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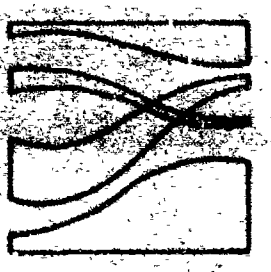
ABSTRACT

Data are reported from the eighth individual interview conducted in 1981 with students participating in a 3-year study on addition and subtraction using verbal problem solving. Ninety-two third-grade children in two schools in Wisconsin that used the Developing Mathematical Processes program were individually administered 18 verbal problems that could be solved using addition or subtraction. Responses were coded in terms of appropriateness of strategy, correct or incorrect answer, type of error, mode of representation, and solution strategy. For every problem, over 90 percent of the students chose a correct strategy. Group data on the problems as well as information on individual students are included. Appendices contain sample problem tasks and individual student profiles. (Author/MNS)



Working Paper No. 313

Results from Eighth Individual Interview (January 1981), Coordinated Study No. 1

by Constance M. Anick, Anne Buchanan, Thomas P. Carpenter, James M. Moser, and Rita Swanberg

August 1981

Wisconsin Research and Development Center for Individualized Schooling

Working Paper No. 313

Results from Eighth Individual Interview (January 1981), Coordinated Study #1

by

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Report from the Project on
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Abstract

This report presents data from the eighth individual interview of the subjects participating in a three-year study on addition and subtraction verbal problem solving. The study is being carried out by the Mathematics Work Group of the Wisconsin Research and Development Center for Individualized Schooling. Ninety-two third grade children were individually administered 18 verbal problems that could be solved using addition or subtraction. Responses were coded in terms of appropriateness of strategy, correct or incorrect answer, type of error, mode of representation, and solution strategy. For every problem, over 90% of the subjects chose a correct strategy. Group data on the problems as well as information on individual subjects are reported in this paper.

Introduction

A major aim of mathematical instruction is to enable students to acquire concepts and skills requisite for solving problems of many types. A principle goal of mathematical education research is to understand how children acquire those concepts and skills and to understand how selected pedagogical and psychological factors are related to their acquisition. The Mathematics Work Group of the Wisconsin Research and Development Center for Individualized Schooling is presently conducting a program of research focused on a small set of those concepts and skills. Our interest lies in arithmetical learning, and in particular, in the acquisition of concepts and skills related to addition and subtraction of whole numbers.

The research program is attempting to relate pupil performance on selected arithmetic skills to pupil cognitive processes, instructional materials, and teachers' classroom behaviors. The interrelationship of these variables is depicted in Figure 1. Using this framework, we are proceeding to:

1. identify important addition and subtraction skills;
2. review past empirical data or collect new data on these skills;
3. re-examine these mathematical skills and hypothesize how they are related to underlying cognitive skills;
4. examine the instructional materials designed to teach these skills; and
5. conduct a series of empirical studies on the appropriateness of particular teacher classroom behaviors, the appropriateness of instructional materials, and the relationship of specific cognitive skills to mathematical skills.

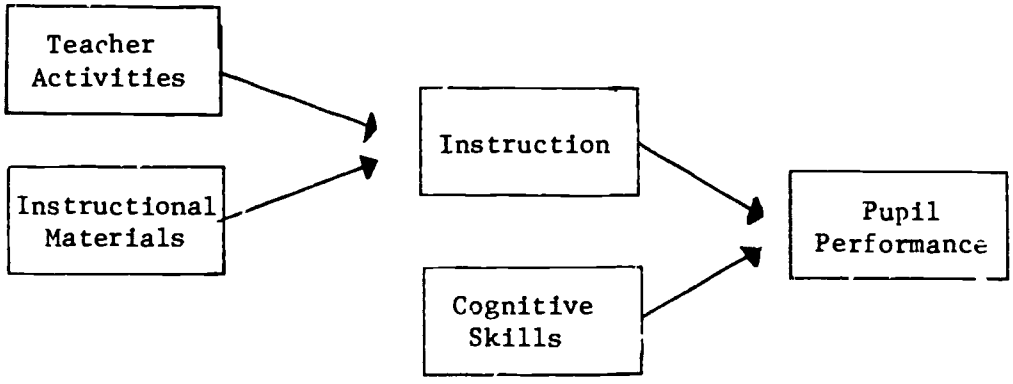

Figure 1. Factors influencing pupil performance.

The work of the Mathematics Work Group is built around the conceptual framework exemplified in Figure 1. The empirical and theoretical investigations generally involve two or more of the factors depicted, and have been organized into four major categories. These are a conceptual paper series, a set of short empirical studies, a major longitudinal study, and an invitational conference of scholars.

This paper relates to the longitudinal study. Approximately 150 students in three separate schools were identified as subjects for the study. One school with about 50 students chose not to continue into the second year of the study. Thus, about 100 children are being followed for three school years. Pupil performance is measured in several ways:

1. Individual interviews. At several times during each school year, individual children are administered a set of problem tasks dealing with addition and subtraction. The interviewer attempts to ascertain the children's solution strategy, correctness of answer, type of errors made, and modeling procedures.

2. Group administered paper-and-pencil tests. There are two separate categories of tests:

   a. Achievement monitoring. These tests measure pupil progress toward a set of performance objectives that are contained in the instructional materials. By means of matrix sampling procedures, estimates are made of group performance. Achievement monitoring tests are given shortly after the completion of the instructional units related to arithmetic objectives.

   b. Topic inventories. These are very short tests that measure pupil progress toward mastery of the objectives of a specific

instructional unit or topic. Every subject takes the same test, resulting in a measure of individual performance.

Instruction and classroom environment are assessed by direct classroom observation of teacher actions, pupil behaviors, and instructional materials. A trained observer is present each day the instructional units, or topics, dealing with arithmetic objectives are being used. Organizational and grouping measures are noted, along with indications of interactions between teacher and pupils, and among pup Measures of pupil engaged time are estimated by observing six target students.

The purpose of this paper is to report on the data from the eighth round of individual interviews for the longitudinal study, which were carried out during January 1981. In the first major section, we present all the background information on subjects and the manner of data collection. In the following two major sections, summaries and interpretations of the data are given. Some of the actual data collected in the interviews appears in the Appendices.

Background Information

This section contains background information needed to understand the data summaries given in the next section. As indicated in the various subsections, greater detail may be obtained by referring to other reports from the Mathematics Work Group.

Population and Curriculum Materials

The eighth interview of individual children was carried out on the 13th and 19th of January 1981, at the two participating schools:

School 1: a public school in Monona, Wisconsin

School 2: a parochial school in Madison, Wisconsin

The subjects for the study consisted of about 100 third grade students, all from predominantly middle class areas, who had parental permission to participate in the interviews. Table 1 presents the number of children who participated in the study in each school and information about their age when the interview was given.

Each of the schools used as their mathematics curriculum the Developing Mathematical Processes (DMP) program (Romberg, Harvey, Moser, & Montgomery, 1974). The following sequence of topics was suggested to the teachers involved in the second and third years of the study: S-4, 30, S-5, 31, S-6, 33, A-1, 36, A-2, 39, A-3, 37, or A-4, 41. The S-series and A-series topics were specially prepared for the Longitudinal Study (see Kouba & Moser, Note 1 and Note 2).

The eighth interview was given in the middle of the 1980-1981 school year, following instruction of Topic A-4. By this time in their mathematics instruction, the children had been introduced to solving problem situations involving the numbers 0-20 and should have made substantial progress toward mastery of basic addition and subtraction facts. Also, they had received instruction in the subtraction and addition algorithms, with and without regrouping.

Interview Tasks

The interview consisted of six problem types (tasks) given under three conditions which are described later. The six types included two problems solvable by subtraction of the two given numbers. The characterization for these six problem types is detailed in Moser (Note 3) and in Carpenter and Moser (Note 4).

Table 1

Number and Age of Population by School

	School 1	School 3	Total
Number of children	60	33	93
Mean age	8 yr. 8 mo.	8 yr. 10 mo.	8 yr. 9 mo.
Maximum age	9 yr. 6 mo.	9 yr. 5 mo.	9 yr. 6 mo.
Minimum age	8 yr. 1 mo.	8 yr. 0 mo.	8 yr. 1 mo.
Male	31	22	53
Female	29	11	40

Table 2 presents representative problems and the order in which the problems were administered to the children. The actual wording for each problem type differed in the three conditions, but the semantic structure remained constant. The actual problems administered are given in Appendix A.

Within each problem, two of three numbers from a number triple (x, y, z) defined by $x + y = z$, $x < y < z$, were given. In the two addition problems x, y were presented, with the smaller number x always given first. In the four subtraction problems, z and the larger addend y were presented. The order of presentation of y and z varied among problem types. The actual number triples used in the problems are listed in Table 3.

The six problem types were presented under three conditions that result from crossing smaller numbers vs. larger numbers with presence vs. absence of manipulative materials. Figure 2 shows these three conditions with the labels assigned to them. In the c+ condition, approximately 30 small plastic cubes about equally divided between blue cubes and orange cubes were available to the child to use as manipulatives if desired.

In the first five sets of interviews, there was a fourth condition, b+. This condition involved the use of small numbers with presence of manipulative materials. Because of the high rate of success for the six b+ tasks in Interview 5 (Kouba & Moser, Note 5), the principal investigators of the longitudinal study decided to eliminate this condition (b+) from subsequent individual interviews.

The assignment of the number triples (small and large domains) to problem types involved a six-by-six Latin square design resulting in six sets of the six problem types. These sets were uniformly and randomly distributed

Table 2

Representative Problem Types

Task 1.	Joining (Addition)	James had 3 toy cars. His father gave him 5 more toy cars. How many toy cars did James have altogetner?
Task 2.	Separating (Subtraction)	Frank had 7 candles. He gave 4 candles to Jan. How many candles did Frank have left?
Task 3.	Part-Part-Whole (Subtraction)	There are 6 jars of paint. 4 jars are red and the rest are blue. How many jars of blue paint are there?
Task 4.	Part-Part-Whole (Addition)	Carol has 6 old shirts. She also has 9 new shirts. How many shirts does Carol have altogether?
Task 5.	Comparison (Subtraction)	Patrick has 3 fish. His sister Jill has 5 fish. How many more fish does Jill have than Patrick?
Task 6.	Joining Missing Addend (Subtraction)	Kathy has 6 M & M's. How many more M & M's does she have to put with them so she has 7 M & M's altogether?

Table 3

Listing of Number Triples Used in Verbal Problems

Smaller numbers	Larger numbers
2-3-5	3-8-11
2-4-6	4-7-11
2-5-7	5-7-12
3-4-7	4-9-13
2-6-8	6-8-14
3-6-9	6-9-15

Presence of manipulatives	Number Size: smaller	Number Size: larger
with		c+
without	b-	c-

Figure 2. Conditions for nonsymbolic problem types.

across subjects. The Latin squares for the small number domain (b) and the large number domain (c) are presented in Tables 4 and 5 respectively. The number in the box (□) in each entry represents the solution the children were to find. The order of the other two given numbers in the tables corresponds to the order in which those numbers appeared in the problem (cf. Table 2). The assignment of problem sets to subjects is listed in Appendix C.

Task sets for a particular level were assigned to children so that the same number triple did not occur in the same problem type (task) in any subsequent interview.

Interview Method

Trained interviewers adminstered the interviews. The interview process for the two schools took two days, the 13th and 19th of January 1981. Two or three interviewers worked at a given school on each day. Interviews began soon after school started and continued through the day, with the usual breaks at lunch and recess. Table 6 details the assignment of interviewers to schools.

Each interviewer was able to conduct 10 to 20 interviews in a day, depending on the schools' schedules. At the schools, the interviewers were assigned interview areas, which, for the most part, were quiet rooms separate from distracting activities.

The interviewers went to the classroom to get a child, and they visited together on the way to the interview area. The verbal tasks were reread to the child as often as necessary so that remembering the given numbers or relationships caused no difficulty. An individual interview required one session lasting 15 to 20 minutes, with each child receiving the same sequence of problems.

