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RESEARCH IN MATHEMATICS EDUCATION

# **Numeric Relational Reasoning: Anticipated and Unanticipated Strategies**

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## Executive Summary

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The purpose of this report is to describe the anticipated and unanticipated strategies that we observed among students' responses from the Numeric Relational Reasoning (NRR) cognitive interviews conducted as part of the Measuring Early Mathematics and Reasoning Skills (MMaRS) project. See the Numeric Relational Reasoning Learning Progression Development and Protocol Development technical reports for details on the structure of the learning progression and the cognitive interviews (Technical Report No. 20-02; Technical Report No. 20-04). This report details the process we used to collect various students' strategies from the cognitive interview data. We provide descriptions and examples of multiple strategies, both anticipated and unanticipated, that elementary students used to work through numeric relational reasoning tasks during the cognitive interviews. To find evidence of strategies in analyzing cognitive interview data, we use an adapted form of interaction analysis (Jordon & Henderson, 1995). To conclude the report, we list various strategies by subcomponent across all core concepts.

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# Numeric Relational Reasoning: Anticipated and Unanticipated Strategies

## Introduction

The purpose of this report is to describe the anticipated and unanticipated strategies we observed from the qualitative analyses of the Numerical Relational Reasoning (NRR) Cognitive Interviews (CIs) for the Measuring Early Mathematics and Reasoning Skills (MMaRS) project. We found several strategies students used to work on the given tasks during cognitive interviews. We anticipated some strategies before analysis, based on a literature review and researchers' experience, and we referred to them as anticipated strategies. We also noticed some strategies that we did not anticipate and referred to them as unanticipated strategies among students' responses. We also listed all anticipated and unanticipated strategies observed for all subcomponents within a core concept.

## Research Questions

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The cognitive interviews were designed to address four research questions related to gathering validity evidence for the NRR learning progression. These research questions rely on data collected directly from the cognitive interviews and from the fidelity of administration form. The research questions include:

- RQ 1: What level of evidence exists to confirm or disconfirm the ordering, content, and developmental appropriateness of the learning progressions?
- RQ 2: What are the characteristics of kindergarten, first- and second-grade students' numeric relational reasoning within one-on-one cognitive interviews?
- RQ 3: What was the level of fidelity of implementation (fidelity by interviewer/observer)?
- RQ 4: What was the level of accessibility and comfort of students on all tasks within every learning progression?

In this report, we only focused on the second research question. To identify elementary students' numeric relational reasoning, we identified various strategies students used to work on the given problem during one-on-one cognitive interviews.

# Cognitive Interviews and Participants

This section briefly describes the cognitive interview protocols, participants, and data collection for the study. We have provided references to other technical reports for details of various components briefly discussed in this report.

## Cognitive Interviews

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Cognitive interviews were conducted to gather one source of validity evidence to support the NRR LP's developmental appropriateness, ordering, conceptualization, and interconnections based on student responses to items aligned with the hypothesized LP. We analyzed students' correctness as aligned with the stipulated subcomponent skills and their demonstrated reasoning strategies. For more information on the development of the NRR learning progression, refer to the NRR Learning Progression Development technical report (Tech. Rep. No. 20-02). For more information on cognitive interview protocol development, including the protocol structure, development processes, and the refinement steps through student tryouts, refer to the NRR Cognitive Interview Protocol Development report (Tech. Rep. No. 20-04).

## Participants and Data Collection

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In the cognitive interviews, 33 students in grades K-3 participated. The students were selected from three different private schools in a metropolitan area in a southern state. One kindergarten student was removed from the study due to the number of limited mathematical responses provided during the interview. The remaining 32 students remained as participants in the study. We asked teachers for the level of support each student needed when completing mathematics problems. We collected the level of support for each student to gauge the students' present level of understanding in early mathematics concepts.

The primary data sources collected from the cognitive interviews included audio and video recordings of the interviews, transcripts of interviews, and fidelity observation forms. The videos were analyzed alongside transcripts to determine students' correct responses, alignment to the learning progression, and student strategies to solve the given problems.

For complete details on participants, data collection, and the methods for purposeful sampling of participants, refer to the Numeric Relational Reasoning Cognitive Interviews: Methods and Quantitative Data Analyses (Technical Report No. 20-05).

## Student Sampling of Data

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To optimize the number of interviews coded for student strategies and gather as much data as possible, we employed quota sampling (Emmel, 2013) as a technique to select interviews in a systematic way. Before identifying the smaller set of interviews, we assigned a number range to each student interview based on the number range that was used most often during the interview; see the Numeric Relational Reasoning Cognitive Interviews: Methods and Quantitative Data Analyses technical report for information on number ranges used in interviews (Technical Report No. 20-05). The distribution of selected interviews across different grade levels and number

ranges is displayed in Tables 1 and 2. Distribution of all selected interviews is available in Appendix A. We combined grades 2 and 3 together because grade 3 students were intended to represent end-of-year second-grade students.

**Table 1**

*Number of Properties of Operations Interviews*

Grade Level	Number Range						Grand Total
	0-5	0-10	0-19	0-50	0-99	0-199	
Kindergarten	6	4					10
Grade 1		6	4				10
Grade 2		1	1	2	5	1	10
Grade 3					1	1	2
Grand Total	6	11	5	2	6	2	32

**Table 2**

*Sample of Properties of Operations Interviews*

Grade Level	Number Range						Grand Total
	0-5	0-10	0-19	0-50	0-99	0-199	
Kindergarten	2	2					4
Grade 1		2	2				4
Grade 2		0	0	1	2	0	3
Grade 3					0	1	1
Grand Total	2	4	2	1	2	1	12
Selected	768	495	152	993	284	676	
SIDs	RK	385	793		563		
		946					
		223					

One student was selected from each number range per grade level from which we had a minimum of four Properties of Operations interviews. For the Relations and Composition and Decomposition targeted learning goals, three interviews were selected from each. The chain of decisions is as follows:

- Are there more than two interviews in a cell?
  - No = Use those two interviews.
  - Yes = Use the two interviews with the highest number of ESSs represented.
    - Is there a tie in the number of ESSs?
      - No = Use those two interviews.



- Yes = Use the interview with the higher number of skills within the targeted number range.
  - If there is still a perfect match between interviews, use the interview of the student with a lower support level.

As a final decision point, the student with a lower support level was chosen for analysis; the overall project goal is that assessment use will provide teachers with meaningful data to make instructional decisions, even if students are not at a lower proficiency level. We only included interviews in the data set, where at least three-fourths of the interview protocol was completed. The final number of interviews selected for qualitative analysis is shown in Table 3.

**Table 3**

*Quota sample of interviews by grade level*

Subcomponent	K	1	2	3
Relations	2	1	3	0
Composition/Decomposition	2	3	1	0
Properties of Operations	4	4	3	1

## Method

As informed by literature and experience, we anticipated multiple strategies for each subcomponent that elementary students may use to reason when working on given problems. We created a list of anticipated strategies for each subcomponent and included them with the subcomponent statements in interview protocols. During the analysis of cognitive interview data, our team identified some strategies students used that were not listed among anticipated strategies. Therefore, we created a list of such unanticipated strategies for each subcomponent. The purpose of collecting and reporting unanticipated strategies was to determine whether any prevalent student strategies may need to be considered for inclusion in conceptualizing the learning progression.

### **Anticipated Strategies Codebook for Each Subcomponent**

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For each subcomponent, anticipated strategies were identified based on a literature review and the teaching and research experience of MMaRS team members. A table was developed for each subcomponent by adding anticipated strategies into the interview protocols. These tables were compiled in a document we referred to as the anticipated strategies codebook. Each table contained the following:

- Subcomponent number and description – This section carried identifying alphanumeric codes and descriptions of each subcomponent, as given in the interview protocols.
- Content question and reasoning question – All content and reasoning questions from the interview protocol were listed in this section of the table.

- Embedded and general tools relevant to the subcomponent – These were all mathematical tools used during the interviews, either embedded in the item or provided to students during the interview.
- Different way and other NRR subcomponents – “A different way” and other NRR subcomponents were created to list any unanticipated strategies students used and reference other subcomponents that were evident from student’s responses.

An example of an anticipated strategies codebook is shown in Figure 1. The Anticipated Strategies Codebook is shown by targeted learning goal in Appendices B, C, and D as part of the Integrated Strategies document for Relations, Composition and Decomposition, and Properties.

**Figure 1**

*Anticipated Strategies Codebook*

NRR.A.1.a. Anticipated Strategies		
<b>NRR.A.1.a.</b>	Compare o <b>quantities</b> to find which is more/less using <b>matching and counting strategies</b> .	
Content Question	(1) Find a day where Carla saw less clouds than she saw on Sunday. (2) Find a day where Carla saw more clouds than she saw on Sunday.	
Reasoning Question	Can you tell me or show me how you decided that this picture has more/less?	
Anticipated Skills		
	Code	Description
Embedded Mathematical Tools	A1a_E_NOT-Cards	Pictures of groups of clouds are embedded into the activity.
General Mathematical Tools	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	Square tiles	Colored square tiles as counters
	Linking cubes	Linking cubes as counters
	Fingers	Fingers as counters
Strategies	Code	Description
	A1a_A_General tool	Child uses a general tool as listed above.
	A1a_A_Count all	Child counts all clouds individually. [Counting]
	A1a_A_Count by 2s	Counting. Child counts clouds in groups of 2; (“2, 4, 6, 8”) [Counting]
	A1c_A_One to one (Individuals)	Child pairs each cloud on one card with a cloud on other card. [One-to-One correspondence of individual objects]
	A1c_A_One to one (Groups)	Child pairs each group of clouds on one card with a group of clouds on other card. [One-to-One correspondence of Groups of objects]
	A1c_A_Count pairs	Child counts pairs of corresponding clouds on each card (“1, 2, 3, 4”) [Counting].
	Count Groups	Child counts number of groups to compare, not attending to individual clouds.
A different way	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.
NRR Essentialized Skill Statements	Other NRR Skill Codes	NRR.C.8.a, NRR.C.8.b, NRR.C.8.c

## Qualitative Analysis of Selected Subset of Data

The MMaRS coding team used an adapted form of interaction analysis (Jordon & Henderson, 1995) to conduct the qualitative analysis of cognitive interview data. Traditionally, interaction analysis involves researchers from different projects meeting weekly to share a group analysis video. After introducing the research and video, the group watches and “stop[s] the tape whenever anything strikes them as significant” (p. 49). A collection of tapes is then compiled from edited clips to provide evidence of the phenomenon of interest.

For the MMaRS cognitive interviews, two teams, each consisting of a lead coder who provided an emic, or insider, perspective and a secondary coder providing an etic, or outsider, perspective analyzed the cognitive interviews. Lead coders were immersed in the learning progression development process, interview protocol development, and served as interviewers during the cognitive interviews. Each pair's secondary coder had little to no involvement with the learning progression development, interview protocol development, or interview process. Both the lead coder and secondary coder had sufficient content and pedagogical knowledge within the NRR construct.

The teams began by dividing each interview transcript into subcomponents and adding relevant non-verbal actions into the text to understand students' work better. Individual student talk turns, or lines of the text that signified students' speech, were identified as the unit of coding. Using the anticipated strategies codebook, coding teams marked strategies followed a coding guide, which included the following four steps:

- Step 1-Locate content and reasoning questions for each subcomponent: Both coders on a team read the interview transcripts simultaneously for each subcomponent to identify content and reasoning questions.
- Step 2-Identify and mark student strategies demonstrated by students in their responses: The two coders identified strategies evident in students' responses. By analyzing transcripts for the same subcomponent, the teams were able to employ a constant comparative method (Creswell, 2013) to revise and refine coded student strategies. While interacting with the transcripts, teams stopped to discuss any student talk turns of interest and decided whether or not the video was necessary for additional contextual information before moving on. The discussion was limited to five-to-seven minutes to mitigate lengthy discussions and ensure arguments were grounded in empirical evidence (Jordon & Henderson, 1995). If a video was consulted, then all of that child's mathematical actions were documented to add context to the talk turn. Interviewer talk turns were considered as supporting evidence when a child used gestures or writing but did not provide any verbal explanations.
- Step 3-Create descriptions for any unanticipated strategies: Using the anticipated strategies codebook, students' strategies were coded as anticipated or unanticipated. After coding all selected transcripts for a subcomponent, team members discussed and reviewed coded strategies, anticipated and unanticipated, to ensure consistency of codes across time. Then coders crafted descriptions for all unanticipated strategies and compiled them by subcomponent. All anticipated and unanticipated strategies were collected in tables by grade level and number range within a subcomponent.
- Step 4-Extract examples of each unanticipated strategy from students' work: At the last step, coders added an example of students' strategies from the interview transcripts to describe the unanticipated strategies.

# Results

To understand the anticipated and unanticipated strategies students used during the cognitive interviews, we grouped and summarized all anticipated and unanticipated strategies for each subcomponent. We compiled the strategy summaries by subcomponent to provide teachers and leaders with information about what strategies students employ in early grades to solve numerical relational problems. The purpose of collecting various students' strategies was to understand elementary students' numeric relational reasoning characteristics within one-on-one cognitive interviews and to conceptualize all subcomponents of each targeted learning goal. Using the summary tables of anticipated and unanticipated strategies, we compiled synthesis tables that show which strategy was used more often for each subcomponent.

## Summary of Strategies

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We summarized the anticipated and unanticipated strategies that students used when solving problems presented in the cognitive interview tasks. We compiled summaries of these strategies in tables for each subcomponent within each core concept.

The summary section for each subcomponent consists of four tables. The first table includes the subcomponent code, description, and grade range from the learning progression—it shows the subcomponent statement and the grade level boundaries. The second table, called "unanticipated strategies," includes the subcomponent, its description, and example(s) of all unanticipated strategies that coders observed for that subcomponent during interviews. Coders wrote this information after achieving an exact agreement. The examples of unanticipated strategies were the selected text from interview transcripts with student id and timestamp. The third and fourth tables carry all unanticipated and anticipated strategies listed by grade level and number ranges. Each table has names of all strategies along with student IDs within each grade level and number range. A snapshot of a summary document is shown in Figure 2.

We added subcomponent code, description, and appropriateness for a specific grade level in the first section of the summary table so that readers can link strategies to subcomponents and grade levels. In the second section, we included the name, description, and an example of all unanticipated strategies for the subcomponent. In the last section of the table, we added anticipated and unanticipated strategies for each grade level by their number ranges. Summaries for all subcomponents are available as part of integrated strategies documents in Appendices B, C, D for Relations, Composition & Decomposition, and Properties, respectively.

## Synthesis of Strategies

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To illuminate strategies that appeared more or less frequently within a core concept, we developed synthesis tables. The synthesis tables are simplified versions of the information presented in the summary tables. We organized synthesis tables by core concept; they show the individual and the total number of instances in which the given strategy was used within a subcomponent. Additionally, the synthesis tables reflect which strategies appeared at which grade level and number range more often. A snapshot of a synthesis of strategies table is shown in Figure 3.

