IS DEVOTED TO EACH OF THE FOLLOWING:

28. The whole class working together as a single group (e.g., whole class lecture or whole class discussion). | 80 | %

29. Small group instruction (or some combination of small groups and students working individually). | 20 | %

30. All students working individually (with or without individual help from teacher or teacher aide). | | %

31. Other (please specify): ____________ | | %

WHICH OF THE FOLLOWING SITUATIONS OCCUR REGULARLY IN YOUR SMALL GROUP INSTRUCTION WITH THE TARGET CLASS? (Check as many as apply)

32. Most able students work separately while the rest of the class works as a single group. ☑

33. Least able students work separately while the rest of the class works as a single group. ☑

34. The class is split into three or more groups, each at a different ability level. ☐

35. None of the above occurs regularly. ☐

36. Question does not apply--no small group instruction. ☐

37. WHICH OF THE FOLLOWING STATEMENTS BEST DESCRIBES YOUR TARGET CLASS? (Check one)

To the extent possible, I teach all students the same content at the same pace. ☐

To the extent possible, I teach all students the same content, but let them proceed at their own pace. ☑

To the extent possible, I vary the content across students or groups of students. ☐

38. WHICH OF THE FOLLOWING STATEMENTS IS MOST CHARACTERISTIC OF YOUR TARGET CLASS? (Check one)

All students are assigned the same set of exercises or problems for completion the same day. ☐

All students are assigned the same set of exercises or problems, but date of completion varies from student to student. ☑

Some students are assigned exercises or problems that I would not expect other students in the class to do. ☐

TO SHOW HOW THE EXERCISES OR PROBLEMS ASSIGNED SOME STUDENTS DIFFER FROM THOSE ASSIGNED TO OTHER STUDENTS IN THE TARGET CLASS, CHECK THOSE STATEMENTS WHICH ARE TYPICAL OF YOUR CLASS: (Check all that apply)

39. Some students are assigned more exercises or problems than other students. ☐

40. Some students are assigned more difficult exercises or problems than other students. ☑

41. Some students are assigned exercises or problems on topics which other students are not expected to cover this year. ☐

42. Not applicable (all students are assigned the same set of exercises or problems). ☐

THE FOLLOWING ARE REASONS THAT TEACHERS MIGHT GIVE FOR STUDENTS NOT MAKING SATISFACTORY PROGRESS IN MATHEMATICS. CHECK THE APPROPRIATE COLUMNS TO INDICATE HOW IMPORTANT EACH OF THE FOLLOWING IS IN ACCOUNTING FOR ANY STUDENTS WHO ARE NOT MAKING SATISFACTORY PROGRESS IN YOUR TARGET CLASS.

If all students in the target class are making satisfactory progress, check here ☐ and skip to question 53.

	A Very Important Reason	A Somewhat Important Reason	Not an Important Reason
43. Student lack of ability.	☐	☑	☐
44. Student misbehavior.	☐	☐	☑
45. Student indifference or lack of motivation (but not misbehavior).	☐	☐	☑
46. Debilitating fear of mathematics.	☐	☐	☑
47. Student absenteeism.	☐	☐	☑
48. Insufficient school time allocated to mathematics.	☐	☑	☐

	A Very Important Reason	A Somewhat Important Reason	Not an Important Reason
49. Insufficient proficiency on my part in dealing with students having the kinds of difficulties found in the target class.	☐	☑	☐
50. Limited resources and materials.	☑	☐	☐
51. Too many students.	☑	☐	☐
52. Other (please specify): ______ ______________________ ______________________	☐	☐	☐

53. **HOW MANY STUDENTS IN THE TARGET CLASS DO YOU BELIEVE ARE ESPECIALLY FEARFUL OR ANXIOUS ABOUT MATHEMATICS?** (Check one)

- None. ☐
- One to three. ☐
- Four to six. ☑
- Seven to nine. ☐
- Ten or more. ☐

54. **DO YOU NORMALLY FIND THE <u>TARGET CLASS</u> EASY OR DIFFICULT TO TEACH?** (Check one)

- Very easy. ☐
- Fairly easy. ☑
- I am neutral about it. ☐
- Fairly difficult. ☐
- Very difficult. ☐

55. **DO YOU NORMALLY (REGARDLESS OF THE PARTICULAR CLASS) FIND MATHEMATICS A SUBJECT WHICH IS EASY OR DIFFICULT TO TEACH?** (Check one)

- Very easy. ☐
- Fairly easy. ☑
- I am neutral about it. ☐
- Fairly difficult. ☐
- Very difficult. ☐

GIVE THE PRESENT NUMBER OF STUDENTS IN THE TARGET CLASS WHO BELONG IN EACH OF THE FOLLOWING CATEGORIES:

(Note: Your responses to items 56 through 59 should sum to the total number of students in your target class.)