Table 4

b- Number Triples

	Task					
Set number	1	2	3	4	5	6
1	3,6, [9]	7,5, [2]	5,3, [2]	2,4, [6]	4,7, [3]	6,8, [2]
2	2,6, [8]	7,4, [3]	6,4, [2]	3,6, [9]	3,5, [2]	5,7, [2]
3	2,5, [7]	8,6, [2]	9,6, [3]	3,4, [7]	4,6, [2]	3,5, [2]
4	3,4, [7]	6,4, [2]	8,6, [2]	2,3, [5]	5,7, [2]	6,9, [3]
5	2,4, [6]	5,3, [2]	7,5, [2]	2,6, [8]	6,9, [3]	4,7, [3]
6	2,3, [5]	9,6, [3]	7,4, [3]	2,5, [7]	6,8, [2]	4,6, [2]

Table 5

c+ and c- Number Triples

	Task					
Set number	1	2	3	4	5	6
1	6,9, [15]	13,9, [4]	11,8, [3]	4,7, [11]	7.12, [5]	8,14, [6]
2	6,8, [14]	12,7, [5]	11,7, [4]	6,9, [15]	8,11 [3]	9,13, [4]
3	4,9, [13]	14,8, [6]	15,9, [6]	5,7, [12]	7,11, [ ]	8,11, [3]
4	5,7, [12]	11,7, [4]	14,8, [6]	3,8, [11]	9,13, [4]	9,15, [6]
5	4,7, [11]	11,8, [3]	13,9, [4]	6,8, [14]	9,15. [6]	7.12, [5]
6	3,8, [11]	15,9, [6]	12,7, [5]	4,9, [13]	8,14, [6]	7,11, [4]

Table 6

Interview School Assignment

Interview code #	Date 1/13	Date 1/19
12	School 3	School 1
27	School 3	
41		School 1
45	School 3	School 1
58		School 1

Coding Subject Responses

All of the possible student responses are presented in detail in Cookson and Moser (Note 6). Only a brief description is presented here. The coding sheet upon which responses were recorded is shown in Figure 3.

Model

C The child used cubes to model (all or part of) the problem.

F The child used fingers to model.

N The child used no physical model.

O The child used some other physical mode, such as chairs or numerals on a clock face.

Correctness

Y The answer was correct.

N The answer was not correct

UN Uncodable: The child gave an answer, but the interviewer was unable to identify the strategy used.

Strategy

Addition:

CS Counting On from Smaller or Counting On from First Number: When counting cubes, fingers, or mentally, the counting sequence began either with the smaller number (first number given in the study) or the successor of that number.

CL Counting On from Larger: The counting sequence began with the larger (second) given number or with the successor of that number.

CA Counting All: The child counted the complete union of the sets represented in the problem, with counting sequence started at "one, two, ..."

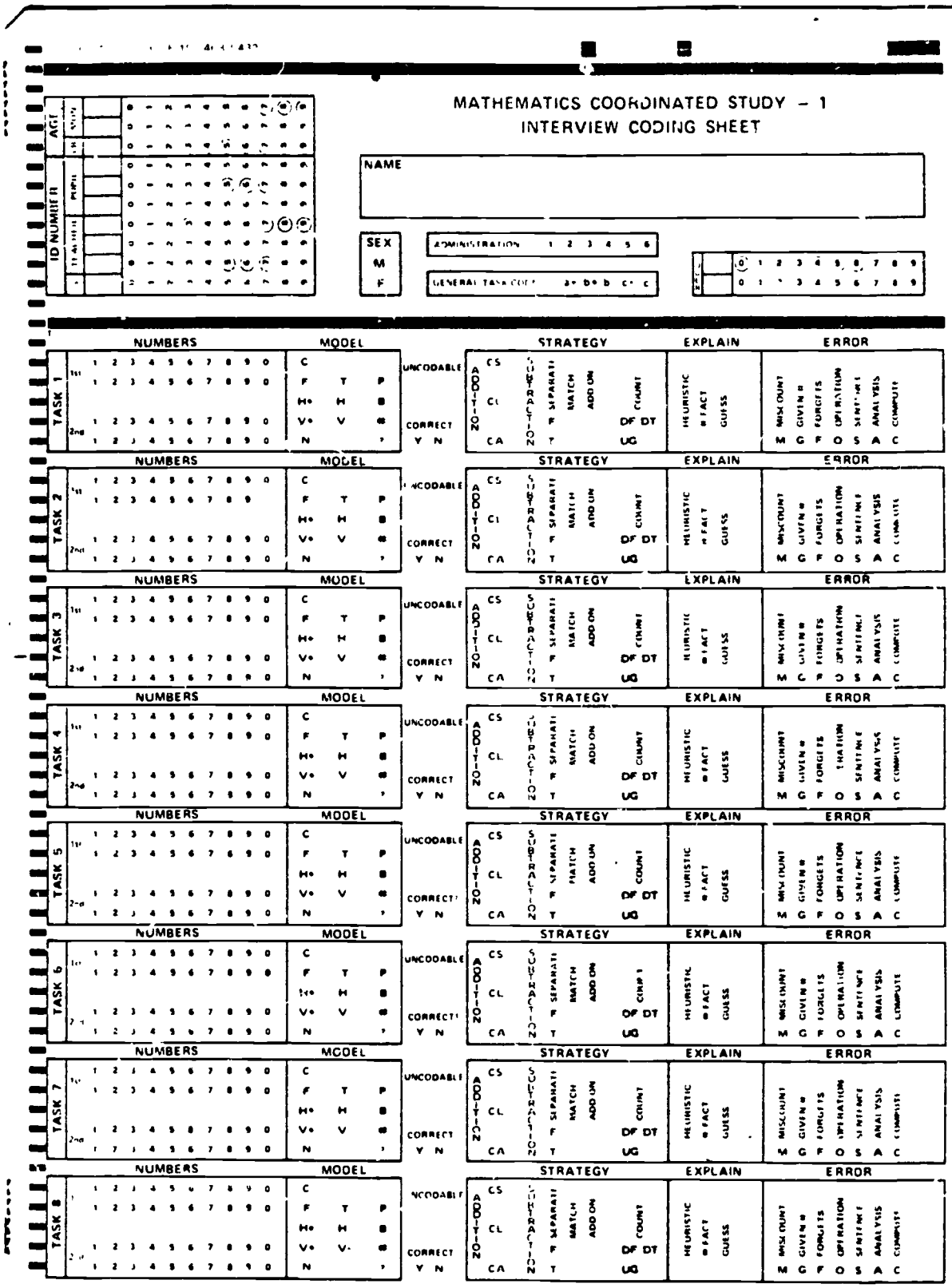

Figure 3. Electronically scored interview coding sheet.

S Subitizing: The child models the two addends and "recognizes" the sum without counting.

Subtraction:

F Separate From: The child models the larger given set and then takes away or separates, one at a time, a number of cubes or objects equal to the smaller given number in the problem. Counting the remainder set gives the answer.

T Separate To: After the larger set is modeled, the child removes cubes or objects one at a time until the remainder is equal to the second given number in the problem. Counting the number of objects removed gives the answer.

MA Match: The child puts out two sets of cubes or objects, each set standing for one of the given numbers. The sets are then matched one-to-one. Counting the excess of the larger set over the smaller set gives the answer.

AO Add On: The child sets out a number of cubes or objects equal to the smaller given number (an addend). The child then adds cubes to that set one at a time until the new collection is equal to the larger given number. Counting the number of cubes added on gives the answer.

DF Count Down From: A child initiates a backwards counting sequence beginning with the larger given number. The backwards counting sequence contains as many counting number words as the smaller given number. The last number uttered in the counting sequence is the answer.

D1 Count Down To: A child initiates a backwards counting sequence beginning with the larger given number. The sequence ends with the given smaller number. By keeping track of the number of counting words uttered in this sequence, the child determines the answer to be the number of counting words used in the sequence.

UG Count Up from Given: A child initiates a forward counting sequence beginning with the smaller given number. The sequence ends with the larger given number. Again, by keeping track of the number of counting words uttered in sequence, the child determines the answer.

Addition and Subtraction (Explain or Mental Processes):

HU Heuristic: Heuristic strategies were employed to generate solutions from a small set of known basic facts. These strategies usually were based on doubles or numbers whose sum was 10.

#F Number Fact: The child gave a correct answer with the justification that it was the result of knowing some basic addition/subtraction fact.

GU Guess: The child gave an answer with the justification that it was the result of guessing.

Error:

M Miscount: The child miscounted in some way.

G (GI) Given Number: The child responded that the answer was one of the two numbers given in the problem.

F Forgets: The child forgot one of the given numbers and thereby found an incorrect answer.

0 (OP) Operation: The child used an addition strategy in a problem that must be solved through subtraction, or a subtraction strategy was employed in an addition problem.

None of the other items under model, strategy, and error on the coding sheets was used for this interview.

Presentation of the Data

Data were collected on children's behavior following presentation of a specific verbal problem. The six different verbal problem types were presented at three different levels, resulting in a maximum of 18 tasks for an individual child. All 93 children who began the interviews were administered the complete set of 18 tasks.

This section begins with a discussion of individual student profiles, which comprise the basic raw data followed by a summary of pupil response data. Several important aspects of the summary data are isolated for contrast and comment. The following major section will present some secondary analyses of combined data.

Individual Student Profiles

A record of each subject's response to the 18 tasks was compiled from the coding sheets. These profiles are the basis for all other statistical information appearing in this paper. The profiles for all subjects are contained in Appendix B. Figure 4 provides an example of a student profile.

For each task at each level, the four coded entries in order from left to right are model, correctness, strategy, and error. The abbreviations used are explained in the previous section. In the strategy column (as in much of the data analysis for this study) Uncodable (UN), Given Number (GI), and Operation (OP) were treated as strategies.

Student ID Number

	133	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
Level	b-	N Y CS -	F Y F -	F Y F	N Y #F -	N N GI GI	F Y UG -
	c+	N Y #F -	N Y #F -	F Y F -	F Y CL -	N GI GI	F Y AO -
	c-	N Y #F -	F Y F -	N N GU -	N Y CL -	N N GI GI	F Y UG -

model
correct
strategy
error

Figure 4. Sample student profile.

The hundreds digit of the student ID number identified which school the student attended: 1 or 3 (see Table 1).

The actual problem and numbers used in the problem for a given level and task can be obtained by using the following procedure. For example, what was the actual problem read to Student 133 for Task 2 at the b- level?

1. Use Appendix A, Problem Tasks by Level, to find the exact wording for Task 2 at the b- level:

Frank had ____ candles.
He gave ____ candles to Jan.
How many candles did Frank have left?

2. Use Appendix C, Number Set Assignment, to find what set was assigned to Student 133 at the b- level. The entry in the b- column for ID #133 is 4.

3. Use Table 4, b- Number Triples, to find what number triple was assigned to set 4, Task 2. The entry in this table is 6, 4, [2], where [2] indicates that 2 is the correct solution. Therefore, Student #133 was given the following problem for Task 2, level b-:

Frank had 6 candles.
He gave 4 candles to Jan.
How many candles did Frank have left?

Looking at Figure 4, we can reconstruct this child's behavior. The first F indicates the child used fingers to model. The next entry, Y, indicates the problem was solved correctly. This accounts for the hyphen in the fourth column, indicating no error. The F in the third column indicates the child used a Separate From strategy. This means the child counted out a set of 6 fingers, then took 4 to get 2 remaining fingers. The child reported "2" as the answer.

Some general understanding of individual students can be achieved by looking at a profile. For example when considering Figure 4 for Student 133, one might conclude:

1. The student did equally well on all three levels.
2. The student was successful at solving all the addition problems (Tasks 1 and 4), all the separating problems (Task 2), and all the joining, missing addend problems (Task 6).
3. The student consistently misinterpreted Task 5.

A Summary of Behaviors by Task and Level

Population Results

A table for each of the six tasks is presented (Tables 7 to 12). All three levels for each task are contained in the same table. The uncodable (UN) and confused (?) responses are included in the strategy category. All data are based on the total of 93 subjects.

Levels of Difficulty

Prior to the commencement of the longitudinal study, it was hypothesized that the different interview conditions would represent sequential levels of difficulty. The number of students responding correctly to each task at the three levels, b-, c+, c-, is presented in Table 13. By the time of this eighth interview, the difference in difficulty for the task levels is not readily apparent except that performance on b- tasks is somewhat better than on the c+ and c- tasks. However, there is little difference between c+ and c-.