**Figure 2**

*Organization of Summary Document*

NRR.A.1.a. Summary  
Essentialized Skill Statement

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Compare two quantities to find which is more/less using matching and counting strategies.								

Unanticipated Strategies

<i>Unanticipated Strategy. Justification/Description</i>	<i>Examples</i>
<i>Context. Students compared the open spaces or on the cards rather than focusing on the quantity of clouds. The example provided demonstrates a child who used the house as a reference point for determining more/less.</i>	<i>Well, I could tell that this one is more because it has more sides...and then there's more around the house than these (128, 9:19, 9:28).</i>
<i>A.1.c. Compare two quantities to find which is more/less using mental images.</i>	<i>Because it looks bigger than that one... because it has more clouds [child stated that Tuesday has more and looks bigger than Monday, but did not define Monday's quantity](337, 07:08- 07:20).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645)					
1		A.1.c. (337)				
2					Context (128)	-

Unanticipated strategies by grade level and number range for NRR.A.1.a.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Count all (805)					
1		-				
2					-	Count groups (284, 993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.1.a. activity

Synthesis tables for all core concepts are available as part of integrated strategies documents in Appendices B, C, D for Relations, Composition and Decomposition, and Properties, respectively. We created the integrated strategies document by combining the anticipated strategies codebook, summary of strategies document, and synthesis of strategies document. We organized the integrated strategies document by core concept. For each core concept, synthesis tables of anticipated and unanticipated strategies are provided first, then summary tables for anticipated and unanticipated strategies by subcomponent. Lastly, the anticipated strategies codebook tables for each subcomponent are provided.

**Organization of Strategies by Subcomponent**

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We used the integrated strategies document to compile the anticipated and unanticipated strategies students used by subcomponent. The purpose was to find which strategies appeared across multiple subcomponents. This information revealed which strategies are shared across subcomponents.

**Figure 3**

*Organization of Synthesis of Strategies*

NRR.A.2. Synthesis Data

**Unanticipated strategies: NRR.A.2.a-b**

Skill Code			A.2.a.	A.2.b.
Unanticipated			Counting	
SID	Grade	Number Range		
645	K	0-5	-	-
805	K		-	-
337	1	0-10	-	On
128	2	0-99	All	Down
284	2	0-199	All	Down, On
993	2		-	-
Strategies Total by Skill Code			2	4

**Anticipated strategies: NRR.A.2.a-b**

Skill Code			A.2.a.	A.2.b.	
Anticipated Strategies			100s Chart	Counting	-
SID	Grade	Number Range			
645	K	0-5	-		-
805	K		-	All, On	-
337	1	0-10	1		-
128	2	0-99	1		-
284	2	0-199	1		-
993	2		1		-
Strategies Total by Skill Code			4	2	0

All strategies were compiled in a spreadsheet with the following columns: Strategy Code, Strategy Description, Examples (only for unanticipated strategies), and subcomponent. For each subcomponent, a coder copied all anticipated strategy codes and their description into the relevant columns. The coder copied the name, description, and examples of all unanticipated strategies in appropriate columns in the next step. The number one was entered for anticipated strategies in the subcomponent columns, and the number two was entered for unanticipated strategies.

After completing a subcomponent, the coder moved to the next subcomponent in the Integrated Strategies document and repeated the above process. If a strategy code with the same definition already exists in the excel sheet, it was used for the next subcomponent as well; otherwise, a new entry was made in the excel sheet. A snapshot of the Strategies by Subcomponent spreadsheet is shown in Figure 4.

If any strategy appeared in the strategy tables without a definition, then the strategy's code was entered without a definition. In the description cell, it was noted that the description of this code is not available. If any subcomponent appeared as a strategy for any other subcomponent, then its name was entered as the subcomponent (e.g., A.4.c). After the primary coder completed an entire protocol, another team member verified the error-free transfer of information for 50% of the subcomponents. If an error was found, then the primary coder was informed, and the primary coder fixed the mistake and re-check all entries before sending it back for verification.

During the process of creating the strategies by subcomponent spreadsheet, it was identified that some strategies had the same strategy code name with similar definitions, like Number Relationships shown in Figure 4. Upon further review, where instances of the strategy code name and definition being closely aligned, the rows in the spreadsheet were combined, and the

definition was refined to focus less on the specific subcomponent and more on the generalization of the strategy.

**Figure 4**

*Organization of Strategies by Subcomponent*

Strategy Code	Strategy Description	Example (only unanticipated strategies will have an example)	NRR.	NRR.	NRR.	NRR.	NRR.	NRR.	NRR.	NRR.	NRR.	NRR.	NRR.
			A.3.a.	A.3.b.	A.3.c.	A.3.d.	A.3.e.	A.3.f.	A.4.a.	A.4.b.	A.4.c.	A.4.d.	A.4.e.
No. Relationships	Child uses language of relationship like less/more, smaller/bigger, left/right									1			
Number of Digits	Students focused on the number of digits on each card to identify the value of the number on the card. It is different from place value concept because students didn't refer to place value or compare digits at a specific place value on each card. Additionally, we didn't have a concept of place value in Relations protocol.	Because these [points to 76] have two digits, these [pointing to 100 and 103] have three (128, 49:58; NRR.A.3.e.).  Cause this [points to 76] has two numbers and this one [points to 100] has three, so I knew that this one [76] would go before this one [100] (993, 31:33; NRR.A.3.e.).  Student said: "It tells me that, cause this one (pointing to 107) has three, and this one (pointing to 78) only has two (128, 53:12; NRR.A.3.f.)"				2	2						
Number relationships (1)	Child uses language of relationship like less/more, smaller/bigger, left/right				1							1	
Number relationships (2)	Definition does not exist, only in data, not in description table.	(337; 128; 993; NRR.A.3.e.)				1							

## Conclusion

We analyzed a subset of cognitive interview data to find evidence of various strategies in elementary students' responses when solving numeric relational reasoning problems. Apart from anticipated strategies, elementary students used many strategies that we did not anticipate before analysis. The purpose of compiling anticipated and unanticipated strategies is for the conceptualization of the learning progression. Our work of anticipated and unanticipated strategies can also inform teachers and leaders about various strategies that elementary students tend to use to work on numerical relational problems. Additionally, we also reported on multiple strategies students frequently used across subcomponents.

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## Appendix A – Student Strategies Sampling Plan

### Relations Sampling Plan

Data Display	Process	Rationale																																																																
<p>Table 5</p> <p>Number of Relations interviews by [grade level x number range] where number range is the most used number range for a given interview.</p> <table border="1" data-bbox="100 521 982 927"> <thead> <tr> <th colspan="8">Column Labels: Number Range</th> </tr> <tr> <th>Row Labels:</th> <th colspan="6"></th> <th>Grand</th> </tr> <tr> <th>Grade Level</th> <th>0-5</th> <th>0-10</th> <th>0-19</th> <th>0-50</th> <th>0-99</th> <th>0-199</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Kindergarten</td> <td>4</td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td>5</td> </tr> <tr> <td>Grade 1</td> <td></td> <td>3</td> <td>1</td> <td>1</td> <td></td> <td></td> <td>5</td> </tr> <tr> <td>Grade 2</td> <td></td> <td></td> <td></td> <td>1</td> <td>2</td> <td>2</td> <td>5</td> </tr> <tr> <td>Grade 3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td>1</td> </tr> <tr> <td><b>Grand Total</b></td> <td><b>4</b></td> <td><b>3</b></td> <td><b>2</b></td> <td><b>2</b></td> <td><b>2</b></td> <td><b>3</b></td> <td><b>16</b></td> </tr> </tbody> </table>	Column Labels: Number Range								Row Labels:							Grand	Grade Level	0-5	0-10	0-19	0-50	0-99	0-199	Total	Kindergarten	4		1				5	Grade 1		3	1	1			5	Grade 2				1	2	2	5	Grade 3						1	1	<b>Grand Total</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>16</b>	<p>View distribution of most used number ranges across grade levels.</p>	<p>Determine the total number of interviews for each number range by grade level to view the distribution of potential proficiency levels across grade levels.</p> <p>Since Grade 3 students were selected to represent high proficiency Grade 2 students, Grade 3 students are counted with the Grade 2 students. For the purposes of this sampling plan, number range 0-199 has a total of two students in Grade 2 and number range 0-99 has a total of six students in Grade 2.</p>
Column Labels: Number Range																																																																		
Row Labels:							Grand																																																											
Grade Level	0-5	0-10	0-19	0-50	0-99	0-199	Total																																																											
Kindergarten	4		1				5																																																											
Grade 1		3	1	1			5																																																											
Grade 2				1	2	2	5																																																											
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<p>Table 6</p> <p>Possible sample distribution of Relations interviews.</p> <table border="1" data-bbox="100 1068 982 1474"> <thead> <tr> <th colspan="8">Column Labels: Number Range</th> </tr> <tr> <th>Row Labels:</th> <th colspan="6"></th> <th>Grand</th> </tr> <tr> <th>Grade Level</th> <th>0-5</th> <th>0-10</th> <th>0-19</th> <th>0-50</th> <th>0-99</th> <th>0-199</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Kindergarten</td> <td>2</td> <td></td> <td>0</td> <td></td> <td></td> <td></td> <td>2</td> </tr> <tr> <td>Grade 1</td> <td></td> <td>2</td> <td>0</td> <td>0</td> <td></td> <td></td> <td>2</td> </tr> <tr> <td>Grade 2</td> <td></td> <td></td> <td></td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>Grade 3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> <td>0</td> </tr> <tr> <td><b>Grand Total</b></td> <td><b>2</b></td> <td><b>2</b></td> <td><b>0</b></td> <td><b>0</b></td> <td><b>1</b></td> <td><b>2</b></td> <td><b>7</b></td> </tr> </tbody> </table>	Column Labels: Number Range								Row Labels:							Grand	Grade Level	0-5	0-10	0-19	0-50	0-99	0-199	Total	Kindergarten	2		0				2	Grade 1		2	0	0			2	Grade 2				0	1	2	3	Grade 3						0	0	<b>Grand Total</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>7</b>	<p>Include 1 interview from each cell with at least 2 interviews represented.</p> <p>Include 2 interviews from each cell with 3 or more interviews represented.</p> <ul style="list-style-type: none"> <li>- Select interview(s) with the highest number of questions asked from the protocol.</li> <li>- Ties: Select interview with higher number of</li> </ul>	<p>Setting a minimum threshold for selecting from a [grade level x number range] cell avoids over-weighting any grade level.</p> <p>For number range 0-199, grade 2 students were selected over grade 3 student because the interviews had a higher number of questions asked (i.e., interview more completed).</p>
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<p>Table 7</p> <p>Sample of Relations interviews.</p> <p style="text-align: center;"><b>Column Labels: Number Range</b></p> <table border="1"> <thead> <tr> <th style="text-align: left;"><b>Row Labels:</b></th> <th colspan="6"></th> <th style="text-align: right;"><b>Grand</b></th> </tr> <tr> <th style="text-align: left;"><b>Grade Level</b></th> <th style="text-align: center;"><b>0-5</b></th> <th style="text-align: center;"><b>0-10</b></th> <th style="text-align: center;"><b>0-19</b></th> <th style="text-align: center;"><b>0-50</b></th> <th style="text-align: center;"><b>0-99</b></th> <th style="text-align: center;"><b>0-199</b></th> <th style="text-align: right;"><b>Total</b></th> </tr> </thead> <tbody> <tr> <td>Kindergarten</td> <td style="text-align: center;">2</td> <td></td> <td style="text-align: center;">0</td> <td></td> <td></td> <td></td> <td style="text-align: right;">2</td> </tr> <tr> <td>Grade 1</td> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td></td> <td></td> <td style="text-align: right;">1</td> </tr> <tr> <td>Grade 2</td> <td></td> <td></td> <td></td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Grade 3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;">0</td> <td style="text-align: right;">0</td> </tr> <tr> <td><b>Grand Total</b></td> <td style="text-align: center;"><b>2</b></td> <td style="text-align: center;"><b>1</b></td> <td style="text-align: center;"><b>0</b></td> <td style="text-align: center;"><b>0</b></td> <td style="text-align: center;"><b>1</b></td> <td style="text-align: center;"><b>2</b></td> <td style="text-align: right;"><b>6</b></td> </tr> <tr> <td style="text-align: center;"><b>SID</b></td> <td style="text-align: center;"><b>645</b></td> <td style="text-align: center;"><b>337</b></td> <td colspan="2"></td> <td style="text-align: center;"><b>128</b></td> <td style="text-align: center;"><b>993</b></td> <td colspan="2"></td> </tr> <tr> <td></td> <td style="text-align: center;"><b>805</b></td> <td></td> <td colspan="2"></td> <td></td> <td style="text-align: center;"><b>284</b></td> <td colspan="2"></td> </tr> </tbody> </table>									<b>Row Labels:</b>							<b>Grand</b>	<b>Grade Level</b>	<b>0-5</b>	<b>0-10</b>	<b>0-19</b>	<b>0-50</b>	<b>0-99</b>	<b>0-199</b>	<b>Total</b>	Kindergarten	2		0				2	Grade 1		1	0	0			1	Grade 2				0	1	2	2	Grade 3						0	0	<b>Grand Total</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>SID</b>	<b>645</b>	<b>337</b>			<b>128</b>	<b>993</b>				<b>805</b>					<b>284</b>			<p>questions asked in targeted number range.</p> <ul style="list-style-type: none"> <li>- Last tie breaker: Lower student support level.</li> </ul>	
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\* Interview 946 excluded because it was less than  $\frac{3}{4}$  completed.