56. Students who are <u>attentive</u> in mathematics class and who are <u>not behavior problems</u>.	30
57. Students who are <u>not attentive</u> in mathematics class, but who are nevertheless <u>not behavior problems</u>.	5
58. Students who are <u>not attentive</u> in mathematics class and who are <u>behavior problems</u>.	
59. Other (please specify): __________ __________________ __________________ __________________	
Total	35

BELOW YOU WILL FIND SUGGESTIONS OF WHAT TEACHERS MIGHT DO TO MAKE THEIR TEACHING MORE EFFECTIVE. PLEASE RATE EACH ITEM AS IF YOU WERE SELECTING A SHORTER LIST OF THE MORE IMPORTANT ITEMS TO EMPHASIZE WITH STUDENT TEACHERS AND OTHERS WHO ARE INTERESTED IN EFFECTIVE TEACHING.

Circle the appropriate number for each item as follows:

4 Among the highest in importance.

3 Of major importance.

2 Of some importance.

1 Of little or no importance.

60. Take time to talk to individual students about the feelings they have toward mathematics class. 4 3 2 1

61. Stimulate competition among students. 4 3 2 1

62. Give less able students assignments that are simple enough that they can progress without making many mistakes. 4 3 2 1

63. Make a special effort to praise students who are mathematically correct in what they say or do. 4 3 2 1

64. Plan transitions from one activity to another. 4 3 2 1

65. Make encouraging remarks to individual students as they work. 4 3 2 1

66. Change activities during a lesson if the students are not paying attention. 4 3 2 1

67. Assign problems which require the abler students to do more than follow examples that have already been demonstrated. 4 3 2 1

68. Immediately correct false statements made by students. 4 3 2 1

69. At the end of a period, summarize the material that has been taught during the period. 4 3 2 1

70. Present the content in a highly structured fashion. 4 3 2 1

71. Take action to deal with signs of student discomfort or distress. 4 3 2 1

72. Establish and enforce clear cut rules for acceptable student behavior. 4 3 2 1

73. Vary the difficulty of questions posed in classroom discussion. 4 3 2 1

74. Give frequent feedback on how well each student is doing. 4 3 2 1

75. Think about how to clear up instructional problems which have arisen in the course of a previous lesson. 4 3 2 1

76. Try to develop warm, personal relationships with students. 4 3 2 1

77. Allow discussions to continue longer than planned when students show particular interest. 4 3 2 1

78. Provide an opportunity for students to discover concepts for themselves. 4 3 2 1

79. Get materials, equipment, and space ready before class. 4 3 2 1

80. At the beginning of the period, outline the content to be covered. 4 3 2 1

4 Among the highest in importance.

3 Of major importance.

2 Of some importance.

1 Of little or no importance.

81.	Make presentations as lively as possible.	4	3	2	1
82.	In planning a lesson, try to anticipate the questions that students might pose during class.	4	3	2	1
83.	When in front of the class, avoid being critical about the answers of an individual student.	4	3	2	1
84.	Call on students who do not volunteer to answer questions.	4	3	2	1
85.	Ask questions to determine the specific weaknesses of less able students and assign tasks accordingly.	4	3	2	1
86.	Write meaningful comments as well as grades on student work.	4	3	2	1
87.	Offer special encouragement to girls to do well in mathematics.	4	3	2	1
88.	Intervene swiftly at the first sign of students fooling around.	4	3	2	1
89.	Have something good to say about the answers students give in class, regardless of whether the answers are correct or incorrect.	4	3	2	1
90.	Change the sequence and duration of activities for the sake of variety.	4	3	2	1
91.	Give abler students assignments with some problems which are truly difficult for them to solve.	4	3	2	1
92.	Review tests with students shortly after the tests have been graded.	4	3	2	1
93.	Anticipate and forestall student disturbances before they occur.	4	3	2	1
94.	Make sure that students know exactly what they should be doing at any given time.	4	3	2	1
95.	Take student preferences into account when planning lessons.	4	3	2	1
96.	Be quick to stop students from discussing matters not closely related to the content of the lesson.	4	3	2	1
97.	Give assignments which are tailored to the particular instructional needs of individual students.	4	3	2	1
98.	Identify students who are in difficulty but do not ask for assistance.	4	3	2	1
99.	Try to convince students that mathematics is as appropriate for girls as for boys.	4	3	2	1
100.	Before an activity begins, give students detailed step-by-step directions on what they are to do.	4	3	2	1