Comparative Difficulty of Addition vs. Subtraction

Results from the earlier interviews were consistent with those of other research: Addition tended to be easier than subtraction. The average number

Table 7

Task 1 (Addition-Joining)

Number (%) of Children Coded for a Particular Behavior

		Level		
		b-	c+	c-
C	Cubes	0(0%)	4(4%)	0(0%)
F	Fingers	0(0%)	3(3%)	7(8%)
N	No Model	93(100%)	86(92%)	86(92%)
O	Other	0(0%)	0(0%)	0(0%)
Y	Correct	91(98%)	86(92%)	87(94%)
UN	Uncodable	0(0%)	1(1%)	1(1%)
?	Confusion	0(0%)	0(0%)	1(1%)
CS	Counts on From Smaller	1(1%)	3(3%)	1(1%)
CL	Counts on From Larger	4(4%)	14(15%)	16(17%)
CA	Counts All	0(0%)	2(2%)	0(0%)
HU	Heuristic	2(2%)	12(13%)	14(15%)
#F	Number Fact	84(90%)	60(65%)	58(62%)
GU	Guess	2(2%)	1(1%)	2(2%)
GI	Given Number	0(0%)	0(0%)	0(0%)
OP	Written Operation	0(0%)	0(0%)	0(0%)
M	Miscount	0(0%)	2(2%)	1(1%)
F	Forgets Data	0(0%)	1(1%)	1(1%)

Table 8

Task 2 (Subtraction-Separate)

Number (%) of Children Coded for a Particular Behavior

		Level		
		b-	c+	c-
C	Cubes	0(0%)	6(6%)	0(0%)
F	Fingers	2(2%)	8(9%)	10(11%)
N	No Model	91(98%)	79(85%)	83(89%)
O	Other	0(0%)	0(0%)	0(0%)
Y	Correct	92(99%)	88(95%)	84(90%)
UN	Uncodable	0(0%)	1(1%)	2(2%)
?	Confusion	0(0%)	0(0%)	0(0%)
F	Separate From	2(2%)	8(9%)	2(2%)
T	Separate To	0(0%)	0(0%)	0(0%)
MA	Match	0(0%)	0(0%)	0(0%)
AO	Add On	0(0%)	1(1%)	0(0%)
DF	Count Down From	0(0%)	3(3%)	7(8%)
UG	Count Up From Given	1(1%)	11(12%)	11(12%)
DT	Count Down To	1(1%)	4(4%)	5(5%)
HU	Heuristic	4(4%)	12(13%)	13(14%)
#F	Number Fact	85(91%)	50(54%)	50(54%)
GU	Guess	0(0%)	2(2%)	2(2%)
GI	Given Number	0(0%)	0(0%)	0(0%)
UP	Written Operation	0(0%)	1(1%)	1(1%)
M	Miscount	1(1%)	2(2%)	3(3%)
F	Forgets Data	0(0%)	0(0%)	1(1%)

Table 9

Task 3 (Subtraction-Part-Part-Whole)

Number (%) of Children Coded for a Particular Behavior

		Level		
		b-	c+	c-
C	Cubes	0(0%)	8(9%)	0(0%)
F	Fingers	4(4%)	6(6%)	6(6%)
N	No Model	89(96%)	79(85%)	87(94%)
O	Other	0(0%)	0(0%)	0(0%)
Y	Correct	85(91%)	85(91%)	83(89%)
Ur.	Uncodable	0(0%)	1(1%)	1(1%)
?	Confusion	0(0%)	1(1%)	0(0%)
F	Separate From	2(2%)	6(6%)	1(1%)
T	Separate To	0(0%)	0(0%)	0(0%)
MA	Match	0(0%)	0(0%)	0(0%)
AO	Add On	1(1%)	0(0%)	0(0%)
DF	Count Down From	0(0%)	1(1%)	3(3%)
UG	Count Up From Given	5(5%)	12(13%)	13(14%)
DT	Count Down To	0(0%)	1(1%)	1(1%)
HU	Heuristic	1(1%)	17(18%)	16(17%)
#F	Number Fact	76(82%)	49(53%)	51(55%)
GU	Guess	2(2%)	2(2%)	3(3%)
GI	Given Number	1(1%)	1(1%)	1(1%)
OP	Written Operation	5(5%)	2(2%)	3(3%)
M	Miscount	0(0%)	1(1%)	1(1%)
F	Forgets Data	0(0%)	0(0%)	2(2%)

Table 10

Task 4 (Addition-Part-Part-Whole)

Number (%) of Children Coded for a Particular Behavior

		Level		
		b-	c+	c-
C	Cubes	0(0%)	6(6%)	0(0%)
F	Fingers	0(0%)	3(3%)	7(8%)
N	No Model	93(100%)	84(90%)	86(92%)
O	Other	0(0%)	0(0%)	0(0%)
Y	Correct	93(100%)	89(96%)	88(95%)
UN	Uncodable	0(0%)	1(1%)	1(1%)
?	Confusion	0(0%)	0(0%)	0(0%)
CS	Counts on From Smaller	1(1%)	2(2%)	3(3%)
CL	Counts on From Larger	3(3%)	18(19%)	20(22%)
CA	Counts All	0(0%)	3(3%)	0(0%)
HU	Heuristic	2(2%)	16(17%)	14(15%)
#F	Number Fact	87(94%)	51(55%)	55(59%)
GU	Guess	0(0%)	2(2%)	0(0%)
GI	Given Number	0(0%)	0(0%)	0(0%)
OP	Written Operation	0(0%)	0(0%)	0(0%)
M	Miscount	0(0%)	2(2%)	3(3%)
F	Forgets Data	0(0%)	0(0%)	1(1%)

Table 11

Task 5 (Subtraction-Comparison)

Number (%) of Children Coded for a Particular Behavior

		Level		
		b-	c+	c-
C	Cubes	0(0%)	6(6%)	0(0%)
F	Fingers	3(3%)	9(10%)	9(1[illegible]%)
N	No Model	90(97%)	78(84%)	84(91%)
O	Other	0(0%)	0(0%)	0(0%)
Y	Correct	88(95%)	83(89%)	83(89%)
UN	Uncodable	0(0%)	0(0%)	0(0%)
?	Confusion	0(0%)	0(0%)	0(0%)
F	Separate From	0(0%)	3(3%)	0(0%)
T	Separate To	0(0%)	0(0%)	0(0%)
MA	Match	0(0%)	2(2%)	0(0%)
AO	Add On	0(0%)	2(2%)	1(1%)
DF	Count Down From	1(1%)	3(3%)	1(1%)
UG	Count Up From Given	9(10%)	13(14%)	15(16%)
DT	Count Down To	0(0%)	1(1%)	2(2%)
HU	Heuristic	1(1%)	16(17%)	19(20%)
#F	Number Fact	77(83%)	48(52%)	50(54%)
GU	Guess	0(0%)	1(1%)	1(1%)
GI	Given Number	2(2%)	1(1%)	1(1%)
OP	Written Operation	3(3%)	3(3%)	3(3%)
M	Miscount	0(0%)	1(1%)	2(2%)
F	Forgets Data	0(0%)	1(1%)	1(1%)

Table 12

Task 6 (Subtraction-Joining Missing Addend)

Number (%) of Children Coded for a Particular Behavior

		Level		
		b-	c+	c-
C	Cubes	0(0%)	4(4%)	0(0%)
F	Fingers	1(1%)	8(9%)	8(9%)
N	No Model	92(99%)	81(97%)	85(91%)
O	Other	0(0%)	0(0%)	0(0%)
Y	Correct	93(100%)	88(95%)	89(96%)
UN	Uncodable	0(0%)	0(0%)	0(0%)
?	Confusion	0(0%)	0(0%)	0(0%)
F	Separate From	0(0%)	0(0%)	0(0%)
T	Separate To	0(0%)	0(0%)	0(0%)
MA	Match	0(0%)	1(1%)	0(0%)
AO	Ann On	1(1%)	6(6%)	1(1%)
DF	Count Down From	0(0%)	1(1%)	0(0%)
UG	Count Up From Given	9(10%)	25(27%)	30(32%)
DT	Count Down To	0(0%)	0(0%)	0(0%)
HU	Heuristic	1(1%)	13(14%)	16(17%)
#F	Number Fact	82(88%)	45(48%)	46(49%)
GU	Guess	0(0%)	2(2%)	0(0%)
GI	Given Number	0(0%)	0(0%)	0(0%)
OP	Written Operation	0(0%)	0(0%)	0(0%)
M	Miscount	0(0%)	2(2%)	1(1%)
F	Forgets Data	0(0%)	0(0%)	1(1%)

Table 13

Number of Correct Responses Per Task Across Levels

Task	Level		
	b-	c+	c-
1	91	86	87
2	92	88	84
3	85	85	83
4	93	89	88
5	88	83	83
6	93	88	89

of correct responses per level for the two addition problems was compared to the average number of correct responses for all four subtraction problems. For this interview, the differences in favor of addition can be attributed to two problems, Task 3: Part-Part-Whole, subtraction and Task 5: Comparison. When a contrast is made with the addition problems and the two other subtraction problems, Tasks 2 and 6, it can be seen that there is virtually no difference in difficulty level. (See Table 14.)

Similarity of Response Patterns for the Two Addition Tasks

An earlier pilot study (Carpenter, Hiebert, & Moser, Note 7) used the same two addition tasks and found almost no difference in the responses given by children to those tasks. The results from the eighth interview reflect this same general consistency of response. It would appear that children of the age represented by this sample do not differentiate between an action-oriented Joining addition problem and a static Part-Part-Whole addition problem. Table 15 presents the contrasts between the two problems on a level-by-level basis.

Subtraction Strategies and Problem Structure

Unlike the monolithic characterization of addition in the previous section, subtraction is not amenable to a single simple interpretation. A number of writers (e.g., Gibb, 1956) have suggested three interpretations or structures underlying subtraction. They are the subtractive, the additive, and the comparative. The four problem tasks were chosen with this categorization in mind. Task 2, Separating, reflects the subtractive notion in that its semantic structure strongly suggests the use of the separating or take-away strategy. Task 6, joining, missing addend, reflects the additive notion in that its semantic structure suggests the additive strategy

Table 14

Average Number of Correct Responses for

Addition and Subtraction Problems by Level

Type	Level		
	b-	c+	c-
Tasks 1,4 (Addition)	92	88	88
Tasks 2,3,5,6 (Subtraction)	90	86	85
Tasks 2,6 (Easier Subtraction)	93	88	87

Table 15

Number of Responses on Two Verbal Addition Problems

Problem Type	Model			Correct	Strategy				
	C	F	N	Y	CA	CS	CL	#F	HU
b- Joining,	0	0	93	93	0	1	4	84	2
Part-Part-Whole	0	0	93	93	0	1	3	87	2
c+ Joining	4	3	86	86	2	3	14	60	12
Part-Part-Whole	6	3	84	89	3	2	18	51	16
c- Joining	0	7	86	84	0	1	16	58	14
Part-Part-Whole	0	7	86	88	0	3	20	55	14

of adding-on or making a smaller set larger. Task 5, Comparison, reflects the static notion of comparison by suggesting neither adding on nor taking away, but rather a matching or contrasting of two sets. Task 3, Part-Part-Whole, subtraction, is the least suggestive of the four subtraction tasks since its semantic structure does not clearly indicate what strategy is most appropriate.

For purposes of discussion, the Separating From (F), Separating To (T), Counting Down From (DF), and Counting Down To (DT) strategies will be aggregated into a single subtractive category. Similarly, the Adding-On (AO) and Counting Up from Given (UG) strategies will be aggregated into a single additive strategy. And finally, Matching (MA) is essentially the comparative strategy. Table 16 presents the frequency of these combined strategy categories for each of the four subtraction problem types across the four levels. By this time, a large number of children have elected to use the mental operations of Number Facts (#F) or Heuristics (HU). Neither of these can be broken down into the additive, subtractive, or comparative categories. The number of children using mental operations is included in Table 16. For those who did not use mental operation strategies, semantic structure still appears to be a strong factor in the choice of strategy for some problems.

For Separating and Joining, missing addend, the correspondence between problem structure and strategy used is strong although there is a greater incidence of additive strategies with the Separating problem than in previous interviews.

Table 16

Number of Responses for Different Subtraction Strategies by Problem and Level

Level	Problem Type	Strategies			
		Subtractive	Additive	Comparative	Mental
b-	Separating	3	1	0	89
	Joining, missing addend	0	10	0	83
	Comparison	1	9	0	78
	Part-Part-Whole, subtraction	2	6	0	77
c+	Separating	15	12	0	62
	Joining, missing addend	1	31	1	58
	Comparison	7	15	2	64
	Part-Part-Whole, subtraction	8	12	0	66
c-	Separating	14	11	0	63
	Joining, missing addend	0	31	0	62
	Comparison	3	16	0	69
	Part-Part-Whole, subtraction	5	13	0	67

While the use of comparative (Matching) strategy with the Comparison problem is not as predominant, the argument for the influence of problem structure on strategy choice is still supported in that the Matching strategy appeared only once in a non-Comparison problem. For some children who had the Matching strategy within their reper oire of problem-solving processes, the semantic structure of the Comparison problem was strong enough to evoke that strategy. However, compared to earlier interviews, the Matching strategy is tending to disappear. Matching is virtually impossible without manipulatives, which accounts for the virtual absence of Matching at the b- and c- levels.