## Composition & Decomposition Sampling Plan

Data Display	Process	Rationale																																																																																
<p>Table 3</p> <p>Number of Composition &amp; Decomposition interviews by [grade level x number range] where number range is the most used number range for a given interview.</p> <table border="1" data-bbox="100 456 978 862"> <thead> <tr> <th colspan="8">Column Labels: Number Range</th> </tr> <tr> <th>Row Labels:</th> <th colspan="6"></th> <th>Grand</th> </tr> <tr> <th>Grade Level</th> <th>0-5</th> <th>0-10</th> <th>0-19</th> <th>0-50</th> <th>0-99</th> <th>0-199</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Kindergarten</td> <td>3</td> <td>1</td> <td>1</td> <td></td> <td></td> <td></td> <td>5</td> </tr> <tr> <td>Grade 1</td> <td></td> <td>3</td> <td>2</td> <td></td> <td></td> <td></td> <td>5</td> </tr> <tr> <td>Grade 2</td> <td></td> <td></td> <td>1</td> <td>2</td> <td>1</td> <td>1</td> <td>5</td> </tr> <tr> <td>Grade 3</td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>1</td> </tr> <tr> <td><b>Grand Total</b></td> <td><b>3</b></td> <td><b>5</b></td> <td><b>4</b></td> <td><b>2</b></td> <td><b>1</b></td> <td><b>1</b></td> <td><b>16</b></td> </tr> </tbody> </table>	Column Labels: Number Range								Row Labels:							Grand	Grade Level	0-5	0-10	0-19	0-50	0-99	0-199	Total	Kindergarten	3	1	1				5	Grade 1		3	2				5	Grade 2			1	2	1	1	5	Grade 3		1					1	<b>Grand Total</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>16</b>	<p>View distribution of most used number ranges across grade levels.</p>	<p>Determine the total number of interviews for each number range by grade level to view the distribution of potential proficiency levels across grade levels.</p> <p>Since Grade 3 students were selected to represent high proficiency Grade 2 students, Grade 3 students are counted with the Grade 2 students. For the purposes of this sampling plan, number range 0-199 has a total of two students in Grade 2 and number range 0-99 has a total of six students in Grade 2.</p>																
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## Properties of Operations Sampling Plan

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	<b>946</b>																																																																																																	
	<b>223</b>																																																																																																	

	Exclude interviews that were less than $\frac{3}{4}$ completed. No videos were excluded based on this criterion.	
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## Appendix B – Integrated Strategies Document: Relations<sup>1</sup>

### NRR.A.1. Comparison Core Concept

1. Comparison									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.1.a.	Compare two <b>quantities</b> to find which is more/less using matching and counting strategies.								
NRR.A.1.b.	Compare two unspecified weights using balances to find which weighs more/less.								
NRR.A.1.c.			Compare two <b>quantities</b> to find which is more/less using mental images.						
NRR.A.1.d.	Compare two <b>numbers</b> using mental number lines to determine which is more/less.								
NRR.A.1.e.					Compare two <b>numbers</b> using written number lines to determine which is more/less.				
NRR.A.1.f.					Compare two <b>numbers</b> using open number lines to determine which is more/less.				
NRR.A.1.g.						Compare two <b>numbers</b> using symbols: >, <.			

<sup>1</sup> A.1.a, and A.1.b paper coded copies are missing.

NRR.A.1. Synthesis Data

**Unanticipated strategies: NRR.A.1.a-g**

Skill Code			A.1.a.	A.1.b.	A.1.c.	A.1.d.	A.1.e.	A.1.f.	A.1.g.
Unanticipated			-	-	-	<i>Value of Digits</i>			
SID	Grade	Number Range							
645	K	0-5	-	-	-	-	-	-	-
805	K		-	-	-	-	-	-	-
337	1	0-10	-	-	-	1	-	-	-
128	2	0-99	-	-	-	1	1	1	1
284	2	0-199	-	-	-	1	-	-	1
993	2		-	-	-	-	-	1	-
Strategies Total by Skill Code			0	0	0	3	1	2	2
Strategies Total by Core Concept: Value of Digits: 8									



Anticipated strategies: NRR.A.1.a-d

Skill Code			A.1.a.	A.1. b.		A.1. c.		A.1. d.
Anticipated Strategy			<i>Counting</i>	<i>Height</i>	<i>Weight</i>	<i>NME</i>	<i>Counting</i>	
SID	Grade	Number Range						
645	K	0-5	-	-	-	1	-	All
805	K		All	-	-	-	All	On
337	1	0-10	-	1	1		Groups	-
128	2	0-99	-	-	1	-	Skip (3)	-
284	2	0-199	Groups	-	-	-	Groups	-
993	2		Groups	1	-	-	Groups	-
Strategies Total by Skill Code			3	2	2	1	5	2

Anticipated strategies: NRR.A.1.e-g

Skill Code			A.1.e.			A.1.f.				A.1.g.		
Anticipated Strategy			<i>Written Number Line (WNL)</i>	<i>NME</i>	<i>Left to Right</i>	<i>Create WNL</i>	<i>Left to Right</i>	<i>NME</i>	<i>Counting</i>	<i>NME</i>	<i>Unknown Meaning of Inequality Symbols</i>	<i>Left to Right</i>
SID	Grade	Number Range										
645	K	0-5	-	1	-	-	-	1	-	-	1	-
805	K		-	-	-	1	-	-	All	1	-	-
337	1	0-10	Hashmarks	-	1	1	1	-	-	-	1	1
128	2	0-99	-	-	-	1	-	-	-	-	-	-
284	2	0-199	Intervals	-	-	1	1	-	0	-	-	-
993	2		Hashmarks , Intervals	-	1	1	-	-	-	-	1	-
Strategies Total by Skill Code			4	1	4	5	2	1	1	1	3	1
Strategies Total by Core Concept: Counting: 10; No Mathematical Evidence (NME): 4; Left to Right: 7												

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Compare two <b>quantities</b> to find which is more/less using <b>matching and counting strategies</b> .								

**Student Expectation**

Students are expected to use both matching and counting strategies to compare the quantity of clouds in images on cards. Students are expected to justify reasoning with examples of how they know there are (or are not) the same number of clouds, which may include adding the totals or counting groups.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Context.</i> Students compared the open spaces or on the cards rather than focusing on the quantity of clouds. The example provided demonstrates a child who used the house as a reference point for determining more/less.	<i>Well, I could tell that this one is more because it has more sides...and then there's more around the house than these (128, 9:19, 9:28).</i>
A.1.c. Compare two <b>quantities</b> to find which is more/less using <b>mental images</b> .	<i>Because it looks bigger than that one... because it has more clouds [child stated that Tuesday has more and looks bigger than Monday, but did not define Monday's quantity](337, 07:08- 07:20).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645)					
1		A.1.c. (337)				
2					Context (128)	-

Unanticipated strategies by grade level and number range for NRR.A.1.a.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Count all (805)					
1		-				
2					-	Count groups (284, 993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.1.a. activity

NRR.A.1.a. Anticipated Strategies

<b>NRR.A.1.a.</b>	Compare o <b>quantities</b> to find which is more/less using <b>matching and counting strategies</b> .	
<b>Content Question</b>	(1) Find a day where Carla saw less clouds than she saw on Sunday. (2) Find a day where Carla saw more clouds than she saw on Sunday.	
<b>Reasoning Question</b>	Can you tell me or show me how you decided that this picture has more/less?	
<b>Anticipated Skills</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A1a_E_NOT-Cards	Pictures of groups of clouds are embedded into the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	Square tiles	Colored square tiles as counters
	Linking cubes	Linking cubes as counters
	Fingers	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	A1a_A_General tool	Child uses a general tool as listed above.
	A1a_A_Count all	Child counts all clouds individually. [Counting]
	A1a_A_Count by 2s	Counting. Child counts clouds in groups of 2; (“2, 4, 6, 8”) [Counting]
	A1c_A_One to one (Individuals)	Child pairs each cloud on one card with a cloud on other card. [One-to-One correspondence of individual objects]
	A1c_A_One to one (Groups)	Child pairs each group of clouds on one card with a group of clouds on other card. [One-to-One correspondence of Groups of objects]
	A1c_A_Count pairs	Child counts pairs of corresponding clouds on each card (“1, 2, 3, 4”) [Counting].
	Count Groups	Child counts number of groups to compare, not attending to individual clouds.
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.
<b>NRR Essentialized Skill Statements</b>	Other NRR Skill Codes	NRR.C.8.a, NRR.C.8.b, NRR.C.8.c

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Compare two <b>unspecified weights</b> using balances to find which weighs more/less.								

**Student Expectation**

Students are expected to use a physical balance and explain how to determine one side weighs more than the other side. Students may use terms such as up/down, heavier/lighter, or tipping to describe the balance in regards to the height of a side and/or the weight of a side.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Size.</i> Child did not refer to the balance. Instead child referred to the size of the objects.	[The bear] <i>is bigger ...</i> [The cup] <i>is little.</i> (805, 3:53, 4:22).

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645) Size (805)					
1		-				
2					-	Skipped (284)

Unanticipated strategies by grade level and number range for NRR.A.1.b.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		Height (337) Weight (337)				
2					Weight (128)	Height (993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.1.b. activity.

NRR.A.1.b. Anticipated Strategies

<b>NRR.A.1.b.</b>	Compare two <b>unspecified weights</b> using balances to find which weighs more/less.	
<b>Content Question</b>	(1) Which object weighs the most? (2) Which object weighs the least?	
<b>Reasoning Question</b>	NOT REQUIRED	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>A1b_E_NOT-Balance</i>	Different objects to check their weights using the given balance. (e.g., cube, toy, tape, paper clip, cup)
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>A1b_A_Weight</i>	<i>Child directly focuses on weight of each object and tells which object is heavier than other object</i>
	<i>A1b_A_Height</i>	Child first describes the position of balance (one side up other side down) then may links the position to the weight of the object. (It's not necessary to link height with weight)
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Other NRR Skill Codes</i>	

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
		Compare two <b>quantities</b> to find which is more/less using <b>mental images</b> .						

**Student Expectation**

Students are expected to use mathematical reasoning and/or counting strategies to compare the quantity of clouds in images on cards. Students are expected to justify reasoning with examples of how they know there are (or are not) the same number of clouds, which may include adding the totals or counting groups.

**Unanticipated Strategies**

<i>Unanticipated Strategy. Justification/Description</i>	<b>Examples</b>
<i>B.5.b. Compose a number with two parts.</i>	<i>...this one's four and then you ot two more, its six (337, 10:08).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	-					
<b>1</b>		B.5.b. (337)				
<b>2</b>					-	-

Unanticipated strategies by grade level and number range for NRR.A.1.c.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Count all (805) General tools (805) NME (645)					
<b>1</b>		Count groups (337)				
<b>2</b>					Count groups (128) Compare groups (128)	Count groups (284, 993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.1.c. activity.

NRR.A.1.c. Anticipated Strategies

<b>NRR.A.1.c.</b>	Compare two <b>quantities</b> to find which is more/less using <b>mental images</b> .	
<b>Content Question</b>	Is he/she correct? Why or why not?	
<b>Reasoning Question</b>	Already embedded in content question.	
<b>Anticipated Skills</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>A1c_E_NOT-Cards</i>	Pictures of groups of clouds are embedded into the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>A1c_A_General tool</i>	Child uses a general tool as listed above.
	<i>A1c_A_Count all</i>	Child counts all clouds individually. [Counting]
	<i>A1c_A_Count by 2s</i>	Counting. Child counts clouds in groups of 2; (“2, 4, 6, 8”) [Counting]
	<i>A1c_A_One to one (Individuals)</i>	Child pairs each cloud on one card with a cloud on other card. [One-to-One correspondence of individual objects]
	<i>A1c_A_One to one (Groups)</i>	Child pairs each group of clouds on one card with a group of clouds on other card. [One-to-One correspondence of Groups of objects]
	<i>A1c_A_Count pairs</i>	Child counts pairs of corresponding clouds on each card (“1, 2, 3, 4”) [Counting].
	<i>Count groups</i>	Child counts the number of groups on the card.
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.
<b>NRR Essentialized Skill Statements</b>	<i>Other NRR Skill Codes</i>	NRR.C.8.a, NRR.C.8.b, NRR.C.8.c

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Compare two <b>numbers</b> using <b>mental number lines</b> to determine which is more/less.								

**Student Expectation**

Students are expected to recognize numbers and their value using number cards. Students are then expected to determine which numbers have greater value and compare multiple numbers in a row.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Value of digits.</i> Children compared the value of digits within numbers without explicitly using place value. Children correctly aligned numbers in the tens and ones places when comparing without explaining place value or providing a unit value distinction between the two numbers.	<p>[Comparing 42 with 44 and 37 with 42]. <i>Because 2 is less than 4...because 3 is less than 4</i> (128, 15:47).</p> <p>[Comparing 37 with 42]. <i>Because it's (37) the first number you come to before 40 and 60</i> (284, 09:36).</p> <p>[Comparing 5 and 7]. <i>Because whenever I look at the numbers, 5 is on over here and 7 is more up, that its more further</i> (337, 11:09).</p>
A.3.e. Order three numbers using number relationships without tools.	<i>Because it's the first number you come to before 40 and 60</i> (284, 09:36).

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		Value of digits (337)				
2					Value of digits (128)	Value of digits (284) A.3.e. (284)

Unanticipated strategies by grade level and number range for NRR.A.1.d.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	General tool (645, 805) Count all (645) Count on (805)					
1		=				
2					=	-

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.1.d. activity.



NRR.A.1.d. Anticipated Strategies

<b>NRR.A.1.d.</b>	Compare two <b>numbers</b> using <b>mental number lines</b> to determine which is more/less.	
<b>Content Question</b>	<p>(1) Is [number for Monday] more or less than [number for Sunday]?</p> <p>(2) She saw [number for Tuesday] butterflies on Tuesday [hold the Tuesday card]. Is that more or less than [number for Sunday]?</p> <p>(3) She saw [number for Wednesday] butterflies on Wednesday [hold the Wednesday card]. Is that more or less than [number for Sunday]?</p>	
<b>Reasoning Question</b>	How do you know that [student's response number] is greater/less than [number]?	
<b>Anticipated Skills</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>A1d_E_NOT-Cards</i>	No physical tools were embedded. Students were expected to use mental number line.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>A1d_A_Place Value</i>	<i>Child uses Ones, Tens, , and hundreds places to compare number.</i>
	<i>A1d_A_No. of digits</i>	<i>Child compare number of digits in each numbers.</i>
	<i>A1d_A_Symbolic</i>	<i>Child recognizes symbolic representation of numbers without associating pictorial representation</i>
	<i>Counting</i>	Count on or count all when using a general tool as concrete representation of numbers
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.
<b>NRR Essentialized Skill Statements</b>	<i>Other NRR Skill Codes</i>	

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
			Compare two <b>numbers</b> using <b>written number lines</b> to determine which is more/less.					

**Student Expectation**

Students are expected to determine where on a written number line two given numbers are placed. Students are then expected to determine based on their placement and relationship to the other number on the number line, which number is greater.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Value of digits.</i> Children compared the value of digits within numbers without explicitly using place value. Children correctly aligned numbers in the tens and ones places when comparing without explaining place value or providing a unit value distinction between the two numbers.	[Comparing 48 with 24]. <i>Everyone knows that 2 is less than 4 and 8 is more than 4 as well (128, 19:20).</i>
A.2.a. Without counting, use tools to find a unit more/less than a given number.	<i>Because its 10 below 130 (993, 11:20).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-				
2					Value of digits (128)	A.2.a. (993)

Unanticipated strategies by grade level and number range for NRR.A.1.e.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645) Count all (805)					
1		Hashmarks (337) LTR (337)				
2					Hashmarks (128)	Intervals (284, 993) Hashmarks (993) LTR (993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.1.e. activity.

NRR.A.1.e. Anticipated Strategies

<b>NRR.A.1.e.</b>	Compare two <b>numbers</b> using <b>written number lines</b> to determine which is more/less.	
<b>Content Question</b>	<p>(1) Rene saw [number]stars at night. [Show card for Rene.] Rene wants to put her number on this number line. Can you show me where you would put this number on the number line? [Place the card on the number line.] <i>Can you tell me why you put it here?</i></p> <p>(2) Olivia saw [number]stars at night. [Show card for Olivia.] Can you show me where you would put this number on the number line? [Place the card on the number line.] <i>Can you tell me why you put it here?</i></p> <p>(3) Which person saw more stars? <i>How do you know that [Olivia saw more than Rene OR Rene saw more than Olivia]?</i></p> <p>(4) Can you tell me a number of stars that is less than [Rene’s number]? How do you know that [student’s response] is less than [Rene’s number]?</p>	
<b>Reasoning Question</b>	Reasoning questions (italicized questions) are included in each content question row.	
<b>Anticipated Skills</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A1e_E_NOT-Written Number Line	Written number line (with intervals marked) is embedded in the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	Square tiles	Colored square tiles as counters
	Linking cubes	Linking cubes as counters
	Fingers	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	A1e_A_Intervals	Child uses only marked intervals on the number line.
	A1e_A_Hash Marks	Child uses hash marks on the number line.
	A1e_A_Unit Places	<i>Child uses unit, tenth, hundred places to compare numbers</i>
	A1e_A_Digits	<i>Child compare number of digits in each numbers.</i>
	LTR	<i>Left to right reading of numbers and ordering across number line</i>
	Counting	<i>Count all or on, students use counting strategies when comparing numbers and ordering</i>
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.
<b>NRR Essentialized Skill Statements</b>	Other NRR Skill Codes	

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
			Compare two <b>numbers</b> using <b>open number lines</b> to determine which is more/less.					

**Student Expectation**

Students are expected to place numbers in order on an open number line (ONL) from while attending to an approximate distance between numbers to determine which number is more/less.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Value of digits.</i> Child compared the value of digits within numbers without explicitly using place value. While it could be inferred that place value is part of the child’s rationale, the child did not use terminology to indicate an understanding.	[Comparing 54 and 40] <i>Because four is less than five and well, it’s a zero so four is more than zero</i> (128, 22:20).  [Explaining why 50 is less than 54] <i>‘Cause 50 has a 0 right here and not a 4, and 0 is less than 4</i> (993, 13:34).

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-				
2					Value of digits (128)	Value of digits (993)

Unanticipated strategies by grade level and number range for NRR.A.1.f.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645) Create WNL (805) General tool (805) Count all (805)					
1		Magnitude (337) Create WNL (337) Friendly numbers (337) LTR (337)				
2					Create WNL (128)	ONL (993) Create WNL (284, 993) LTR (284)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.1.f. activity.

NRR.A.1.f. Anticipated Strategies

<b>NRR.A.1.f.</b>	Compare two <b>numbers</b> using <b>open number lines</b> to determine which is more/less.	
<b>Content Question</b>	<p>(1) The next night, Rene saw [number]stars at night. [Show card for Rene.] Now, she wants to put her number on this number line. Can you show me where you could put this number on the number line? [Place the card on the number line.]</p> <p>(2) Olivia saw [number]stars at night. [Show card for Olivia.] Can you show me where you would put this number on the number line?[Place the card on the number line.]</p> <p>(3) Who saw more stars? How do you know that [Olivia saw more than Rene OR Rene saw more than Olivia]?</p> <p>(4) Can you tell me a number of stars that is less than [Rene’s number]? How do you know that [student’s response] is less than [Rene’s number]?</p>	
<b>Reasoning Question</b>	Reasoning questions (italicized questions) are included in each content question row.	
<b>Anticipated Skills</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>A1f_E_NOT-Cards</i>	Open number lines embedded in the activity.
<b>General Mathematical Tools</b>	<p>These tools are located under Mathematical Tools &gt; a_Type of Tool</p> <p>If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.</p>	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>A1f_A_Use Unmarked Numbers</i>	Child uses unmarked number line.
	<i>A1f_A_Create WNL</i>	Child marks numbers on the open number line to use it.
	<i>A1f_A_Magnitude</i>	Child focus on the distance between numbers taken into consideration
	<i>A1f_A_Order</i>	Child places smaller numbers on Left side and larger numbers on Right side of the number line
	<i>A1f_A_Jumps</i>	Child marks arcs to show “jump” between numbers (usually associated with skip counting)
	<i>A1f_A_Friendly Numbers</i>	Child marks the open number line with friendly number (e.g., 0, 5, 10 etc.).
	<i>LTR</i>	<i>Left to right reading of numbers and ordering across number line</i>
	<i>Counting</i>	<i>Count all or on, students use counting strategies when comparing numbers and ordering</i>
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.
<b>NRR Essentialized Skill Statements</b>	<i>Other NRR Skill Codes</i>	If a child does show another number, consider skill statements in core concept 8.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
					Compare two <b>numbers</b> using symbols: >, <.			

**Student Expectation**

Students are expected to use inequality symbols to express which number of two given numbers is the greatest. Students are expected to place the inequality symbol correctly between two numbers of different values.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Value of digits.</i> Children compared the value of digits within numbers without explicitly using place value. Children correctly aligned numbers in the tens and ones places when comparing without explaining place value or providing a unit value distinction between the two numbers.	[Comparing 130 and 196] <i>Because there's a nine and a six and three is less than nine and zero is less than six (128, 23:40).</i>  <i>Because it's greater than 90 and it has a 6 and it's greater than 0. And 9 is greater than 3 (284, 17:29).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	-					
<b>1</b>		-				
<b>2</b>					Value of Digits (128)	Value of Digit (284)

Unanticipated strategies by grade level and number range for NRR.A.1.g.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Unknown meaning (645) NME (805)					
<b>1</b>		LTR (337) Unknown meaning (337)				
<b>2</b>					-	Unknown meaning (993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.1.g. activity.

NRR.A.1.g. Anticipated Strategies

<b>NRR.A.1.g.</b>	Compare two <b>numbers</b> using symbols: >, <.	
<b>Content Question</b>	(1) Who saw more stars? (2) Can you use one of these symbols [show symbol cards] to show that [student's response]?	
<b>Reasoning Question</b>	How do you know that [student's response] saw more stars?	
<b>Anticipated Skills</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A1g_E_NOT- (>,<) Symbols	Greater than and Lesser than symbols (>, <).
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	Square tiles	Colored square tiles as counters
	Linking cubes	Linking cubes as counters
	Fingers	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	A1g_A_Unknown Meaning	Child doesn't know how to use >,< symbols to compare numbers, but has seen them and/or is willing to interact with them
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.
<b>NRR Essentialized Skill Statements</b>	Other NRR Skill Codes	NRR.A.1.d(Mental Number Line), NRR.A.1.e(Written Number Line), NRR.A.1.f(Open Number Line),

## NRR.A.2. Ordinality Core Concept

2. Ordinality									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.2.a.		Without counting, use tools to find a unit more/less than a given number.							
NRR.A.2.b.		Without calculating, mentally find a <b>unit</b> more/less than a given <b>number</b> .							

## NRR.A.2. Synthesis Data

### Unanticipated strategies: NRR.A.2.a-b

Skill Code			A.2.a.	A.2.b.
<b>Unanticipated</b>			<i>Counting</i>	
SID	Grade	Number Range		
645	K	0-5	-	-
805	K		-	-
337	1	0-10	-	On
128	2	0-99	All	Down
284	2	0-199	All	Down, On
993	2		-	-
Strategies Total by Skill Code			2	4

### Anticipated strategies: NRR.A.2.a-b

Skill Code			A.2.a.		A.2.b.
<b>Anticipated Strategies</b>			<i>100s Chart</i>	<i>Counting</i>	-
SID	Grade	Number Range			
645	K	0-5	-		-
805	K		-	All, On	-
337	1	0-10	1		-
128	2	0-99	1		-
284	2	0-199	1		-
993	2		1		-
Strategies Total by Skill Code			4	2	0



**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Without counting, use tools to find a unit more/less than a given number.								

**Student Expectation**

Students are expected to use a hundreds-chart to find a given number. Then students are expected to use the number chart to find 1 less, 1 more, 10 more, and 10 less than the given number. Students may or may not count out the numbers in between.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Count all.</i> Children counted numbers on the chart to find the number ten more or less than the starting number. It was anticipated for children to use units, number lines or embedded tools and instead counted numbers to find the answer.	[Explaining how child knows a number is ten more] ... <i>we just start counting. One, two, three, four, five, six, seven, eight, nine</i> (128, 27:17).  <i>Because I counted 10 and ended up at 97</i> (284, 21:01). <i>10 more, you count 10 out and see what number you end up on</i> (284, 22:04).

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-				
2					Count all (128)	Count all (284)

Unanticipated strategies by grade level and number range for NRR.A.2.a.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645) Count all (805) Count on (805)					
1		100's chart (337)				
2					100's chart (128)	100's chart (284, 993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.2.a. activity.

NRR.A.2.a. Anticipated Strategies

<b>NRR.A.2.a.</b>	Without counting, use tools to find a unit more/less than a given number.	
<b>Content Question</b>	(1) Can you show me where [number] is on the chart? (2) What number is 1 less than [number]? <i>How do you know it is one less?</i> (3) What number is 1 more than [number]? (4) What number is 10 more than [number]? <i>How do you know it is 10 more?</i> (5) What number is 10 less than [number]?	
<b>Reasoning Question</b>	Reasoning questions (italicized questions) are included in each content question row.	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>		Since ESs explicitly states "Use Tools", code activities based on which tool was used and how
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>A2a_A_WNL</i>	Child uses Written Number Line (WNL) to answer the question.
	<i>A2a_A_MNL</i>	Child uses Mental Number Line (MNL) to answer the question.
	<i>A2a_A_ONL</i>	Child uses Open Number Line (ONL) to answer the question.
	<i>100's chart</i>	Student uses 100's chart to answer the question
<b>A different way</b>	100s Chart	<ul style="list-style-type: none"> <li>Child uses 100s chart to answer the question.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Other NRR Skill Codes</i>	If a child does show another number, consider skill statements in core concept 8.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Without <b>calculating</b> , mentally find a <b>unit</b> more/less than a given <b>number</b> .								

**Student Expectation**

Students are expected to find 1 more, 2 less, and 10 more than a given number using mental strategies and counting. No hundreds-chart provided.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Count on.</i> Children counted on from a starting number, saying each number to arrive at the number ten more. While they may have employed a number line strategy, they relied heavily on counting single units.	[Explaining that ten is one more than eight] ... <i>if you count up from one, its nine. Then you skip nine it's gonna be ten</i> (337, 22:28). <i>So that would be... 92, 93.[counting], 99, 100</i> (284, 25:03).
<i>Count down.</i> Children counted backward from a starting number, saying each number to arrive at the number ten less. Some children counted aloud and others wrote the numbers to count down, writing first the ones then the tens place.	<i>90... and 89, 88... 87, 86... 85, 84, 83</i> (284, 24:46-24:59). <i>Like, the numbers that are before 92</i> [writes out numbers RTL, ones then tens] <i>82</i> (128, 31:41-32:57).
<i>Value of digits.</i> Children compared the value of digits within numbers without explicitly using place value. Children correctly aligned numbers in the tens and ones places when comparing without explaining place value or providing a unit value distinction between the two numbers.	[Interviewer describes] <i>you were writing these numbers from right to left and ... filling in those numbers... fill in first then ones, then the tens place, right?</i> [student nods affirmative] (128:33:01). <i>When it's 10 less than a number, usually the first number goes 1 down and the next number stays the same</i> (993, 22:10).

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	-					
<b>1</b>		Count on (337)				
<b>2</b>					Count down (128)	Value of Digits (993) Count down (284) Count on (284) Calculating (284)

Unanticipated strategies by grade level and number range for NRR.A.2.b.

<b>Grade</b>	<b>0-5</b>	<b>0-10</b>	<b>0-19</b>	<b>0-50</b>	<b>0-99</b>	<b>0-199</b>
<b>K</b>	General tool (805) NME (645)					
<b>1</b>		-				
<b>2</b>					-	

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.2.b. activity.

NRR.A.2.b. Anticipated Strategies

<b>NRR.A.2.b.</b>	Without <b>calculating</b> , mentally find a <b>unit</b> more/less than a given <b>number</b> .	
<b>Content Question</b>	(1) Please find 1 more than the number ____. (2) Please find 2 less than the number ____. (3) Please find 10 more than the number ____. (4) Please find 10 less than the number ____. (5) Please find 100 more than the number _____.	
<b>Reasoning Question</b>	Please show me in pictures, words, or numbers how you found _____.	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A2b_E_NOT- ???	No tools embedded, and use of any tool is not anticipated for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	A2a_A_Calculating	Child use calculation strategy to find a number more/less.
	A2a_A_Mental Number Line	Child uses mental number line to find a unit more/less.
<b>A different way</b>	Any Other Tool	<ul style="list-style-type: none"> <li>Use of any other strategy/tool (other than Counting and Mental Number Line) will be Unanticipated.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Other NRR Skill Codes</i>	If a child does show another number, consider skill statements in core concept 8.

NRR.A.3. Transitivity Core Concept

3. Transitivity									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.3.a.	Compare two unspecified lengths (a) and (b) to a given reference length (c) to determine which is longer/shorter (a) or (b).								
NRR.A.3.b.	Order unspecified quantities in a <b>word problem</b> .								
NRR.A.3.c.					Order three unspecified weights using balances.				
NRR.A.3.d.					Order three <b>numbers</b> using number relationships with tools.				
NRR.A.3.e.					Order three <b>numbers</b> using number relationships without tools (i.e., mental strategies).				
NRR.A.3.f.					Order three numbers in a <b>word problem</b> .				

NRR.A.3. Synthesis Data

Unanticipated strategies: NRR.A.3.a-f

Skill Code			A.3.a.	A.3.b.	A.3.c.	A.3.d.	A.3.e.	A.3.f.
Unanticipated			<i>Visual</i>	-	-	<i>A.3.e.</i>	<i>Number of Digits</i>	
SID	Grade	Number Range						
645	K	0-5	-	-	-	-	-	-
805	K		1	-	-	-	-	-
337	1	0-10	-	-	-	-	-	-
128	2	0-99	1	-	-	1	1	1
284	2	0-199	-	-	-	-	-	-
993	2		-	-	-	1	1	-
Strategies Total by Skill Code			2	0	0	2	2	1
Strategies Total by Core Concept: Number of Digits = 3								

**Anticipated strategies: NRR.A.3.a-c**

Skill Code			A.3.a.		A.3.b.			A.3.c.			
Anticipated Strategies			Cover	Align End and Mark with Finger	Draw Pictures	NME	Multiple Comparisons	Height	Weight	NME	
SID	Grade	Number Range									
645	K	0-5	1	-	-	1	-	-	-	-	1
805	K		1	-	1	-	-	-	-	-	1
337	1	0-10	-	1	1	-	1	1	1	1	-
128	2	0-99	-	-	1	-	-	-	-	1	-
284	2	0-199	-	1	1	-	1	-	1	1	-
993	2		-	1	-	-	1	1	1	1	-
Strategies Total by Skill Code			2	3	4	1	3	2	3	4	4

**Anticipated strategies: NRR.A.3.d-f**

Skill Code			A.3.d.		A.3.e.		A.3.f.		
Anticipated Strategies			NME	Tools	Number Relationship	NME	A.3.e.		
SID	Grade	Number Range							
645	K	0-5	1		-	-	1	1	-
805	K		1		-	-	1	1	-
337	1	0-10	-	Blank 100's Chart	1	1	-	-	-
128	2	0-99	-		-	1	-	-	1
284	2	0-199	-	100's Chart	1	1	-	-	1
993	2		-		-	1	-	-	1
Strategies Total by Skill Code			2	2	2	4	2	2	3
Strategies Total by Core Concept:			Multiple Comparison = 5;		No Mathematical Evidence = 11;				
			Number Relationship = 6						

**Essentialized Skill Statement**

3. Transitivity									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.3.a.	Compare two unspecified <b>lengths</b> (a) and (b) to a given reference length (c) to determine which is longer/shorter (a) or (b).								