The data for the Part-Part-Whole, subtraction problem present a less clear picture. The frequencies for subtractive and additive at the b- level are too small and too close together to make any interpretation. The most often used strategy at the c+ and c- levels is the additive one. Yet, the overwhelming numerical difference between the subtractive and additive strategies that occurs in the Separating problem is not present for this problem.

The "Mental" Strategies

Throughout the first two years of instruction that the children receive in class, the memorization of the number facts is encouraged. This fact is reflected in the high use of number facts and heuristics. For all the problems, Number Fact and Heuristic combined is the most common strategy used.

Less Frequently Occurring Strategies

During this eighth interview, several possible student response behaviors in somewhat isolated instances were observed. The two counting down strategies, Counting Down From and Counting Down To, appeared rather infre ently. However, the Counting Down From strategy was chosen more often for Task 2, th Separating problem, than for the other three subtraction problems. This is consistent with results from previous interviews, showing that children apparently are associating counting down or backwards more often with the Separating task than with the other subtraction tasks.

Errors

The greater difficulty of the Comparison (Task 5) and the Part-Part-Whole, subtraction problems (Task 3) is reflected in the higher incidence of errors. Children's lack of comprehension of the structure of these two problems could be the cause for the cases in which one of the given numbers was supplied as the answer or the wrong operation was used. Miscounting occurred infrequently, and primarily with the larger number problems. A summary of the frequency of errors is presented in Table 17.

Secondary Analyses of Data

The data analyses contained in this section concern pupil performance rather than results for specific tasks as in the previous section. The patterns appar in an individual student's response will be considered. The relationship between a particular type of strategy or model employed and the correctness of response is examined.

Relationship of Strategy Employed to Correctness of Response

The basic question of interest in this analysis is, "If a child employed a particular strategy, was the problem also solved correctly?" Data

Table 17

Frequency of Errors Across the Six Problem Tasks

Task	Level	Error Types				
		Miscount	Forgets Data	Use wrong operation	Given #	Guess
1 Joining	b-	0	0	0	0	2
	c+	2	1	0	0	1
	c-	1	1	0	0	2
2 Separating	b-	1	0	0	0	0
	c+	2	0	1	0	2
	c-	3	1	1	0	2
3 Part-Part-Whole, subtraction	b-	0	0	5	1	2
	c+	1	0	2	1	2
	c-	1	2	3	1	3
4 Part-Part-Whole	b-	0	0	0	0	0
	c+	2	0	0	0	2
	c-	3	1	0	0	0
5 Comparison	b-	0		3	2	0
	c+	2	1	3	1	1
	c-	2	1	3	1	1
6 Joining, missing addend	b-	0	0	0	0	0
	c+	2	0	0	0	2
	c-	1	1	0	0	0

answering this question are presented in Tables 18 to 20, which aggregate information by levels b-, c+, and c-, respectively.

The results for the following behaviors do not appear in the tables because they are inappropriate to our discussion.

1. Number Fact. A requisite for coding Number Fact is that the child's response must be correct. There were 491 responses coded as Number Fact in b-, 303 in c+, and 310 in c-.

2. ? or confusion. A requisite for this coding is that the child gives no answer; therefore, it could not be coded right or wrong. There were 0 such responses in level b-, 1 in c+, and 1 in c-.

3. Uncodable. There were very few uncodable responses: 9 in level b-, 4 in level c+, and 5 in level c-.

4. Wrong Operation. If the children used the wrong operation (for example, adding instead of subtracting), the answer is always incorrect. There were 8 responses in level b- that were coded wrong operation, 6 in c+, and 7 in c-.

5. Given Number. If a child responded with a number given in the problem, it was always an incorrect answer. There were 3 such responses in level b-, 2 in c+, and 2 in c-.

The entries in Tables 18 to 20 present the number of children who used a certain strategy for a certain task. That number is followed by a percentage figure in parentheses, which represents the portion of those children using the strategy who also got the correct answer.

Table 18

Level b-: Number of Children Employing a Strategy and Their Rate of Success

	Task						
Strategy	1	2	3	4	5	6	Total
CS	1(100%)[a]	-	-	1(100%)	-	-	2(100%)
CL	4(100%)	-	-	3(100%)	-	-	7(100%)
CA	0	-	-	0	-	-	0
F	-	2(50%)	2(100%)	-	0	0	4(75%)
T	-	0	0	-	0	0	0
MA	-	0	0	-	0	0	0
AO	-	0	1(100%)	-	0	1(100%)	1(100%)
DF	-	0	0	-	1(100%)	0	1(100%)
UG	-	1(100%)	5(100%)	-	9(100%)	9(100%)	24(100%)
DT	-	1(100%)	0	-	0	0	1(100%)
HU	2(100%)	4(100%)	1(100%)	2(100%)	1(100%)	1(100%)	11(100%)
GU	2(0%)	0	2(0%)	0	0	0	4(0%)

[a]Numbers in parentheses give the percentage of the children in that cel who solved the problem task correctly.

Table 19

Level c+: Number of Children Employing a Strategy and Their Rate of Success

Strategy	Task						Total
	1	2	3	4	5	6	
CS	3(67%)[a]	-	-	2(100%)	-	-	5(80%)
CL	14(93%)	-	-	18(94%)	-	-	32(94%)
CA	2(100%)	-	-	3(67%)	-	-	5(80%)
F	-	8(88%)	6(100%)	-	3(100%)	0	17(94%)
T	-	0	0	-	0	0	0
MA	-	0	0	-	2(100%)	0	3(67%)
AO	-	1(100%)	0	-	2(100%)	6(100%)	9(100%)
DF	-	3(67%)	1(100%)	-	3(100%)	1(100%)	8(88%)
UG	-	11(100%)	12(92%)	-	13(85%)	25(96%)	61(93%)
DT	-	4(100%)	1(100%)	-	1(100%)	0	6(100%)
HU	12(92%)	12(100%)	17(94%)	16(100%)	16(81%)	13(92%)	86(93%)
GU	1(0%)	2(0%)	2(0%)	2(0%)	1(0%)	2(0%)	10(0%)

[a]Numbers in parentheses give the percentage of the children in that cell who solved the problem task correctly.

Table 20

Level c-: Number of Children Employing a Strategy and Their Rate of Success

Strategy	Task						Total
	1	2	3	4	5	6	
CS	1(100%)[a]	-	-	3(67%)	-	-	4(75%)
CL	16(94%)	-	-	20(85%)	-	-	36(89%)
CA	0	-	-	0	-	-	0
F	-	2(100%)	1(100%)	-	0	-	3(100%)
T	-	0	0	-	0	0	0
MA	-	0	0	-	0	0	0
AO	-	0	0	-	1(0%)	1(100%)	2(50%)
DF	-	7(71%)	3(100%)	-	1(100%)	0	11(82%)
UG	-	11(91%)	13(85%)	-	15(93%)	30(93%)	69(91%)
DT	-	5(60%)	1(100%)	-	2(50%)	0	8(63%)
HU	14(100%)	13(100%)	16(100%)	14(100%)	19(89%)	16(88%)	92(96%)
GU	3(0%)	2(0%)	4(0%)	1(0%)	1(0%)	0	11(0%)

[a]Numbers in parentheses give the percentage of the children in that cell who solved the problem task correctly.

For example, in the example below, of the 14 children who used the counting up from smaller strategy for Task 1, 71% (which is to say, 10 of them) also solved the task correctly.

Strategy	1	2
CS	3(67%)	-

In the example, a dash appears on the CS cell for Task 2. A dash indicates the strategy would be inappropriate for this task. In the example, CS is an addition strategy and thus, was not coded for Task 2, a subtraction problem.

There is no clear-cut pattern indicating that one particular strategy appears to be more successful than any other. Part of this is attributable to the overall high degree of success on the problems, regardless of what strategy is used.

Relationship of Model Used to Correctness of Response

We also investigated the relationship between a particular modeling behavior and the rate of correct responses. Tables 21 to 23 present the results. In the Model category, the possible responses were cubes, fingers, no action, other (physical), or a combination of cubes and fingers. Uncodable model responses, confused responses, and combination of models other than cubes and fingers were not considered in the tabulation of these results.

The tables present the number of children who used a particular model for each task and the percentage of those children whose answer to the task was correct.

Table 21

Level b-: Number of Children Employing a Model and Their Rate of Success

Model	Task 1	2	3	4	5	6	Total
Cubes alone	NA	NA	NA	NA	NA	NA	NA
Fingers alone	0	2(50%)[a]	4(100%)	0	3(100%)	1(100%)	10(90%)
Cubes and fingers	NA	NA	NA	NA	NA	NA	NA
No action	93(98%)	91(100%)	89(91%)	93(100%)	90(94%)	92(100%)	548(97%)
Other	0	0	0	0	0	0	0

[a]Numbers in parentheses give the percentage of the children in that cell who solved the problem task correctly.

NOTE: NA indicates the strategy is not applicable to this task.

Table 22

Level c+: Number of Children Employing a Model and Their Rate of Success

	Task						
Model	1	2	3	4	5	6	Total
Cubes alone	4(100%)[a]	2(83%)	8(88%)	6(83%)	6(83%)	4(75%)	34(85%)
Fingers alone	3(67%)	8(100%)	6(100%)	3(100%)	9(100%)	8(100%)	37(97%)
Cubes and Fingers	0	0	0	0	0	0	0
No action	86(93%)	79(95%)	79(91%)	84(96%)	78(88%)	81(95%)	487(93%)

[a]Numbers in parentheses give the percentage of the children in that cell who solved the problem task correctly.

Table 23

Level c-: Number of Children Employing a Model and Their Rate of Success

	Task						
Model	1	2	3	4	5	6	Total
Cubes alone	NA	NA	NA	NA	NA	NA	NA
Fingers alone	7(100%)[a]	10(80%)	6(100%)	7(100%)	9(90%)	8(88%)	46(91%)
Cubes and Fingers	NA	NA	NA	NA	NA	NA	NA
No action	85(94%)	83(92%)	87(89%)	86(94%)	84(89%)	85(96%)	510(92%)
Other	1(0%)	0	0	0	0	0	1(0%)

[a]Numbers in parentheses give the percentage of the children in that cell who solved the problem task correctly.

NOTE: NA indicates the strategy is not applicable to this task.

As was the case with strategies, there is no definite pattern of success for a particular modeling behavior. Thus, no reliable conclusions can be drawn from these data.

Conclusion

This is the eighth, and final, in a series of reports on the data from the individual interviews for the Coordinated Study. Each report contains data for only one round of interviewing, and is not concerned with results or changes across time. The longitudinal findings will be presented in separate reports. For previous reports in the individual interview series and for additional information and reports concerning the longitudinal study, contact the Mathematics Work Group at the Wisconsin Research and Development Center for Individualized Schooling, Madison, Wisconsin.

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Appendix A

PROBLEM TASKS BY LEVEL

B-

1. Addition - simple joining

James had _____ toy cars. His father gave him _____ more toy cars. How many toy cars did James have altogether?

B-

2. Subtraction - simple separating

Frank had _____ candles. He gave _____ candles to Jan. How many candles did Frank have left?

B-

3. Subtraction - part, part, whole

There are _____ jars of paint. _____ jars are red and the rest are blue. How many jars of blue paint are there?

B-

4. Addition - part, part, whole

Carol has _____ old shirts. She also has _____ new shirts. How many shirts does Carol have altogether?

B-

5. Subtraction - comparison

Patrick has _____ fish. His sister Jill has _____ fish. How many more fish does Jill have than Patrick?

B-

6. Subtraction - simple joining missing addend

Kathy has _____ M & M's. How many more M & M's does she have to put with them so she has _____ M & M's altogether?

C+

1. Addition - simple joining

Norman had _____ books. His friend gave him _____ more books. How many books did Norman have altogether?

C+

2. Subtraction - simple separating

Jeanne had _____ buttons. She gave _____ buttons to Mark. How many buttons did Jeanne have left?

C+

3. Subtraction - part, part- whole

There are _____ children swimming. _____ are boys and the rest are girls. How many girls are swimming?

C+

4. Addition - part, part, whole

The dog has _____ dog biscuits. He also has _____ dog biscuits. How many dog biscuits does the dog have altogether?

C+

5. Subtraction - comparison

Ellen has _____ holloween candies. Her friend Greg has _____ holloween candies. How many more candies does Greg have than Ellen?

C+

6. Subtraction - simple joining missing addend

Robert has _____ caterpillars. How many more caterpillars does he have to put with them so he has _____ caterpillars altogether?

C-

1. Addition - simple joining

Dennis had _____ marbles. His mother gave him _____ more marbles. How many marbles did Dennis have altogether?

C-

2. Subtraction - simple separating

Dawn had _____ toy airplanes. She gave _____ of them to Tom. How many toy airplanes did Dawn have left?