**Student Expectation**

children were expected to compare length of two objects (two pencils in this case) with a reference to the length of third object (felt strip in this case) and identify which object is longer and which one is shorter.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Visual.</i> If a student didn't use the felt strip as intended but used his/her visual observation to compare the length of two objects, this is an unanticipated strategy to solve this problem.	<p><i>I know it. I know this thing. I don't think about it but I see it (805, 34:53).</i></p> <p><i>Because it looks more longer than this one and this one looks shorter than this one (128, 36:49).</i></p>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Visual (805)					
<b>1</b>		-				
<b>2</b>					Visual (128)	-

Unanticipated strategies by grade level and number range for NRR.A.3.a

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Cover (805,645)					
<b>1</b>		Align End & Mark w/finger (337)				
<b>2</b>					Use Middle and Mark w/Pen (128)	Align End & Mark w/finger (993, 284)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.3.a activity.



NRR.A.3.a. Anticipated Strategies

<b>NRR.A.3.a.</b>	Compare two unspecified <b>lengths</b> (a) and (b) to a given reference length (c) to determine which is longer/shorter (a) or (b).	
<b>Content Question</b>	Which pencil is longer?	
<b>Reasoning Question</b>	How do you know that this pencil is longer?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A3a_E_NOT- Felt Strip	A felt strip to measure length of pencils
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	A3a_A_End	Child measures pencils by aligning end of the felt strip to an end of each pencil.
	A2a_A_Middle	Child measures pencils using middle of the felt strip.
	A2a_A_Mark	Child marks the felt strip either by holding with fingers or using a marker.
	Cover	Child covers
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	Other NRR Skill Codes	

**Essentialized Skill Statement**

3. Transitivity									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.3.b.		Order unspecified quantities in a <b>word problem</b>							

**Student Expectation**

Children were expected to compare three unspecified quantities given in a word problem and identify which one of the three quantities is largest and which one is smallest.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
In the selected data, no evidence of unanticipated strategies were found.	N/A

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-				
2					-	-

Unanticipated strategies by grade level and number range for NRR.A.3.b.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Draw Pictures (805) NME (645)					
1		Draw Pictures (337) Multiple Comparison (337)				
2					Draw Pictures (128)	Draw Pictures (284) Multiple Comparison (284, 993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.3.b. activity.

NRR.A.3.b. Anticipated Strategies

<b>NRR.A.3.b.</b>	Order unspecified <b>quantities</b> in a <b>word problem</b> .	
<b>Content Question</b>	Who has the most candy?	
<b>Reasoning Question</b>	Please use words, pictures, or numbers to show how you figured out that ___ has the most candy.	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A3b_E_NOT-	No tools embedded
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>Draw Pictures</i>	Student draw pictures of candies or bags
	<i>Creates Example</i>	Child assigns number/quantities for each person's bag to determine order. <i>(If child creates example then must code NRR.A.3.d and NRR.A.3.e)</i>
	<i>Multiple Comparison</i>	Student compares two objects in set of three, repeating the strategy until all objects are compared to one another two at a time.
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Other NRR Skill Codes</i>	NRR.A.3.d and NRR.A.3.e

**Essentialized Skill Statement**

3. Transitivity									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.3.c.				Order three unspecified <b>Weights</b> using balances.					

**Student Expectation**

children were expected to compare unspecified weights of three objects shown on pictures of a balance and identify which one of the three objects have most weight (heaviest) and least weight (lightest).

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Story.</i> Student showed another example (which was not expected/asked) to explain the comparison of unspecified weights and to justify his/her response to the given problem.	When interviewer asked “Ben thinks bear is heaviest, how you would help Ben understand if he is right or wrong”, student created another example and changed the position of sides of the balance and explained that if this new situation occurs then Ben will be right, and with current scenario Ben is wrong (993, 27:40)
<i>Personal Experience.</i> Student connect the given problem with personal experience of which object is heaviest and lightest.	Student compared the given situation of three stuffed animals on the balance with his/her personal experience with stuffed toys. Student expressed that sometimes I weight my stuffed animals and for some reason the toy cat is heaviest, it might be because of different materials (128, 44:19 – 45:16).
<i>Labeling.</i> Student label three unspecified weight objects as 1 <sup>st</sup> , 2 <sup>nd</sup> , and 3 <sup>rd</sup> , to mark which object is heaviest and which one is lightest.	Student labeled animals as 1 <sup>st</sup> and 2 <sup>nd</sup> on first balance and then labeled X and 2 <sup>nd</sup> on the second balance to represent which one is heavy on each balance, and concluded which two animals are heaviest in the two given scenarios (128, 43:27 – 44:01).

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-				
2					Story (128) Personal Experience (128) Labeling (128)	Another Way (993)

Unanticipated strategies by grade level and number range for NRR.A.3.c

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (805, 645)					
1		Weight (337) Height (337) Mult. Comparision (337)				
2					Weight (128) A.1.b. (128)	Weight (993, 284) Height (993, 284) Mult. Comparision (993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.3.c activity.

NRR.A.3.c. Anticipated Strategies

<b>NRR.A.3.c.</b>	Order three unspecified <b>weights</b> using balances.	
<b>Content Question</b>	(1) Which animal weighs the least? (2) Which animal weighs the most?	
<b>Reasoning Question</b>	Ben thinks the bear is the heaviest item. How would you help him understand if he is right or wrong?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>A3c_E_NOT- Pictures of a balance</i>	Pictures of the balance embedded into the activity
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>A3c_A_Weight</i>	<i>Child directly focuses on weight of each object and tells which object is heavier/lighter than other object.</i>
	<i>A3c_A_Height</i>	Child first describes the position of balance (one side up other side down, tilt) then may links the position to the weight of the object. (It's not necessary to link height with weight)
	<i>Multiple comparison</i>	Student compares two objects in set of three, repeating the strategy until all objects are compared to one another two at a time.
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Other NRR Skill Codes</i>	

**Essentialized Skill Statement**

3. Transitivity									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.3.d.							Order three <b>numbers</b> using <b>number relationships with tools</b> .		

**Student Expectation**

Using number relationships and a mathematical tool (e.g., number line and hundreds chart), students were expected to compare three given numbers and arrange them in an increasing order.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
A.3.e. Order three numbers using number relationships without tools (i.e., mental strategies).	[Child selected 146 and placed to the right of 120] <i>Because it's more than 120</i> (128, 46:33- 46:50).  [Interviewer asked if child wanted to use tools to order numbers] <i>No</i> [child correctly ordered numbers] (993, 29:12- 29:33).

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-				
2					A.3.e. (128)	A.3.e. (993)

Unanticipated strategies by grade level and number range for NRR.A.3.d

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (805, 645)					
1		Number Relationship (337) Blank 100s Chart (337)				
2						100s Chart (284) Number Relationship (284)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.3.d activity.

NRR.A.3.d. Anticipated Strategies

<b>NRR.A.3.d.</b>	Order three <b>numbers</b> using <b>number relationships with tools</b> .	
<b>Content Question</b>	Can you put the numbers in order from least to greatest? Here are some tools you can use. [Show the hundreds chart and number line.] Which number is least? Which number is greatest?	
<b>Reasoning Question</b>	Reasoning question listed in protocol does not aid in alignment for this skill code.	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>A3d_E_NOT- Number line &amp; 100's Chart</i>	Number line and 100's chart are embedded in the activity and students are expected to use only embedded tools to answer the question.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>A3d_A_WNL</i>	Child uses Written Number Line (WNL) to answer the question.
	<i>A3d_A_MNL</i>	Child uses Mental Number Line (MNL) to answer the question.
	<i>A3d_A_ONL</i>	Child uses Open Number Line (ONL) to answer the question.
	<i>Number relationships</i>	Child uses language of relationship like less/more, smaller/bigger, left/right
<b>A different way</b>	Written 100s Chart Blank 100s Chart	<ul style="list-style-type: none"> <li>Child uses 100s chart to answer the question (written or blank)</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Core Concept #</i>	If a child does show another number, consider skill statements in core concept 8.
	<i>Other NRR Skill Codes</i>	
	<i>Non-NRR Skill Codes</i>	



**Essentialized Skill Statement**

3. Transitivity									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.3.e.				Order three <b>numbers</b> using number relationships <b>without tools</b> (i.e., mental strategies).					

**Student Expectation**

Using number relationships (Without Mathematical Tools), students were expected to compare three given numbers and arrange them in an increasing order. In this activity, it is explicit to Not use any mathematical tool.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Number of Digits.</i> Students focused on the number of digits on each card to identify the value of the number on the card. It is different from place value concept because students didn't refer to place value or compare digits at a specific place value on each card. Additionally, we didn't have a concept of place value in Relations protocol.	<i>Because these [points to 76] have two digits, these [pointing to 100 and 103] have three (128, 49:58).  Cause this [points to 76] has two numbers and this one [points to 100] has three, so I knew that this one [76] would go before this one [100] (993, 31:33).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-				
2					Number of Digits (128)	Number of Digits (993)

Unanticipated strategies by grade level and number range for NRR.A.3.e

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645, 805)					
1		Number Relationship (337)				
2					Number Relationship (128)	Number Relationship (284, 993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.3.e activity.

NRR.A.3.e. Anticipated Strategies

<b>NRR.A.3.e.</b>	Order three <b>numbers</b> using number relationships <b>without tools</b> (i.e., mental strategies).	
<b>Content Question</b>	Can you put the numbers in order from least to greatest? Which number is least? Which number is greatest?	
<b>Reasoning Question</b>	How do you know that these numbers are in order from least to greatest?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A3e_E_NOT-	No tools are embedded in the activity and use of any tool is not anticipated for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	A3e_A_MNL	Child uses Mental Number Line (MNL) to answer the question.
	A3e_A_Relationship	Child uses language of relationship like less/more, smaller/bigger, left/right
	A3e_A_Place Values	Child compares using 10s, and 100s place values.
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Other NRR Skill Codes</i>	

**Essentialized Skill Statement**

3. Transitivity									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.3.f.							Order three <b>numbers</b> in a <b>word problem</b> .		

**Student Expectation**

Students were given three numbers in a contextual situation, students were asked to place these numbers in order from least to greatest.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<p><i>Number of Digits.</i> Students focused on the number of digits on each card to identify the value of the number on the card. It is different from place value concept because students didn't refer to place value or compare digits at a specific place value on each card.                      Note: We did not have a concept of place value in Relations protocol.</p>	<p>Student said: "It tells me that, cause this one (pointing to 107) has three, and this one (pointing to 78) only has two (128, 53:12)</p>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-				
2					Number of Digits (128)	-

Unanticipated strategies by grade level and number range for NRR.A.3.f.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645, 805)					
1		Mental Number Line (337) A.1.d. (337)				
2					A.3.e. (128)	Place Value (993) A.3.e. (284, 993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.3.f. activity.

NRR.A.3.f. Anticipated Strategies

<b>NRR.A.3.f.</b>	Order three <b>numbers</b> in a <b>word problem</b> .	
<b>Content Question</b>	Dasia, Eli, and Fran are lining up for their soccer team picture. They need to line up from least to greatest by their jersey number. Can you put them in order from least to greatest? Which number is least? Which number is greatest?	
<b>Reasoning Question</b>	NOT NEEDED	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A3f_E_NOT- ???	No tools are embedded in the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
	<i>Draw Pictures</i>	Student draw pictures of candies or bags
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	A3d_A_WNL	Child uses Written Number Line (WNL) to answer the question.
	A3d_A_MNL	Child uses Mental Number Line (MNL) to answer the question.
	A3d_A_ONL	Child uses Open Number Line (ONL) to answer the question.
	<i>Place Value</i>	<i>Child uses Ones, Tens, , and hundreds places to compare number.</i>
<b>A different way</b>	Written 100s Chart Blank 100s Chart	<ul style="list-style-type: none"> <li>Child uses 100s chart to answer the question (written or blank)</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Core Concept #</i>	If a child does show another number, consider skill statements in core concept 8.
	<i>Other NRR Skill Codes</i>	
	<i>Non-NRR Skill Codes</i>	

NRR.A.4. Representation of Order in Comparison Situations Core Concept

4. Representations of Order in Comparison Situations									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.4.a.	Find how much more/less between two quantities using matching and counting strategies.								
NRR.A.4.b.	Find how much more/less between two quantities using tools.								
NRR.A.4.c.	Find how much more/less between two numbers in a word problem using tools.								
NRR.A.4.d.	Find how much more/less between two numbers in a word problem.								
NRR.A.4.e.	Compare two numbers to find which is [closest to/furthest from] a benchmark.								

NRR.A.4. Synthesis Data

Unanticipated strategies: NRR.A.4.a-e

Skill Code			A.4.a.		A.4.b.			A.4. c.			A.4.d.		A.4.e.
Unanticipated			NME		Focus on A.4.a. Answer	Tool Not Used for Problem-Solving		Unfounded	Counting		NME	Tool Not Used for Problem-Solving	
SID	Grade	Number Range											
645	K	0-5	1	1	-	-	-	-	-	-	-	-	
805	K		1	1	-	-	-	-	-	-	-	-	
337	1	0-10	-	-	1	1	1	-	-	-	-	-	
128	2	0-99	-	-	1	1	-	-	All	-	-	1	
284	2	0-199	-	-	-	1	-	1	-	On	1	-	
993	2		-	-	-	1	1	-	On	On	-	-	
Strategies Total by Skill Code			2	2	2	4	2	1	2	2	1	1	
Strategies Total by Core Concept: No Mathematical Evidence = 5; Counting = 4; Tool Not Used for Problem-Solving = 7													

Anticipated strategies: NRR.A.4.a-e

Skill Code			A.4.a.	A.4.b.	A.4.c.		A.4.d.	A.4.e.		
Anticipated Strategies			<i>Match groups</i>	<i>Count All</i>	-	NME	A.1.c.		<i>Open Number Line (ONL)</i>	NME
SID	Grade	Number Range								
645	K	0-5	-	-	-	1	-	1	-	1
805	K		-	-	-	1	-	-	-	1
337	1	0-10	1	-	-	-	1	1	1	-
128	2	0-99	-	1	-	-	-	-	1	-
284	2	0-199	1	1	-	-	-	-	-	-
993	2		1	1	-	-	-	-	-	-
Strategies Total by Skill Code			3	3	0	2	1	2	2	2
Strategies Total by Core Concept: No Mathematical Evidence = 4; A.1.c = 3										

**Essentialized Skill Statement**

<b>4. Representations of Order in Comparison Situations</b>									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.A.4.a.	Find how much more/less between two quantities using matching and counting strategies.								

**Student Expectation**

Understanding a given contextual situation, students were asked to compare two given quantities, identify which one is more/less, and find how much more/less between given quantities using matching and counting strategies.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Another Way.</i> Student showed another way (presented a possible solution) to the problem which was not anticipated. Student suggested how teacher could bring a group of 4 chairs to accommodate every group of four students until every child get a seat in the class.	Student said: "If the teacher bring more and four groups again, these four (students) got a chair, these four got a chair (pointed to another group of four students) and these four got a chair (pointed to another group of four students). Then if she bring two more, the whole class would have enough chairs.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645, 805)					
1		-				
2					-	Another way:balances (284)

Unanticipated strategies by grade level and number range for NRR.A.4.a.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		Match groups (337)				
2					Count all (128)	Count all (284, 993) Match groups (284, 993) B.5.c. (993)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.4.a. activity.

NRR.A.4.a. Anticipated Strategies

<b>NRR.A.4.a.</b>	<b>Find how much more/less between two quantities using matching and counting strategies.</b>	
<b>Content Question</b>	Can you show me how you could find out how many more children there are than chairs? How many more children are there than chairs?	
<b>Reasoning Question</b>	NOT NEEDED	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>A4a_E_NOT- Pictures of children and chairs</i>	Pictures of children and chairs (in groups) are embedded in the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>Match Groups</i>	Child matched groups to compare quantities as more/less
	<i>Counting</i>	Child counted all or individual items in the situation to compare quantities or prove as more/less
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Core Concept #</i>	If a child does show another number, consider skill statements in core concept 8.
	<i>Other NRR Skill Codes</i>	
	<i>Non-NRR Skill Codes</i>	



**Essentialized Skill Statement**

<b>4. Representations of Order in Comparison Situations</b>										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.A.4.b.	Find how much more/less between two <b>quantities</b> using <b>tools</b> .									

**Student Expectation**

Students were given pictures of children and chairs, it was expected that student will use mathematical tools to find how many children are more than the given number of chairs.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Tools Not Used for Problem Solving.</i> This is unanticipated category for the cases when students involve the given mathematical tool in their work but students did not use the tool for problem solving. For example, students used Number line but instead of using it to identify the magnitude between numbers they used it for writing numbers on it.	Student write each number up to 18 (that was total number of students in the problem) on the open number line (284, 44:57).  Student used 100's chart and marked 10 but again counted from 1 to 9 to identify there are 9 children (128, 56:45) .
<i>Focused on A.4.a. Answer.</i> Since NRR.A.4.a and NRR.A.4.b used same question but in A.4.b students were provided mathematical tools to figure out their answers, students didn't try to calculate or double-check their answer from A.4.a, instead, students focus on their previous answer and try to show the same answer using tools.	For NRR.A.4.b, student used the number 10 (that was miscalculated in NRR.A.4.a) and said "so there is 10 so there is at least one, two, three, four, five, six, seven, eight, and nine. Nine children that can seat in there" (128, 56:38)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	NME (645, 805)					
<b>1</b>		Focus on A.4.a. answer (337) Tool not used for problem solving (337)				
<b>2</b>					Tool not used for the problem solving (128) Focus on A.4.a. answer (128)	Tool not used for the problem solving (284, 993)

Unanticipated strategies by grade level and number range for NRR.A.4.b.

<b>Grade</b>	<b>0-5</b>	<b>0-10</b>	<b>0-19</b>	<b>0-50</b>	<b>0-99</b>	<b>0-199</b>
<b>K</b>						
<b>1</b>		Blank 100's chart (337)				
<b>2</b>						

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.4.b. activity.

NRR.A.4.b. Anticipated Strategies

<b>NRR.A.4.b.</b>	Find how much more/less between two <b>quantities</b> using <b>tools</b> .	
<b>Content Question</b>	Can you show me how you could find out how many more children there are than chairs? How many more children are there than chairs?	
<b>Reasoning Question</b>	NOT NEEDED	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A4b_E_NOT- Pictures of children and chairs	Pictures of children and chairs (in groups) are embedded in the activity.
<b>General Mathematical Tools</b>	<p style="text-align: center;">These tools are located under Mathematical Tools &gt; a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.</p>	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>Counting</i>	<i>Count all or on, students use counting strategies when comparing numbers and ordering</i>
	<i>Blank 100's chart</i>	Student uses 100's chart to answer the question
	<i>No. Relationships</i>	Child uses language of relationship like less/more, smaller/bigger, left/right
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Core Concept #</i>	If a child does show another number, consider skill statements in core concept 8.
	<i>Other NRR Skill Codes</i>	
	<i>Non-NRR Skill Codes</i>	

**Essentialized Skill Statement**

4. Representations of Order in Comparison Situations										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.A.4.c.		Find how much more/less between two numbers in a word problem using tools.								

**Student Expectation**

Students were given a contextual situation in a word problem, it was expected that student will use mathematical tools to find how much one number is more/less than the other number (i.e., how many children are more than the given number of chairs)

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Tools Not Used for Problem-Solving.</i> For this activity, mathematical tools (100's chart) were part of the skill code and it was anticipated that students will use 100's chart to identify that there are ---- number of more seats than ---- number of students.	Student put finger on number 23 and then count all (backward) to 1 to confirm there are 22 numbers. (128, 01:00:20 – 01:01:34)  Students did not use the given mathematical tool to solve the problem and said: "I pictured desks in my head and then I pictured people in them" (337, 44:38 – 44:42)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K						
1		Tools not used for problem-solving (337)				
2					Count all (128) Tools not used for problem-solving (128)	Tools not used for problem-solving (993) A.4.d (284) Unfounded (284) Count on (993)

Unanticipated strategies by grade level and number range for NRR.A.4.c.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (645, 805)					
1		A.1.c. Mental Image (337)				
2					-	-

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.4.c. activity.

NRR.A.4.c. Anticipated Strategies

<b>NRR.A.4.c.</b>	Find how much more/less between two <b>numbers</b> in a <b>word problem</b> using tools.	
<b>Content Question</b>	Is Fran right or wrong?	
<b>Reasoning Question</b>	How would you help Fran see if she is right or wrong?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>A4c_E_NOT- Blank 100's Chart</i>	Blank 100's number chart is embedded in the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	<del>Colored square tiles as counters</del>
	<i>Linking cubes</i>	<del>Linking cubes as counters</del>
	<i>Fingers</i>	<del>Fingers as counters</del>
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>100's chart</i>	Student uses 100's chart to answer the question
	<i>Counting</i>	<i>Count all or on, students use counting strategies when comparing numbers and ordering</i>
	<i>MNL</i>	Child uses Mental Number Line (MNL) to answer the question.
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Core Concept #</i>	If a child does show another number, consider skill statements in core concept 8.
	<i>Other NRR Skill Codes</i>	
	<i>Non-NRR Skill Codes</i>	

**Essentialized Skill Statement**

<b>4. Representations of Order in Comparison Situations</b>										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.A.4.d.			Find how much more/less between two <b>numbers</b> in a <b>word problem</b> .							

**Student Expectation**

Understanding a given contextual situation in a word problem, students were asked to compare two given numbers (amount of dollars) and identify which one amount is more and why.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
Count On: For this skill code, it was expected that students will use numbers relationship and computation to solve the given problem. It is unanticipated that students will use any Counting strategy here.	For the Mark and Jose money problem, student use Count On strategy and drew mark for Count On number to find who has more money. (993, 43:48)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1			-			
2					NME (128)	Count On (993, 284)

Unanticipated strategies by grade level and number range for NRR.A.4.d

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	A.1.c. (645) A.1.a. (805)					
1		A.1.c. (337)				
2						

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.4.d activity.

NRR.A.4.d. Anticipated Strategies

<b>NRR.A.4.d.</b>	Find how much more/less between two <b>numbers</b> in a <b>word problem</b> .	
<b>Content Question</b>	Mark has \$_. Jose has \$_. How many more dollars does Mark have than Jose?	
<b>Reasoning Question</b>	How do you know that Mark has _____ more dollars than Jose?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A4d_E_NOT- ???	No tool embedded in the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>Number relationships</i>	Child uses language of relationship like less/more, smaller/bigger, left/right
	<i>Counting</i>	<i>Count all or on, students use counting strategies when comparing numbers and ordering</i>
	<i>MNL</i>	Child uses Mental Number Line (MNL) to answer the question.
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Core Concept #</i>	If a child does show another number, consider skill statements in core concept 8.
	<i>Other NRR Skill Codes</i>	
	<i>Non-NRR Skill Codes</i>	

**Essentialized Skill Statement**

<b>4. Representations of Order in Comparison Situations</b>										
<b>Code</b>	<b>Kindergarten</b>			<b>Grade 1</b>			<b>Grade 2</b>			
	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	
NRR.A.4.e.			Compare two <b>numbers</b> to find which is [closest to / furthest from] a <b>benchmark</b> .							

**Student Expectation**

For this skill code, students were given a benchmark number and two other numbers to find which one of the two numbers is closest to the benchmark using an open number line.

Understanding a given contextual situation in a word problem, students were asked to compare two given numbers (amount of dollars) and identify which one amount is more and why.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<p><b>Tools Not Used for Problem Solving:</b> This is unanticipated category for the cases when students involve the given mathematical tool in their work but students did not use the tool for problem solving. For example, students used Number line but instead of using it to identify the magnitude between numbers they used it for writing numbers on it.</p> <p><b>Unfounded:</b> The student uses a reasoning that is incorrect (a logical fallacy), or guesses at the solution. Response may be partially or fully developed (Crawford et al., 2018). Student provided a logical explanation for the solution of given problem (which might be partially or fully incorrect) that make sense for student.</p>	<p>Student write each number up to 18 (that was total number of students in the problem) on the open number line (284, 44:57)</p> <p>Student used 100's chart and marked 10 but again counted from 1 to 9 to identify there are 9 children (128, 56:45)</p> <p>Student said: "I will go around the classroom (to count them) to see if they looks more than 85" (284, 47:03).</p>

<b>Grade</b>	<b>0-5</b>	<b>0-10</b>	<b>0-19</b>	<b>0-50</b>	<b>0-99</b>	<b>0-199</b>
<b>K</b>						
<b>1</b>						
<b>2</b>					Tools Not Used for Problem Solving (128)	Unfounded (993)

Unanticipated strategies by grade level and number range for NRR.A.4.e

<b>Grade</b>	<b>0-5</b>	<b>0-10</b>	<b>0-19</b>	<b>0-50</b>	<b>0-99</b>	<b>0-199</b>
<b>K</b>	NME (645, 805)					
<b>1</b>		ONL (337)				
<b>2</b>					ONL (128)	A.3.d. (284)

Anticipated strategies and skill codes used by grade level and number range for the NRR.A.4.e activity.



NRR.A.4.e. Anticipated Strategies

<b>NRR.A.4.e.</b>	Compare two <b>numbers</b> to find which is [closest to/furthest from] a <b>benchmark</b> .	
<b>Content Question</b>	Which number is closest to (#)? (#) or (#)? [# represent various numbers those were used based on the appropriate number ranges. For example, Which number is closest to 10? 7 or 12?]	
<b>Reasoning Question</b>	NOT NEEDED	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	A4d_E_NOT- ???	No tool embedded in the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>ONL</i>	Child uses the open number line to answer question without marking.
	<i>MNL</i>	Child uses Mental Number Line (MNL) to answer the question.
	<i>Create WNL</i>	Child marks numbers on the open number line to use it.
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b>	<i>Core Concept #</i>	If a child does show another number, consider skill statements in core concept 8.
	<i>Other NRR Skill Codes</i>	
	<i>Non-NRR Skill Codes</i>	

# Appendix C – Integrated Strategies Document: Composition and Decomposition

## NRR.B.5. Composition Core Concept

5. Composition									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.B.5.a.	Compose a <b>number</b> with <b>single</b> objects.								
NRR.B.5.b.	Compose a <b>number</b> with <b>two</b> parts.								
NRR.B.5.c.	Compose a <b>number</b> with <b>three or more</b> parts.								
NRR.B.5.d.	Compose a <b>number</b> with two or more parts using <b>different number combinations</b> .								
NRR.B.5.e.	Compose a <b>number</b> with two or more parts using <b>concepts of place value</b> .								

## NRR.B.5. Synthesis Data

### Unanticipated strategies: NRR.B.5.a-c

Skill Code			B.5.a.		B.5.b.			B.5.c.				
			C	Counting	C	Counting	Writing	C	Constructing Numbers Using Digits	Counting	Writing	
SID	Grade	Number Range	Unanticipated Strategies									
CK	K	0-5	1	-	0	-	-	0	1	-	-	
341	K		1	-	1	-	Expression	1	-	-	Expression	
708	1	0-10	1	Parts & Combine Groups	0	Parts & Combine Groups	-	1	-	Parts & Combine Groups	-	
769	1		1	Skip (10)	1	-	Equation	1	-	-	Equation	
223	1	0-19	1	Skip (10)	1	-	-	1	-	Parts & Combine Groups	-	
352	2	0-50	1	Mental	[0-199] 1	-	-	[0-199] 1	-	-	-	
Strategies Total by Skill Code			6	4	4	1	2	5	1	2	2	

Unanticipated strategies: NRR.B.5.d-e

Skill Code			B.5.d.			B.5.e.	
Unanticipated Strategies			C	Compare Numbers to Find Same	Counting	C	NME
SID	Grade	Number Range					
CK	K	0-5	0	-	-	[0-19] 0	-
341	K		1	1	-	[0-19] 0	-
708	1	0-10	1	-	Parts & Combine Groups	[0-19] 0	-
769	1		1	-	-	[0-19] 0	-
223	1	0-19	1	-	-	0	1
352	2	0-50	[0-199] 1	1	-	[0-199] 1	1
Strategies Total by Skill Code			5	2	1	1	2

Anticipated strategies: NRR.B.5.a-b

Skill Code			B.5.a.					B.5.b.				
Anticipated Strategies			C	Add	Counting	Another Number	B.5.b.	C	Add	Equipartition	Counting	Tool
SID	Grade	Number Range										
CK	K	0-5	1	-	All	1	-	0	1	-	-	(I) Square Tiles
341	K		1	-	All	1	-	1	1	Doubles	-	-
708	1	0-10	1	-	-	1	1	0	-	-	All	(I) Square Tiles
769	1		1	-	All	1	-	1	1	Doubles	All	(S) Fingers
223	1	0-19	1	-	All	1	-	1	-	Doubles	-	-
352	2	0-50	1	1	-	1	-	[0-199] 1	1	-	-	-
Strategies Total by Skill Code			6	1	4	6	1	4	4	3	2	3

Anticipated strategies: NRR.B.5.c-d

Skill Code			B.5.c.					B.5.d.						
Anticipated Strategies			C	Add	Counting	Tool	Equipartition	B.5.b	C	Counting	Tool	Compare	B.5.b	B.5.c.
SID	Grade	Number Range												
CK	K	0-5	0	-	-	-	-	-	0	-	(I) Linking Cubes	-	1	-
341	K		1	-	-	-	-	1	1	-	-	Same Number	-	-
708	1	0-10	1	-	All	(S) Square Tiles	-	-	1	All	(I) Square Tiles	-	-	1
769	1		1	1	-	-	Triples	-	1	All, On	-	Sum	1	1
223	1	0-19	1	-	All	-	Triples	-	1	All, On	(I) Square Tiles	-	1	-
352	2	0-50	[0-199] 1	1	-	-	Doubles, Triples	-	[0-199] 1	-	-	Same Number	-	-
Strategies Total by Skill Code			5	2	2	1	4	1	5	5	3	3	3	2

Anticipated strategies: NRR.B.5.e

Skill Code			B.5.e.				
Anticipated Strategies			C	Place Value	Counting	Tool	B.5.b.
SID	Grade	Number Range					
CK	K	0-5	[0-19] 0	-	-	-	-
341	K		[0-19] 0	-	All	-	1
708	1	0-10	[0-19] 0	-	-	(I) Place Value Blocks	-
769	1		[0-19] 0	1	-	-	1
223	1	0-19	0	-	-	-	-
352	2	0-50	[0-199] 1	1	-	-	-
Strategies Total by Skill Code			1	2	1	1	2

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Compose a <b>number</b> with <b>single</b> objects.								