C-

3. Subtraction - part, part, whole

There are _____ monkeys in a cage. _____ are on the ground and the rest are in the tree. How many monkeys are in the tree?

C-

4. Addition - part, part, whole

Peter has _____ white socks. He also has _____ blue socks. How many socks does Peter have altogether?

C-

5. Subtraction - comparison

Marian had _____ apples. Her friend Larry had _____ apples. How many more apples does Larry have than Marian?

C-

6. Subtraction - simple joining missing addend

Wayne has _____ bottle caps. How many more bottle caps does he have to put with them so he has _____ bottle caps altogether?

Appendix B

INDIVIDUAL STUDENT PROFILES

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 101 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	Y #F -	F Y UG -	N Y #F -	F Y CL -	N Y #F -	N Y #F -
C-	Y #F -	F Y UG -	N Y #F -	F Y CL -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 102 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 103 ADMINISTPATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N Y UG -	N Y CL -	N Y #F -	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 104 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y #F -	N Y #F -
C-	N Y #F -	N Y HU -	F Y UG -	N Y #F -	N Y HU -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 105 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y UG -	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 106 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N N GL -	N N GU -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 107 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 108 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N N GU -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	F Y AO -
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	F Y AO -	F Y AO -
C-	N Y CL -	N Y #F -	N Y DT -	N Y CL -	N N DT F	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 110 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B-	N Y #F -	N Y HU -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y CL -	C N F M	N Y [illegible] -	N Y CL -	N Y HU -	F Y UG -
C-	N Y CL -	N Y UG -	N Y HU -	F Y CL -	N Y HU -	F Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 111 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N N GU -	N Y UG -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N N GU -	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 112 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y CL -	N Y #F -	N Y #F -
C+	N Y CL -	N Y UG -	N Y UG -	N Y CL -	N Y UG -	N Y UG -
C-	N Y CL -	N Y UG -	N Y UG -	N Y CL -	F Y UG -	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 113 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N N GU -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N N GU -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 114 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N N GU -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 115 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	[illegible] Y UG -	N Y #F -	N Y #F -	F Y UG -	N Y UG -
C-	N Y #F -	F Y UG -	N Y #F -	N Y #F -	F Y UG -	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 117 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y HU -	N Y HU -	N Y #F -	N Y HU -	N N OP 0	N Y #F -
C-	N Y HU -	N Y HU -	N Y #F -	N Y HU -	N N OP 0	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 118 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 119 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N N OP O	N Y #F -
C+	N Y #F -	F Y F -	F Y F -	N Y CL -	N Y #F -	N Y HU -
C-	N Y #F -	F Y F -	F Y F -	N Y #F -	F N AO M	F Y AO -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 120 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N N #F F	N Y #F -	N #F -	N Y #F -	N Y #F -	N Y #F -
C-	N N #F F	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 121 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y CL -	N Y UG -	C Y UG -	C Y CS -	N Y UG -	N Y UG
C-	N Y CL -	N Y UG -	N Y UG -	N Y CL -	N Y #F -	N Y #F

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 123 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y UG
C-	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y UG

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 124 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y HU -	N Y #F -	N N GU -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 125 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	F Y UG -	N Y #F -	N Y #F -	N Y #F -
C+	N Y CL -	F Y UG -	F Y UG -	F Y CL -	F Y UG -	N Y UG -
C-	F Y CL -	F N UG M	F Y UG -	N N #F -	F Y UG -	F Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 127 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y CL -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y UG
C+	N Y CL -	C Y F -	C Y F -	C Y CL -	C Y MA -	C N MA
C-	F Y CL -	N Y HU -	N Y HU -	F Y CL -	F Y UG -	F Y UG

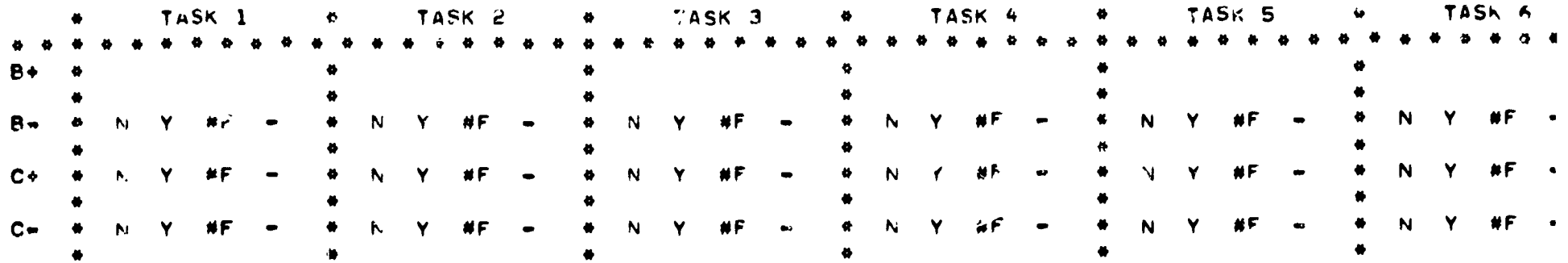
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 128 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N N GU -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F

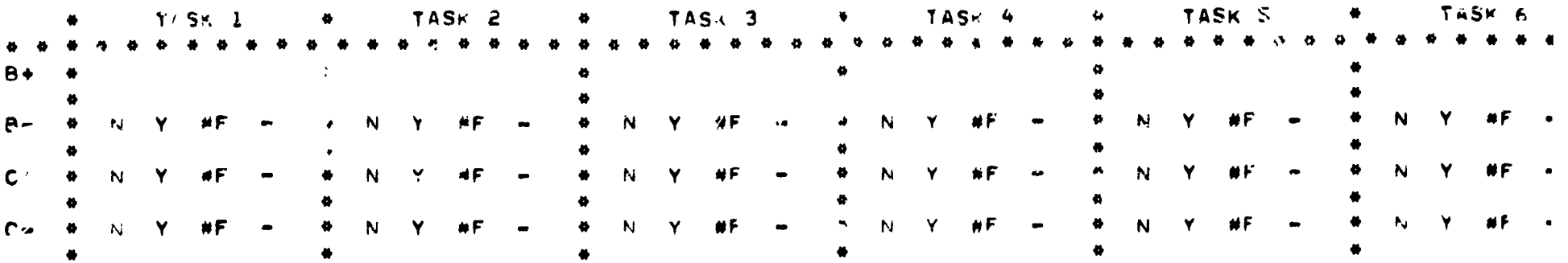
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 129 ADMINISTRATION 8



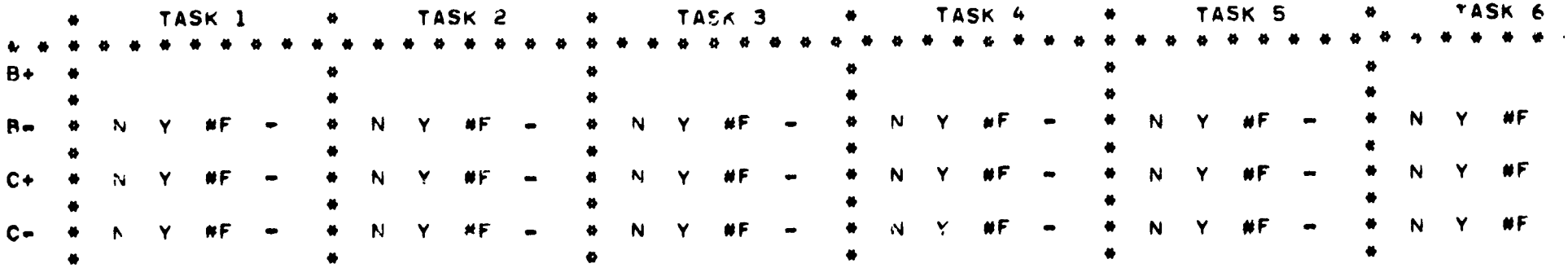
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 130 ADMINISTRATION 8



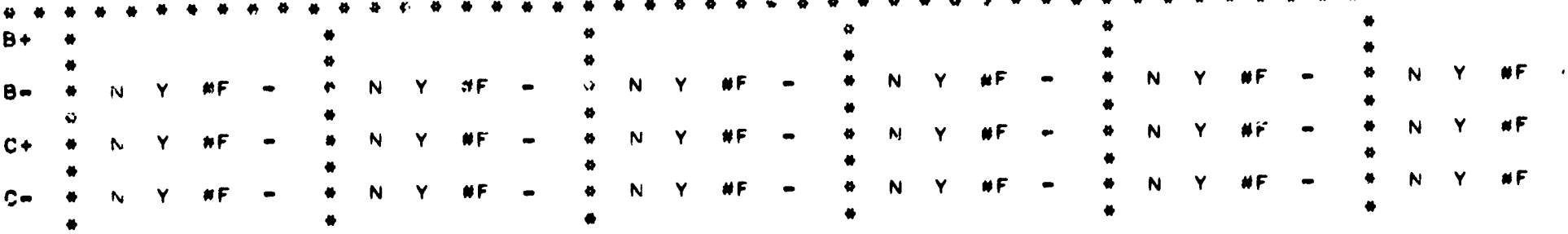
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 131 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 132 ADMINISTRATION 8



INDYVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 133 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y CS -	F Y F -	F Y F -	N Y #F -	N N GI GI	N Y UG -
C+	N Y #F -	N Y #F -	F Y F -	F Y CL -	N N GI GI	F Y AO -
C-	N Y #F -	F Y F -	N N GU -	N Y CL -	N N GI G.	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 134 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N N OP O	N Y #F -	N N OP O	N Y UG .
C+	N N GU -	N Y #F -	N N OP O	N Y UN -	N N OP O	N Y UG .
C-	N N GU -	N Y #F -	N N OP O	N Y UN -	N N OP O	N Y UG .

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 135 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N N OP O	N Y #F -	N Y #F -	N Y #F
C+	N N HU -	F Y AO -	N N GU -	N Y #F -	N Y #F -	F Y AO
C-	N Y #F -	N N OP M	N N OP O	N Y #F -	N Y UG -	N Y UG

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 137 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y CL -	N Y #F -	N Y UG -	N Y CL -	N Y UG -	N Y #F
C+	N Y CL -	N Y UG -	N Y HU -	N Y HU -	N HU -	N Y HU
C-	N Y CL -	N Y UG -	N Y HU -	N Y HU -	N Y HU -	N Y HU

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 139 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	F N F M	F Y F -	N Y #F -	N Y #F -	N Y #F
C+	N Y HU -	N Y HU -	N Y UG -	N Y #F -	N N HU -	N Y HU
C-	N Y HU -	N Y HU -	N Y UG -	N Y #F -	N N HU -	N Y HU

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 140 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y CL -	N N DF M	C Y UG -	Y CL -	N Y #F -	N Y HU
C-	N Y HU -	N Y DF -	N Y DF -	N Y CL -	N Y DF -	N Y HU

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 141 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y HU
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y HU

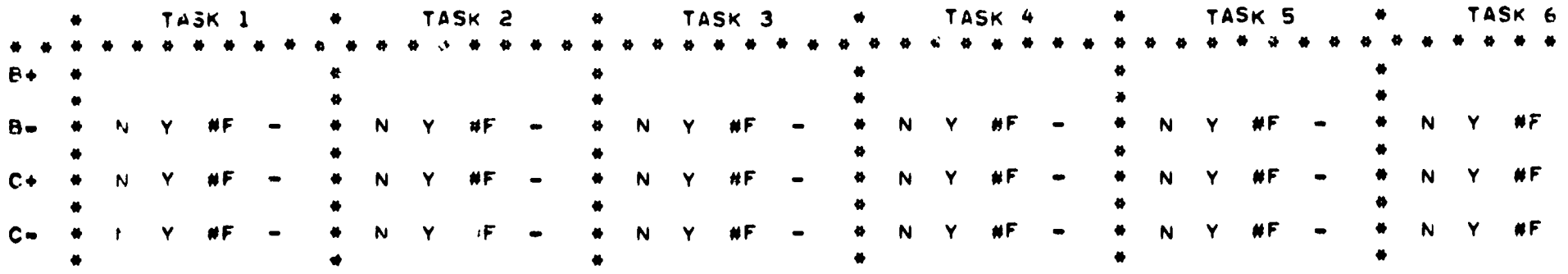
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 143 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y HU -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	N Y HU -	N Y HU -	N Y #F -	N Y HU -	N Y UG
C-	N Y #F -	N Y HU -	N Y HU -	N Y #F -	N Y HU -	N Y UG