**Student Expectation**

Students were expected to arrange tile counters into groups that could be combined and counted. Some students counted all counters as one group.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Counting: Skip by 10s.</i> Children composed larger numbers than the given quantity of single objects by using each object to represent ten. Children counted by tens when explaining their stated composition. This was unanticipated as using an alternate unit for counting was not prompted.	<i>I think I'll do 100 with these... 10, 20, 30, 40, 50, 60, 70 80, 90, 100 (223, 07:14- 07:17).</i>  [Interviewer asked what different numbers the child could count to with the counters] <i>10, 20, 30, 40, 50, 60, 70, 80, 90, 100 (769, 00:25 &amp; 00:35)</i>
<i>Counting: Mental.</i> Child provided the strategy of counting in head when asked how the total number was obtained. This reasoning strategy could be appropriate given the student was in Grade 2, but the child did not provide observable mathematic evidence.	[Interviewer asked how the child knew there were eleven] <i>I counted in my head (352, 06:53).</i>
<i>Counting: Parts &amp; combine groups.</i> Child created concrete representations of two parts with counters, counted each part, and combined the groups to compose the number. This strategy served as a variation of counting all and included necessary skills to compose numbers with single objects before composing with two parts.	[Interviewer describing 708's actions] <i>There's eight in this row and then two in this row, and then you counted by pointing your finger at each of them (708, 01:14).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K						
1		Counting: Parts & combine groups (708)	Counting: Skip by 10s (223, 769)			
2				Counting: Mental (352)		

Unanticipated strategies by grade level and number range for NRR.B.5.a.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Counting: All (CK, 341) Another Number (CK, 341)					
<b>1</b>		Another number (708, 769) Counting: All (769) B.5.b (708)	Another number (223) Counting: All (223)			
<b>2</b>				Another Number (352) Add (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.5.a. activity.

NRR.B.5.a. Anticipated Strategies

<b>NRR.B.5.a.</b>	Compose a <b>number</b> with <b>single</b> objects.	
<b>Content Question</b>	What different numbers could you make using these counters?	
<b>Reasoning Questions</b>	*Are there other numbers you can make using these counters? How do you know that there are ____ counters?	
<b>Anticipated Skills</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>Square tiles</i>	Square tiles of the same color are embedded into the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B5a_A_General tool</i>	Child uses a general tool as listed above.
	<i>B5a_A_Add</i>	Child adds groups of counters; differs from composing based on the child's vocabulary (e.g., add, addend, plus, sum, NOT make). Writing the + symbol may also be considered addition.
	<i>B5a_A_Combine groups</i>	Child combines groups of counters
	<i>B5a_A_Count all</i>	Child counts all square tiles individually
	<i>B5a_A_Count by 2s</i>	Counting. Child counts square tiles in groups of 2
	<i>B5a_A_Count on</i>	Child counts one group, identifies the amount in the one group, then continues to count on.
	<i>B5a_A_Count parts</i>	Child divides group of square tiles into parts then counts each part
<b>A different way</b>	<i>B5a_D_Other number</i>	The required reasoning question asks the child to make other numbers.
<b>NRR Essentialized Skills</b>	<i>Core Concept 6</i>	Consider evidence of decomposition skill statements alongside composition that was intended for this ESS.
	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. <ul style="list-style-type: none"> <li>- Skills prior to this skill code are considered anticipated.</li> <li>- Skills beyond this skill code are considered unanticipated.</li> </ul>
	<i>Non-NRR Skill Codes</i>	Skills evident in child's reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Compose a <b>number</b> with <b>two</b> parts.								

**Student Expectation**

Students were expected to select two number cards that could then be combined using counting or addition strategies to represent a greater number.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Counting: Parts &amp; combine groups.</i> Child created concrete representations of two parts with counters, counted each part, and combined the groups to compose the number. This strategy served as a variation of counting all and included necessary skills to compose numbers with single objects before composing with two parts.	[Described by interviewer] <i>I see how you put some green squares here for the six, and some blue squares here for the two. And I like how you pointed to each of them to count them (708, 05:06).</i>
<i>Writing: Expression.</i> Child wrote mathematical expression (not equations) to work on the given task and to explain his/her mathematical understanding.	In response to interviewer question, student wrote and said Two plus two is four (and wrote $2+2+4$ on the paper) (341, 03:46)
<i>Writing: Equation.</i> Child wrote mathematical equation (not expression) to work on the given task and to explain his/her mathematical understanding.	Four plus four equals eight (student wrote $4+4=8$ ) (769, 08:38)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Writing: Expression (341)					
1		Count Parts & Combine Groups (708) Writing: Equation (769)				
2				-		

Unanticipated strategies by grade level and number range for NRR.B.5.b.



Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Doubles (341) Add (CK, 341) Tools: (I) Sq. Tiles (CK)					
<b>1</b>		Tool: (S) Fingers (769) Tools: (I) Sq. Tiles (708) Count all (708, 769) Add (769) Doubles (769)	Doubles (223)			
<b>2</b>				Add (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.5.b. activity.

NRR.B.5.b. Anticipated Strategies

<b>NRR.B.5.b.</b>	Compose a <b>number</b> with <b>two</b> parts.	
<b>Content Question</b>	Here are some number cards. Please choose two cards. What number would you make if you add these numbers together?	
<b>Reasoning Question</b>	*How did you figure out that ___ and ___ make the number ___? What other numbers could you make using any two cards? Show me what you saw in your head using pictures, words, or numbers?	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity. Child was given cards with numbers. These cards were not intended as tools. However, examples of the cards as tools include and is not limited to, if the child uses the cards to create number sentences or places on an open number line.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B5b_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B5b_A_Add</i>	Child adds numbers to find sum; differs from composing based on the child’s vocabulary. Evidence of vocabulary use (e.g., add, plus, sum, NOT make) or writing symbols must be evident. Use of the word “addend” is unanticipated.
	<i>B5b_A_Count all</i>	Child starts counting from one for the first card and continues to count each number individually.
	<i>B5b_A_Count on</i>	Child recognizes number of first card, then continues to count on.
	<i>B5b_A_Doubles</i>	Child uses doubles
	<i>B5b_A_Zero</i>	Child recognizes the identity property of addition (i.e., the sum of zero and a number is that number).
<b>A different way</b>	*	The reasoning question that specifically asks for another number was not required. If the question was asked, then a different way was anticipated. If the question was not asked, then a different way was not anticipated.
<b>NRR Essentialized Skills</b>	<i>Core Concept 8</i>	If a child does show another number, consider skill statements from properties of operations, core concept 8.
	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Skills evident in child’s reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Compose a <b>number</b> with <b>three or more</b> parts.								

**Student Expectation**

Students were expected to select three number cards that could then be combined using counting or addition strategies to represent a greater number.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Writing: Equation. Child wrote mathematical equation (not expression) to work on the given task and to explain his/her mathematical understanding.</i>	Student wrote $3 + 3 = 6$ ; in response to the question (769, 05:37).
<i>Writing: Expression. Child wrote mathematical expression (not equations) to work on the given task and to explain his/her mathematical understanding.</i>	[Student picked cards with zero, four, and six and in response to interviewer’s question} student wrote two mathematical expressions $0+4$ and $4+6$ to show the different numbers (341, 0:38]
<i>Count parts &amp; combine groups.</i> Some children created representations of parts and counted single objects in parts before combining groups. Counting single items to create groups and then putting the groups together demonstrated variations or prerequisite skills of counting all or counting on, anticipated strategies for this ESS.	[Drew it out in groups and counted parts] <i>One two, one two, one two</i> (223, 10:51).  [Interviewer spoke to describe actions] <i>I see that you put three green squares, four yellow squares, and two blue squares. And then you used your finger to count, to point to each one and count.</i> (708, 08:05)
<i>Adding on (Triples).</i> Child created two 2-part compositions to compose three parts, adding on the third part to the first sum. While effective, it was unanticipated to break the ESS into a multi-step composition.	[Interviewer asked for proof that $10+10+10=30$ ] <i>So 10 plus 10 is 20, and 20 plus 10 equals 30</i> (352, 10:07)
<i>Constructing Numbers Using Digits.</i> Student put cards with different digits on them next to each other to construct new numbers.	[Interviewer asked so you put two, four, and five, what numbers you can make] so this would be fifty-four (putting cards of five and four together), this would be fifty-two (putting cards of five and two together). (CK, 04:56)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Constructing Numbers Using Digits (CK) Writing: Expression (341)					
<b>1</b>		Count parts & combine groups (708) Writing: Equation (769)	Count parts & combine groups (223)			
<b>2</b>				Adding On (Triples) (352)		

Unanticipated strategies by grade level and number range for NRR.B.5.c.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Zero (341) Writing: Expression (341) B.5.b (341)					
<b>1</b>		Tools: (S) Sq. Tiles (708) Counting: All (708) Add (769) Equipartition: Triples (769)	Counting: All (223) Equipartition: Triples (223)			
<b>2</b>				Add (352) Equipartition: Doubles (352) Equipartition: Triples (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.5.c. activity.

NRR.B.5.c. Anticipated Strategies

<b>NRR.B.5.c.</b>	Compose a <b>number</b> with <b>three or more</b> parts.	
<b>Content Question</b>	Now, choose three cards to make another number. What number did you make?	
<b>Reasoning Question</b>	*How could you prove that ____, __, and __ makes ____? Can you show me in another way that ____, __, and __ makes ____? How did you figure out that __, ____, and __ makes ____?	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity. Child was given cards with numbers. These cards were not intended as tools. However, examples of the cards as tools include and is not limited to, if the child uses the cards to create number sentences or places on an open number line.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B5c_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B5c_A_Add</i>	Child adds numbers to find sum; differs from composing based on the child’s vocabulary. Evidence of vocabulary use (e.g., add, plus, sum, NOT make) or writing symbols must be evident. Use of the word “addend” is unanticipated.
	<i>B5c_A_Count all</i>	Child starts counting from one for the first card and continues to count each number individually.
	<i>B5c_A_Count on</i>	Child recognizes number of first card, then continues to count on for second and third cards.
	<i>B5c_A_Doubles</i>	Child uses doubles
	<i>B5c_A_Zero</i>	Child recognizes the identity property of addition (i.e., the sum of zero and a number is that number).
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, consider the strategy as unanticipated.
<b>NRR Essentialized Skills</b>	<i>Core Concept 8</i>	If a child does show another number, consider skill statements in core concept 8.
	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child’s reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
			Compose a <b>number</b> with two or more parts using <b>different number combinations</b> .					

**Student Expectation**

Students were expected to use counting or adding strategies to determine that the number combinations written from the prompt represent the same amount.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Draw it out.</i> Child drew circles as single objects to represent two parts. These served as a substitution for general tools that were available to the student, making the strategy similar but unanticipated.	[Draws a row of 6 circles and a row of 4, then counts them] ...4, 5, 6. 1, 2, 3, 4, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 9, 10- (769, 07:08).
<i>Counting parts &amp; combine groups.</i> Children showed a representation of parts and whole with single objects, counted parts independently, then combined the groups. It was unexpected for children to count groups independently before combining them to compose the number.	[Child showed a representation of two-part composition, interviewer described] ...you put six yellow and four blue out... (708, 12:07).  So it's 60 and 30 and 30. So 60 and 30 and 30. So 30, 30 isn't that the same .... The adding. It's not the same adding (352, 13:23)
<i>Compare Numbers to Find Same.</i> Student compared one numbers with other (or part of the other number) to compare two numbers to decide which one is bigger and/or smaller among given three numbers.	[In comparing 11, 3, and 23] student said: "They kind of did because they're both the same. Three and three (check mark 3 and 3 of 23) (341, 09:17).

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Compare Numbers to Find Same (341)					
1		Counting: parts & combine groups (708) Draw a Picture (769)	-			
2				Compare Numbers to Find Same (352)		

Unanticipated strategies by grade level and number range for NRR.B.5.d.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Tools: (I) Linking Cubes (CK) Same parts (341) B.5.b (CK)					
<b>1</b>		Tools: (I) Sq. Tiles (708) Counting: All (708, 769) Counting On (769, 223) Compare: Sum (769) B.5.b. (769) B.5.c. (708, 769)	Counting All (223) Counting On (223) Tools: (I) Sq. Tiles (223) B.5.b. (223)			
<b>2</b>				Compare: Same parts (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.5.d. activity.

NRR.B.5.d. Anticipated Strategies

<b>NRR.B.5.d.</b>	Compose a <b>number</b> with two or more parts using <b>different number combinations</b> .	
<b>Content Question</b>	Ben and Carla were making numbers like you just did. Ben and Carla think that they made the same number. [follow-up questions included] What do you think? How do you know?	
<b>Reasoning Question</b>	*Show me using pictures, words, or numbers how you found your answer. Your friend doesn't think they have the same number. How could you use one of these tools to prove that they have the same number?	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity. Child was given cards with numbers. These cards were not intended as tools. However, examples of the cards as tools include and is not limited to, if the child uses the cards to create number sentences or places on an open number line.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B5d_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B5d_A_Add</i>	Child adds numbers to find sum; differs from composing based on the child's vocabulary. Evidence of vocabulary use (e.g., add, plus, sum, NOT make) or writing symbols must be evident. Use of the word "addend" is unanticipated.
	<i>B5d_A_Compare Sums</i>	Child compares the of Ben's cards to the sum of Carla's cards.
	<i>B5d_A_Count all</i>	Child starts counting from one for the first card and continues to count each number individually.
	<i>B5d_A_Count on</i>	Child recognizes number of first card, then continues to count on for second and third cards.
	<i>B5d_A_Digits</i>	Name the number that the individual digits combine to make (e.g., 1 and 1 makes 11).
	<i>B5d_A_Same parts</i>	Child identifies that part of Ben's cards are the same of part of Carla's cards. This strategy also includes skill code B.5.b and possibly B.5.c.
<b>A different way</b>	<i>B5d_D_Combination</i>	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, consider the strategy as unanticipated. However, different number combinations were anticipated. If child was able to identify the two different number combinations as maintaining equality, then consider this as anticipated.
<b>NRR Essentialized Skills</b>	<i>Core Concept 8</i>	If a child does show another number, consider skill statements in core concept 8.
	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.