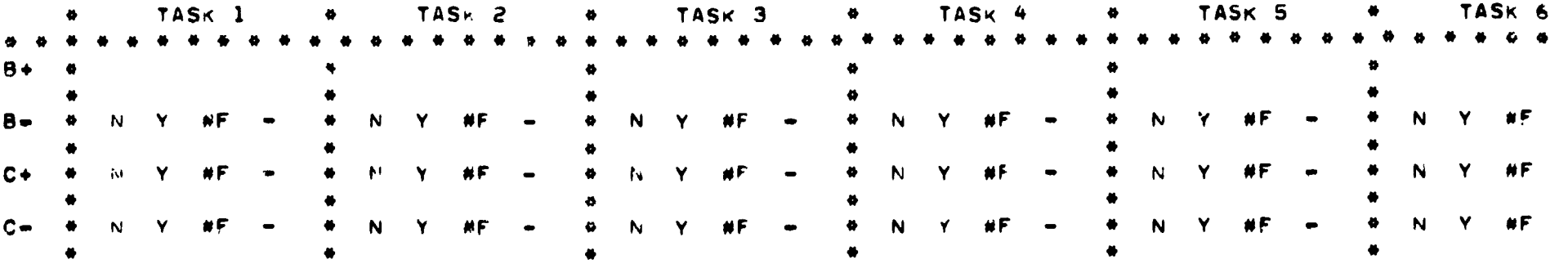
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 144 ADMINISTRATION 8



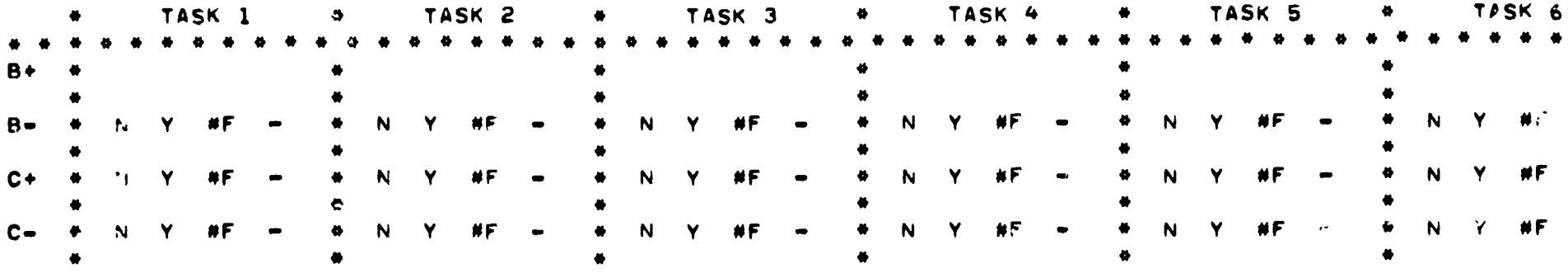
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 147 ADMINISTRATION 8



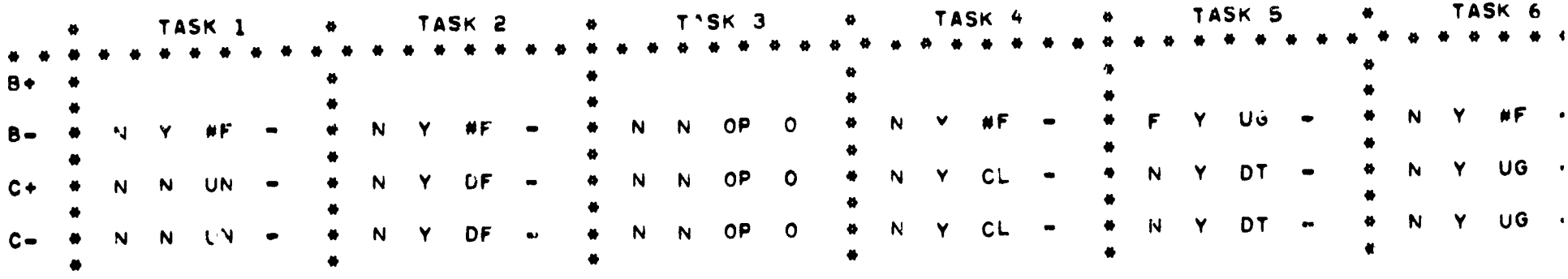
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 148 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 151 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 152 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y HU -	N Y #F -	N Y #F -	N Y #F -	N Y UG
C+	N Y CL -	N Y HU -	F Y UG -	N Y HU -	N Y HU -	N Y UG
C-	N Y HU -	N Y HU -	N N UG M	N N CL F	N Y HU -	N Y #F

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 153 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N N OP O	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y DT -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y DT -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 154 ADMINISTRATION 6

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 155 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y HU -	N Y UG -	N Y UG -	N Y #F -	N Y HU -	N Y UG -
C-	N Y HU -	N Y UG -	N Y UG -	N Y #F -	N Y HU -	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 158 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	N Y #F -	F Y UG -	N Y #F -	F Y UG -	N Y UG
C-	F Y CL -	N Y #F -	N Y #F -	F Y CL -	N Y #F -	F Y UG

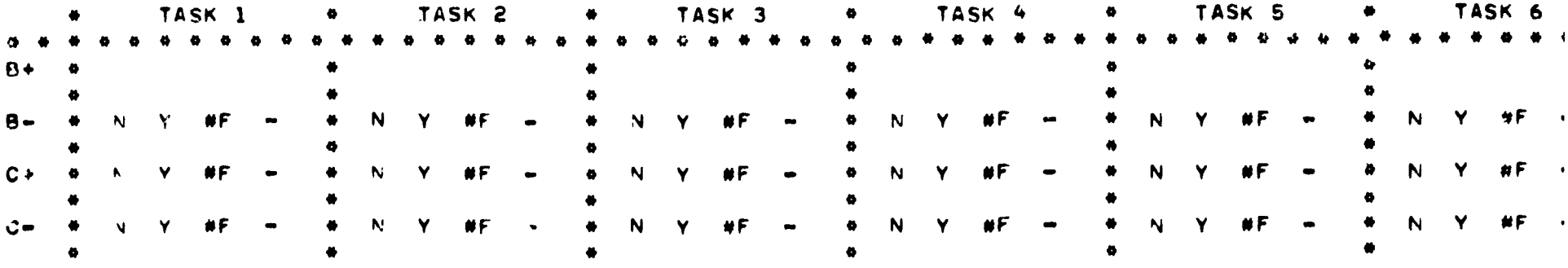
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 159 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	N Y #F -	N Y HU -	N Y #F -	N Y HU -	N N HU
C-	N Y #F -	N Y #F -	N Y HU -	N Y #F -	N Y HU -	N N HU

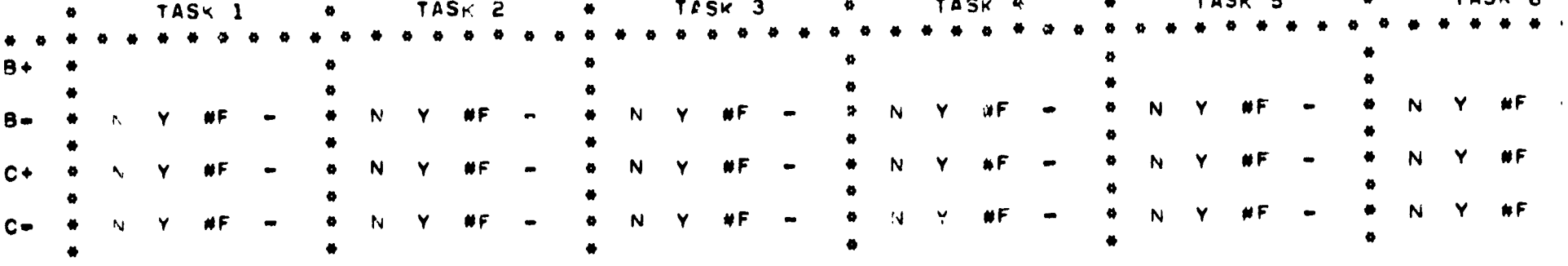
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 160 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 162 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 163 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 164 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	F Y CL -	N Y #F -	N Y #F -	N Y #F -	F Y UG -	N Y #F -
C-	N Y CL -	N Y #F -	N Y HU -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 165 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N N GI GI	N Y #F
C+	N Y #F -	F Y F -	N Y #F -	N Y CL -	F Y AO -	F Y AO
C-	N Y #F -	N N GU -	N Y #F -	N Y #F -	N Y #F -	N Y #F

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 166 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y DF -	N Y #F
C+	N Y #F -	N Y #F -	C Y F -	N Y #F -	F Y F -	N Y #F
C-	N Y #F -	N Y #F -	N Y #F -	N Y CL -	N Y #F -	F Y UG

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 167 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y CL -	N Y #F -	N Y UG -	N Y HU -	N Y #F -	N Y #F -
C+	N Y #F -	N Y UG -	N Y UG -	N Y HU -	N N UG M	N Y UG -
C-	N Y #F -	N Y UG -	N Y UG -	N Y HU -	N N UG M	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 168 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y HU -	N Y CL -	N Y UG -	N Y UG -
C-	N Y #F -	N Y #F -	N Y HU -	N Y CL -	N Y UG -	N Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 169 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	F Y DF -	N Y DF -	N Y CL -	F Y DF -	F Y UG
C-	F Y CL -	F Y DF -	F Y UG -	N Y #F -	F Y UG -	N Y #F

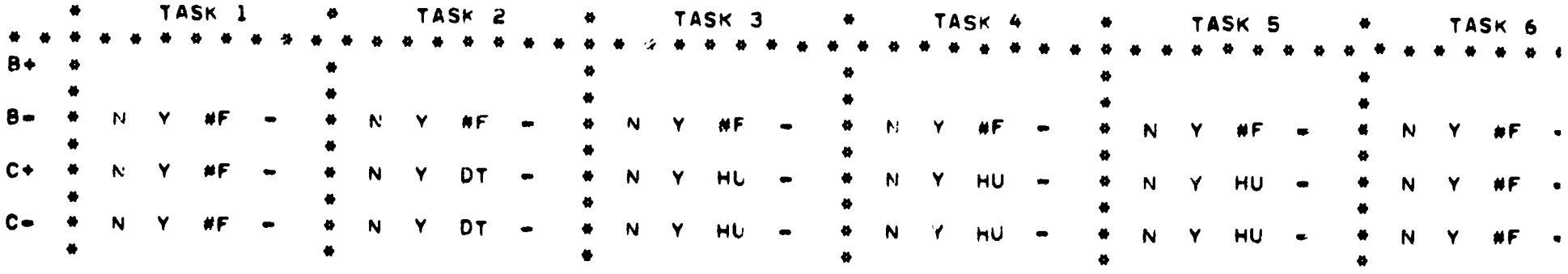
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 171 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y HU -	N Y HU -	N Y #F -	N Y UG -	N Y UG
C+	N Y HU -	N Y HU -	N Y HU -	N Y CL -	N N HU F	N Y #F
C-	N Y HU -	N N UN -	N Y HU -	N N CL M	N Y HU -	N Y HU

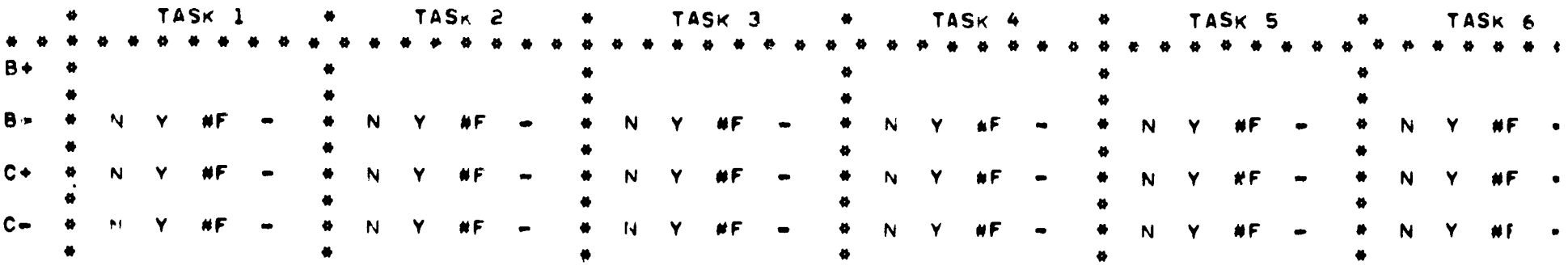
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 172 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 173 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 175 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N N GU -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F

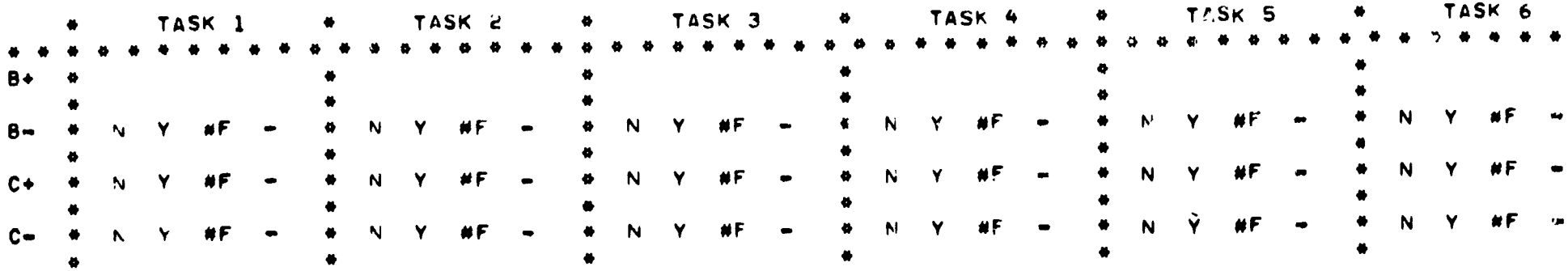
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 177 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y HU -	N Y #F -	N Y #F
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y UG
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y UG

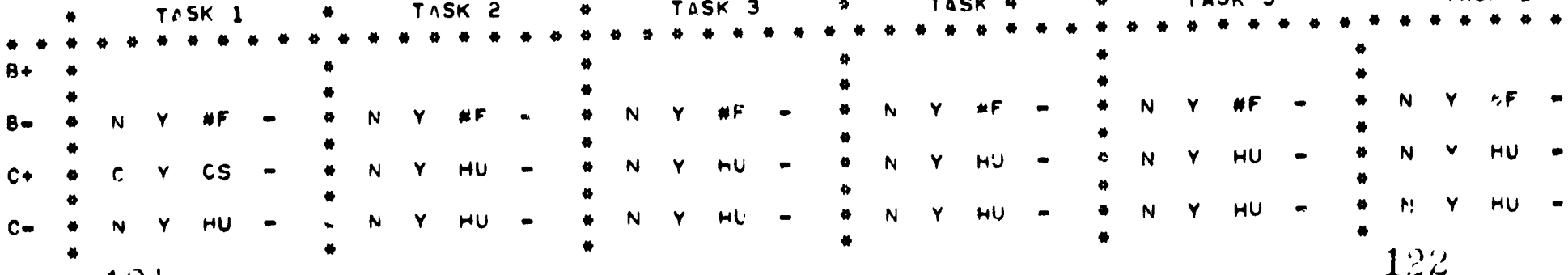
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 301 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 302 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 303 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 304 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	F Y AO -	N Y #F -	F Y UG -	N Y #F -
C+	C Y CL -	C Y F -	C Y F -	C N CA M	C Y F -	C Y AO -
C-	F Y CS -	F Y DF -	N Y #F -	F Y CL -	F Y UG -	F Y UG -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 305 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 306 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N N GU -	N Y #F -	N N OP O	N Y #F -	N N OP O	N Y #F
C+	N N #F -	C Y F -	C ? ? -	C Y CA -	C N OP O	C Y AO
C-	- ? ? -	N N DF M	N Y DF -	N Y CS -	N N OP O	N Y UG

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INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 307 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 308 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y UG -	N Y CS -	N Y UG -	N Y UG -
C+	N N CL M	N N GU -	N N UG M	N Y #F -	N N UG -	N N GU -
C-	N Y #F -	N N GU -	N N UG -	N Y CL -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 309 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y CL -	N Y UG -	N Y UG -	N Y CL -	N Y UG -	N Y UG
C+	N Y CL -	C Y F -	N Y UG -	N Y CL -	C Y MA -	N Y UG
C-	N Y CL -	N Y UG -	N Y UG -	N Y CS -	N Y UG -	N Y UG

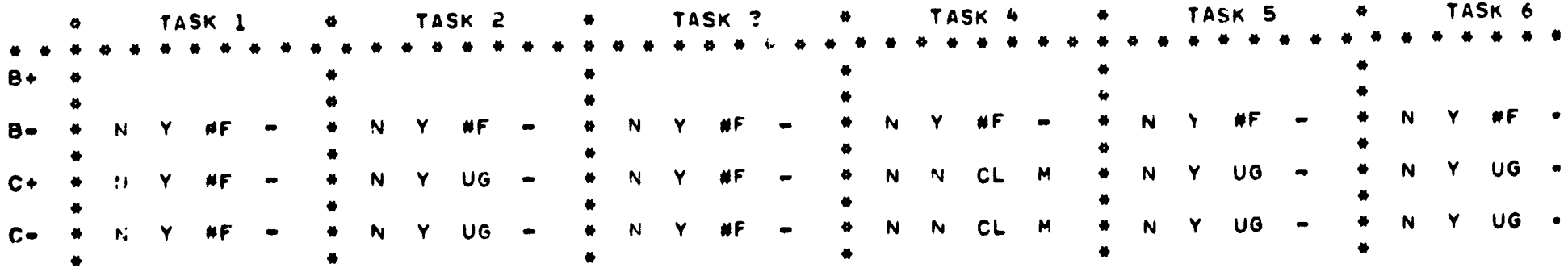
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 310 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y HU -	N Y #F -	N Y #F -	N Y HU -	N Y HU
C+	F N CS M	N Y UG -	N Y #F -	N Y CL -	N Y #F -	N Y HU
C-	N Y CL -	N Y #F -	N N #F F	N Y #F -	N Y UG -	N Y #F

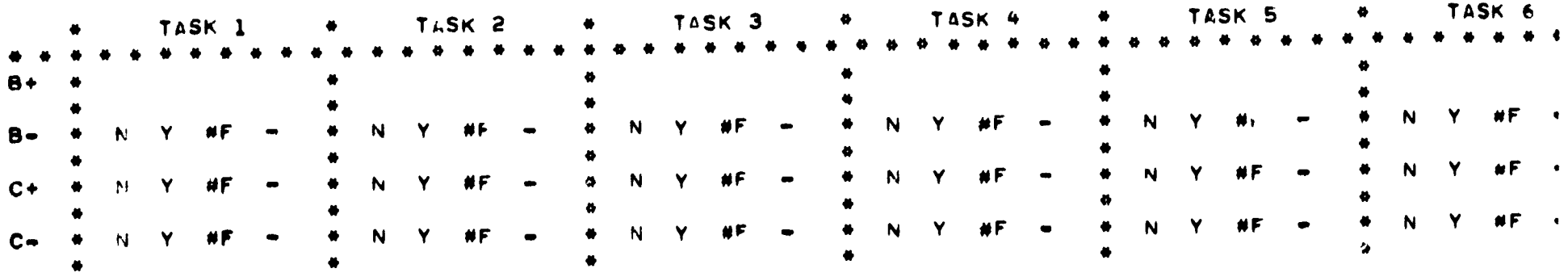
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 311 ADMINISTRATION 8



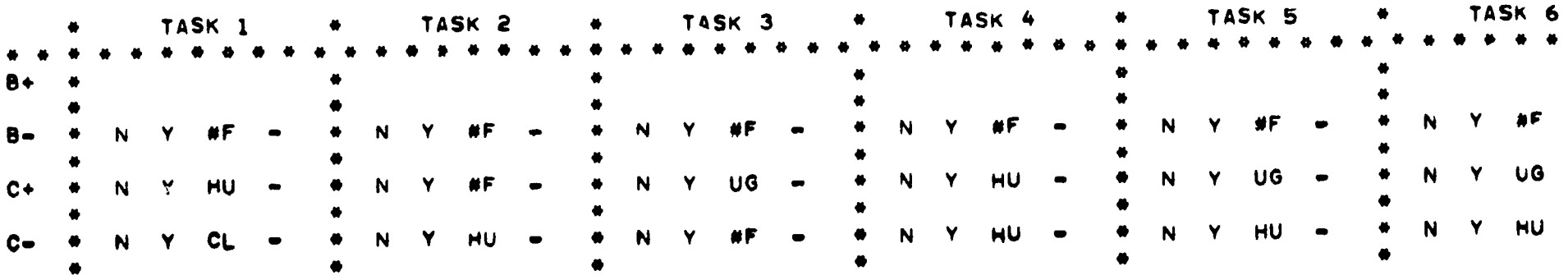
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 312 ADMINISTRATION 8



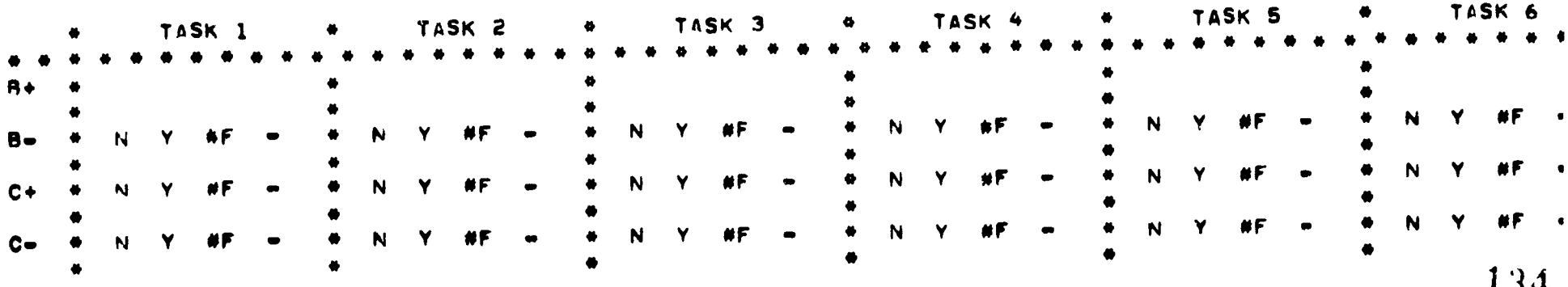
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 313 ADMINISTRATION 8



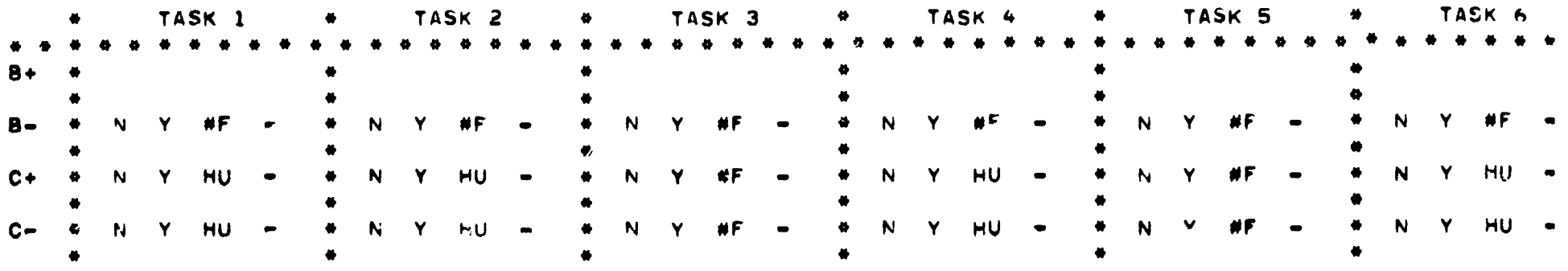
INDIVIDUAL S ENT PROFILE BY A MINISTRATION

STUDENT 314 ADMINISTRATION 8



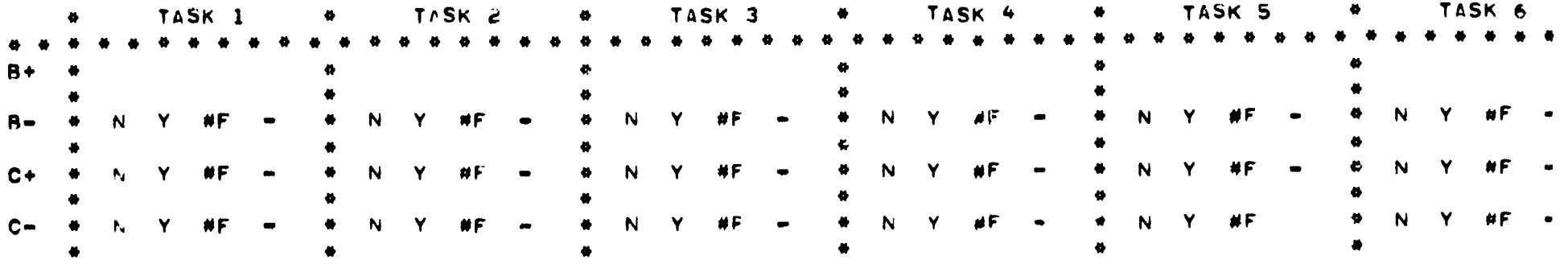
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 315 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 316 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 318 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y HU -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y UG
C+	N Y HU -	N Y #F -	C Y HU -	N Y HU -	N Y HU -	N Y HU
C-	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N N HU

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 319 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	F Y UG -	N Y #F
C+	F Y CL -	F Y DT -	F Y DT -	N Y #F -	F Y DF -	F Y UG
C-	F Y CL -	F N DT F	F Y DF -	F Y CL -	F Y UG -	F N UG

INDIVIDUAL STUDENT PRO ILE BY ADMINISTRATION

STUDENT 320 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y DT -	N Y #F -	N Y #F -	N Y UG -	N Y #F -
C+	N Y CL -	N Y UG -	C Y F -	N Y CL -	N Y #F -	N Y UG -
C-	F Y CL -	F Y DF -	F Y UG -	N Y HU -	F Y UG -	N Y HU -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 321 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	C Y CA -	N Y #F -	N N HU -	C Y CA -	N Y HU -	F Y UG -
C-	N Y HU -	F Y HU -	N Y HU -	F Y HU -	N Y #F -	N Y HU -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 322 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	C Y CA -	N Y HU -	N Y HU -	N Y HU -	C Y F -	N Y HU -
C-	N Y HU -	N Y #F -	N N GU F	N Y #F -	N Y HU -	N Y HU -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 323 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y #F -	N Y #F -	N Y HU -	N N HU -	N N UG N
C-	N Y #F -	N Y #F -	N Y #F -	N Y HU -	N N HU -	N N UG N

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 325 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F
C+	N Y #F -	C Y F -	N Y #F -	N Y #F -	C Y DF -	C Y DF
C-	N N GU -	N Y #F -	N Y #F -	N N CS M	N Y #F -	N Y HU

INDIVIDUAL STUDENT PROFILE BY ALMINISTRATION

STUDENT 326 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y UG -	N Y UG
C+	N Y #F -	N Y HU -	N Y HU -	N Y #F -	N Y UG -	N Y #F
C-	N Y #F -	N N DT -	N Y #F -	N Y #F -	N Y HU -	N Y UG

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 327 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y UN -	N Y UN -	N Y #F -	N Y #F -	N Y #F -
C-	N Y #F -	N Y UN -	N Y UN -	N Y #F -	N Y #F -	N Y #F -

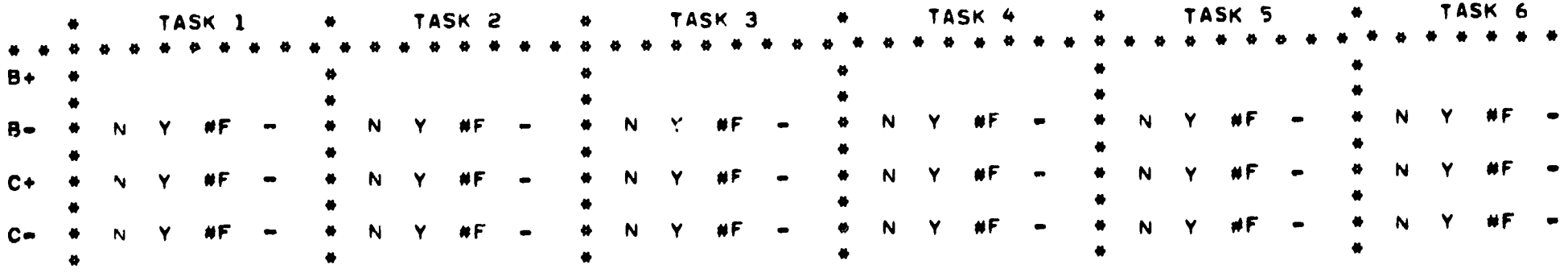
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 328 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N N GI GI	N Y #F -	N Y #F -	N Y #F -
C+	N Y CS -	N Y #F -	N N GI GI	N Y CS -	N Y UG -	N Y UG -
C-	N N CL M	N Y #F -	N N GI GI	N Y #F -	N Y #F -	N Y UG -

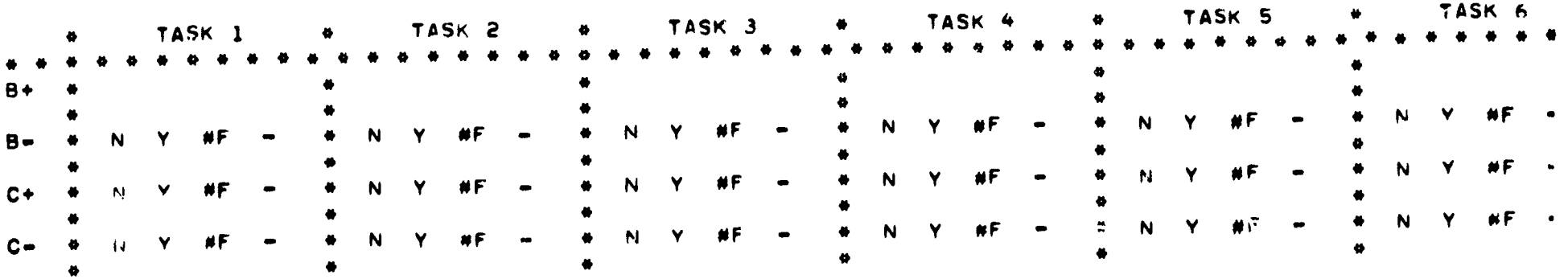
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 329 ADMINISTRATION 8



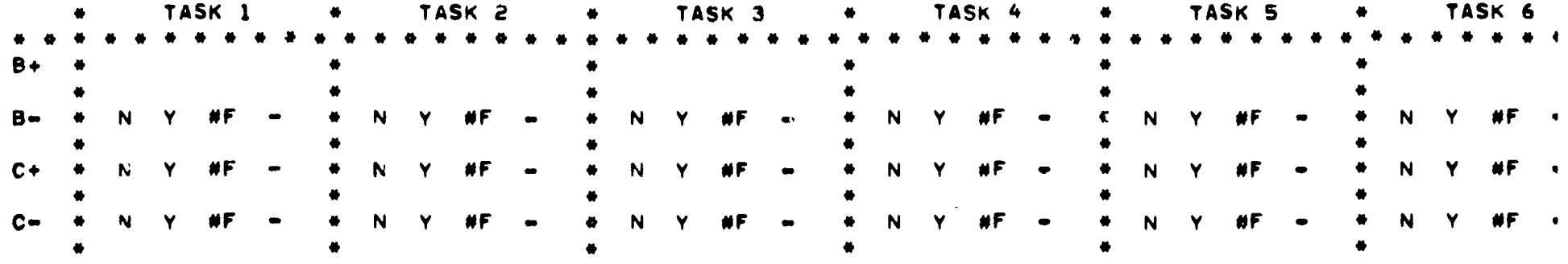
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 331 ADMINISTRATION 8



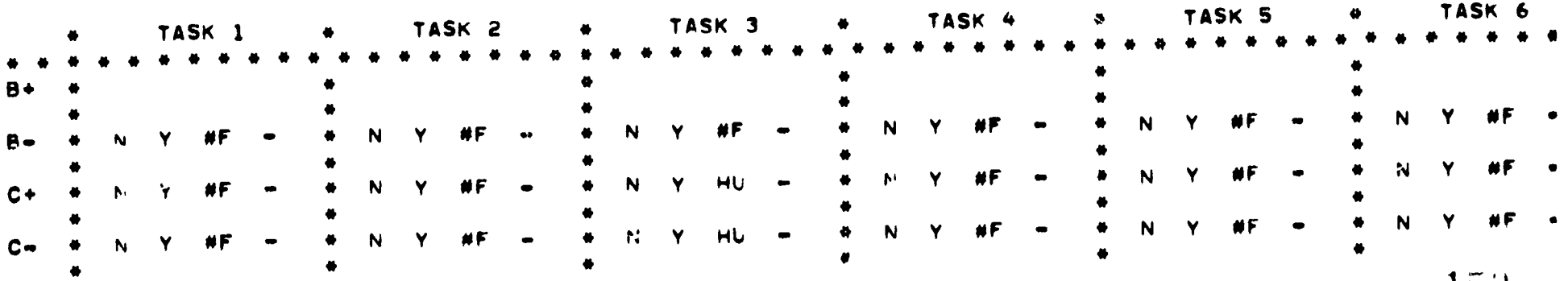
INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 332 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 333 ADMINISTRATION 8



INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 334 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y #F -	N Y DT -	N Y #F -	N Y CL -	N Y #F -	N Y #F -
C-	N Y #F -	N Y DT -	N Y #F -	N Y CL -	N Y #F -	N Y #F -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 335 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y HU -	N N OP O	N Y HU -	N Y HU -	N Y HU -	N Y HU -
C-	N Y HU -	N N OP O	N Y HU -	N Y HU -	N Y HU -	N Y HU -

INDIVIDUAL STUDENT PROFILE BY ADMINISTRATION

STUDENT 336 ADMINISTRATION 8

	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6
B+						
B-	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -	N Y #F -
C+	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y HU -
C-	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y HU -	N Y HU -

Appendix C

NUMBER SET ASSIGNMENT FOR NUMBER TRIPLES

Number Set Assignment

Student ID#

	101	102	103	104	105	106	107	108	110	111	112	113	114	115	117
b-	NA*	4	2	1	2	2	4	6	3	NA	1	2	3	2	NA
c+	3	4	6	6	1	5	4	6	6	5	1	3	3	1	3
c-	NA	1	2	1	4	3	1	5	1	NA	3	4	1	NA	NA

Student ID#

	118	119	120	121	123	124	125	127	128	129	130	131	132	133	134
b-	NA	2	NA	4	NA	1	2	2	5	NA	NA	NA	NA	4	5
c+	NA	2	3	5	3	6	5	4	5	4	NA	6	NA	2	5
c-	NA	1	NA	3	NA	3	5	2	1	NA	NA	1	NA	6	NA

Student ID#

	135	137	139	140	141	143	144	147	148	151	152	153	154	155	158
b-	2	5	6	5	NA	1	NA	NA	NA	5	2	1	5	NA	3
c+	2	5	1	2	4	6	2	3	NA	1	6	1	5	5	6
c-	1	NA	NA	3	NA	NA	NA	1	NA	NA	2	NA	1	NA	5

Student ID#

	159	160	162	163	164	165	166	167	168	169	171	172	173	175	177
b-	2	6	NA	NA	2	2	5	3	2	1	4	NA	NA	4	3
c+	2	2	NA	NA	6	5	5	6	2	1	4	5	1	3	4
c-	NA	5	NA	NA	4	4	2	NA	NA	2	3	NA	NA	NA	NA

Student ID#

	301	303	303	304	305	306	307	308	309	310	311	312	313	314	315
b	NA	3	NA	1	NA	3	4	4	3	6	NA	NA	2	NA	NA
c+	2	4	NA	5	5	5	4	4	6	5	2	NA	[illegible]	NA	6
c-	NA	1	NA	1	NA	2	3	1	5	2	NA	NA	2	NA	NA

Student ID#

	316	318	319	320	321	322	323	325	326	327	328	329	[illegible]	332	333
b-	NA	1	3	6	NA	NA	NA	NA	4	NA	5	NA	NA	NA	NA
c+	NA	5	1	4	5	6	1	2	3	3	5	NA	NA	2	2
c-	NA	1	6	2	3	1	NA	5	5	NA	2	NA	NA	NA	NA

Student ID#

	334	335	336
b-	NA	NA	NA
c+	5	2	4
c-	NA	NA	NA

*NA = Not Administered

ASSOCIATED FACULTY

Thomas P. Carpenter
Professor
Curriculum and Instruction

W. Patrick Dickson
Assistant Professor
Child and Family Studies

Fred N. Finley
Assistant Professor
Curriculum and Instruction

Lloyd E. Frohreich
Professor
Educational Administration

Maureen T. Hallinan
Professor
Sociology

Dale D. Johnson
Professor
Curriculum and Instruction

Herbert J. Klausmeier
V. A. C. Henmon Professor
Educational Psychology

Joel R. Levin
Professor
Educational Psychology

James M. Lipham
Professor
Educational Administration

Cora B. Marrett
Professor
Sociology and Afro-American Studies

Fred M. Newmann
Professor
Curriculum and Instruction

Wayne Otto
Professor
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Penelope L. Peterson
Associate Professor
Educational Psychology

W. Charles Read
Professor
English and Linguistics

Thomas A. Romberg
Professor
Curriculum and Instruction

Richard A. Rossmiller
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