	<i>Non-NRR Skill Codes</i>	Content evident in child's reasoning that are not captured in the current NRR learning progressions are considered unanticipated.
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**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Compose a <b>number</b> with two or more parts using <b>concepts of place value</b> .								

**Student Expectation**

Students were expected to listen to the prompt and use mathematical reasoning related to place value to explain what total number the combination of ones and tens would make. Students were also allowed to use place value blocks or other tools, if needed.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Write it out.</i> Child wrote the number correctly but could not provide reasoning for the response. Breaking the whole number into units and verbalizing how many of each unit is an expected skill for Grade 2.	[Child stated same response twice without further detail] <i>One hundred and three</i> (352, 15:49).
<i>NME.</i> Child requested markers to write and drew an outdoor scene with no mathematical relevance.	[Interviewer asked about drawing] <i>A garden... I'm going to make flowers.. it's the sky</i> (223, 16:34-17:27)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K						
1			NME (223)			
2				Write it Out (352) NME (352)		

Unanticipated strategies by grade level and number range for NRR.B.5.e.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	B.5.b. (341) NME (CK) Counting: All (341)					
1		Tools: (I) Place-Value Blocks (708) B.5.b. (769)	-			
2				-		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.5.e. activity.

NRR.B.5.e. Anticipated Strategies

<b>NRR.B.5.e.</b>	Compose a <b>number</b> with two or more parts using <b>concepts of place value</b> .	
<b>Content Question</b>	What number would 3 ones and [1,2,5 tens/ 1 hundred] make?	
<b>Reasoning Question</b>	*You said that 3 ones and __ tens makes _____. How many ones do you need to make ____? How do you know that 3 ones and _____ tens makes ____?	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity. Child was given cards with numbers. These cards were not intended as tools. However, examples of the cards as tools include and is not limited to, if the child uses the cards to create number sentences or places on an open number line.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B5e_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B5e_A_Add</i>	Child adds numbers to find sum; differs from composing based on the child’s vocabulary. Evidence of vocabulary use (e.g., add, plus, sum, NOT make) or writing symbols must be evident. Use of the word “addend” is unanticipated.
	<i>B5e_A_Compare Sums</i>	Child compares the of Ben’s cards to the sum of Carla’s cards.
	<i>B5e_A_Count all</i>	Child starts counting from one for the first card and continues to count each number individually.
	<i>B5e_A_Count on</i>	Child recognizes number of first card, then continues to count on for second and third cards.
	<i>B5e_A_Representation</i>	Child draws a representation such as tallies or dots and lines to aid in thinking.
	<i>B5e_A_Place value blocks</i>	Count concrete place value blocks
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, consider the strategy as unanticipated.
<b>NRR Essentialized Skills</b>	<i>NRR.B.5.b.</i> <i>NRR.B.5.c.</i>	Child might compose a number with two or more parts, but not necessarily use place value concepts.
	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child’s reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

NRR.B.6. Decomposition Core Concept

6. Decomposition									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.B.6.a.	Decompose a <b>number</b> into <b>two</b> parts.								
NRR.B.6.b.	Decompose a <b>number</b> into <b>two</b> parts using <b>equipartitioning</b> .								
NRR.B.6.c.	Decompose a <b>number</b> into <b>three or more</b> parts.								
NRR.B.6.d.									Decompose a number up to 25 into <b>three or more</b> parts using <b>equipartitioning</b> .
NRR.B.6.e.	Decompose a <b>number</b> into <b>two or more</b> parts using <b>different number combinations</b> .								
NRR.B.6.f.	Decompose a <b>number</b> with two or more parts using <b>concepts of place value</b> .								

NRR.B.6. Synthesis Data

Unanticipated strategies: NRR.B.6.a-d

Skill Code			B.6.a. and B.6.b.					B.6.c.			B.6.d.			
Unanticipated Strategies			C 6a	C 6b	Construct Numbers Using Digits	Writing	Counting	Value of Digit	C	N M E	Deconstruct Numbers Into Digits	Writing	C	Writing
SID	Grade	Number Range												
CK	K	0-5	0	0	1	-	-	-	0	-	-	-	1	-
341	K		0	0	-	Expression	-	-	0	-	-	Numbers	1	-
708	1	0-10	0	1	-	-	-	-	0	1	-	-	0	-
769	1		0	0	1	-	-	-	0	-	1	-	1	-
223	1	0-19	1	1	-	-	Parts, All,	-	8	-	-	-	1	-
352	2	0-50	0	1	-	-	-	1	1	-	-	-	0	Equation
Strategies Total by Skill Code			1	3	2	1	2	1	1		1	1		1

**Unanticipated strategies: NRR.B.6.e-f**

Skill Code			B.6.e.				B.6.f.	
Unanticipated Strategies			C	Compare Numbers to Find	Construct Numbers Using Digits	Writing	C	Construct Numbers Using Digits
SID	Grade	Number Range						
CK	K	0-5	0	-	1	-	8	-
341	K		1	-	-	Expression	8	-
708	1	0-10	0	Different	-	-	0	-
769	1		0	-	-	-	0	1
223	1	0-19	1	-	-	-	0	-
352	2	0-50	1	Same	-	-	1	-
Strategies Total by Skill Code			1	2	1	1		1

**Anticipated strategies: NRR.B.6.a-c**

Skill Code			B.6.a. and B.6.b.					B.6.c.				
Anticipated Strategies			C 6a	NRR. B.6.	Tools	Counting	Basic Operations	C 6b	Basic Operations	Tools	Zero	NRR.B.5
SID	Grade	Number Range										
CK	K	0-5	0	-	(I) Linking Cubes	-	-	0	-	(I) Linking Cubes	-	B.5.b
341	K		0	-	(I) Linking Cubes	-	-	0	-	-	-	-
708	1	0-10	0	B.6.b	(I) Linking Cubes	-	-	0	-	-	-	-
769	1		0	-	-	-	-	0	Add	-	1	B.5.b
223	1	0-19	1	B.6.b	(S) Fingers	-	-	8	-	-	-	-
352	2	0-50	0	-	(I) Written Number Line	On Skip(5)	Add	1	Add	-	-	B.5.c B.5.e
Strategies Total by Skill Code			1	2	5	2	1	1	2	1	1	4

Anticipated strategies: NRR.B.6.d-e

Skill Code			B.6.d						B.6.e.							
Anticipated Strategies			C	NRR. B.6	Counting	Distribute Equal Groups	Zero	Different Number Combinations	C	Basic Operations	Tools	Counting	Different Number Combinations	NRR. B.5	NRR. B.6	Zero
SID	Grade	Number Range														
CK	K	0-5	1	B.6.b	On, Doubles	1	-	-	0	Add	-	All	-	B.5.b	-	-
341	K		1	B.6.b	-	1	-	-	1	-	-	On	-	-	-	-
708	1	0-10	0	B.6.c	-	1	1	-	0	-	(I) Linking Cubes	-	-	-	-	-
769	1		1	B.6.b	-	1	-	-	0	Add	-	-	1	-	B.6.b B.6.c	1
223	1	0-19	1	-	-	1	-	1	1	-	(S) Square Tiles	Parts, All	1	-	B.6.a B.6.b	-
352	2	0-50	0	B.6.a B.6.b	-	-	-	-	1	Add	-	-	1	B.5.b B.5.d	-	1
Strategies Total by Skill Code			4	6	2	5	1	1	3	3	2	4	3	3	4	2

Anticipated strategies: NRR.B.6.f

Skill Code			B.6.f				
Anticipated Strategies			C	NRR. B.6	Counting	Tools	Basic Operations
SID	Grade	Number Range					
CK	K	0-5	8	-	-	-	-
341	K		8	-	-	-	-
708	1	0-10	0	-	All	(I) Place Value Blocks	-
769	1		0	-	-	-	-
223	1	0-19	0	-	All	-	-
352	2	0-50	1	B.6.a	-	-	Add
Strategies Total by Skill Code			1	1	2	1	1

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Decompose a <b>number</b> into <b>two parts</b> .								
Decompose a <b>number</b> into <b>two parts</b> using <b>equipartitioning</b> .								

**Student Expectation**

B.6.a. : Students were expected to listen to the prompt and select two number cards to combine in order to make the given even number. Doubles may or may not be used.

B.6.b. : Students were expected to listen to the prompt and select a different combination of two number cards in order to make the given even number. Doubles may or may not be used, depending on what was selected during B.6.a.

**Unanticipated Strategies**

<b>Unexpected Strategy. Justification/Description</b>	<b>Examples</b>
<i>Constructing Numbers Using digits:</i> Child used two digits and created a new number by placing two digits together.	<i>Three and three, Thirty-three. Four, three, Forty-three (CK, 12:39)</i> <i>In response to “so you selected 10 and 20, how would you make 20 from 10 and 20” student said: “so, because it’s like when you smash it together, when you put it on top, it makes it 20 (769, 12:28)</i>
<i>Writing: Expression.</i> Child wrote mathematical expression (not equations) to work on the given task and to explain his/her mathematical understanding.	<i>In response to adding any two numbers to make number 4, student said: “I should add- (and wrote 4+5)” a mathematical expression instead of a mathematical equation (341, 12:29)</i>
<i>Counting: All.</i> Child counted all of the counters (general tool) as a proof. Children in Grade 1 and beyond should have skills to compose two numbers or by adding or counting on to replace counting all.	<i>One, two, three, four, five, six, seven, eight, nine, ten [counted all counters when asked if they made ten] (223, 22:09).</i>
<i>Counting: Parts.</i> In response to two parts of a number, instead of Counting All numbers, the child counted each parts.	<i>In response to breaking apart 10 into 6 and 4, student counted “One, two, three, four (for the part 4) one, two, three, four, five, six (for the part 6) (223, 21:36)</i>
<i>Value of Digit.</i> Children treated digits in multi-digit numbers as independent when adding or putting the digits in mathematically unsound orders to create other numbers. Children should recognize two-digit numbers as one number and use composition skills to combine numbers.	<i>Because three plus three equals six [explanation for 30+30=60, without referencing units] (352, 25:30)</i>



Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Construct Numbers Using Digits (CK) Writing: Expression (341)					
<b>1</b>		Construct Numbers Using Digits (769)	Counting: Parts (223) Counting: All (223)			
<b>2</b>				Value of Digit (352)		

Unanticipated strategies by grade level and number range for NRR.B.6.a&b

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Tools: (I) Linking Cubes (CK, 341)					
<b>1</b>		Tools: (I) Linking Cubes (708) B.6.b. (708)	Tools: (S) Fingers (223) B.6.b. (223)			
<b>2</b>				Tools: (I) Written Number Line (352) Counting: On (352) Counting: Skip(5) (352) Basic Operations: Add (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.6.a&b activity.

NRR.B.6.a. Anticipated Strategies

<b>NRR.B.6.a.</b>	Decompose a <b>number</b> into <b>two parts</b> .	
<b>Content Question</b>	I want to break apart the number _____. What two numbers can you use to make the number _____?	
<b>Reasoning Question</b>	*How could you use one of these tools to show me that _____ breaks apart into _and_? Tell me more about how you figured out that _____ is the same as _____.	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>B6a_E_NOT-Part-part-whole</i>	Part-part-whole figure was given to child.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B6a_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B6a_A_Add</i>	Child adds numbers to find sum; differs from composing based on the child’s vocabulary. Evidence of vocabulary use (e.g., add, plus, sum, NOT make) or writing symbols must be evident. Use of the word “addend” is unanticipated.
	<i>B6a_A_Count on</i>	Child acknowledges whole number, then counts on from a part then stops at whole number.
	<i>B6a_A_Doubles</i>	Child uses doubles
	<i>B6a_A_Subtract</i>	Child subtracts number from whole to find part. Evidence of vocabulary use (e.g., subtract, difference, minus, NOT take away) or writing symbols must be evident. Excluding “take away” to differentiate computational subtraction from the act of decomposing a number.
	<i>B6a_A_Unit</i>	Child breaks given whole number into 1s, 10s, and/or 100s.
	<i>B6a_A_Zero</i>	Child recognizes the identity property of addition (i.e., the sum of zero and a number is that number).
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, consider the strategy as unanticipated.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child’s reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

NRR.B.6.b. Anticipated Strategies

<b>NRR.B.6.b.</b>	Decompose a <b>number</b> into <b>two</b> parts using <b>equipartitioning</b> .	
<b>Content Question</b>	Content question asked depends on if child responded with doubles in the previous question. Equipartitioning: How would you break apart _____ into two parts that are the same number? What numbers would you use? Non-Equal groups: How would you break apart _____ into two parts using numbers that are not the same? What numbers would you use?	
<b>Reasoning Question</b>	*How did you figure out that _____ breaks apart into ____ and ____? Show me what you saw in your head using pictures, words, or numbers. What made you decide to [child's decision]?	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>B6b_E_NOT-Part-part-whole</i>	Part-part-whole figure was given to child.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B6b_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B6b_A_Add</i>	Child adds numbers to find sum. Evidence of vocabulary use (e.g., add, addend, plus, sum, NOT make) or writing symbols must be evident.
	<i>B6b_A_Count on</i>	Child acknowledges whole number, then counts on from a part then stops at whole number.
	<i>B6b_A_Doubles</i>	Child uses doubles
	<i>B6b_A_Subtract</i>	Child subtracts number from whole to find part. Evidence of vocabulary use (e.g., subtract, difference, minus, NOT take away) or writing symbols must be evident. Excluding "take away" to differentiate computational subtraction from the act of decomposing a number.
	<i>B6b_A_Unit</i>	Child breaks given whole number into 1s, 10s, and/or 100s.
	<i>B6b_A_Zero</i>	Child recognizes the identity property of addition (i.e., the sum of zero and a number is that number).
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, consider the strategy as unanticipated.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child's reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Decompose a <b>number</b> into <b>three or more parts</b> .								

**Student Expectation**

Students were expected to select three number cards that equal the same value of the given number in the prompt. The number is written as the whole in a part-part-whole chart and the student selects cards or writes numbers in as parts.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Deconstructing Numbers Into Digits:</i> Child separated both digits of a two-digit number to break apart a given number into two or three pieces.	In response to breaking apart 15 into three numbers, student said “one and five” (769, 14:48)
<i>Writing: Numbers.</i> Child wrote mathematical expression (not equations) to work on the given task and to explain his/her mathematical understanding.	In response to break number 3, student wrote 2 and then wrote another 2 and said “I made a two. Then I turned, then I made a two” (341, 16:59)
<i>NME.</i> Either the interviewer or child determined that the content question was too difficult. Both children were in Grade 1 and should have prerequisite skills of decomposing a number into two parts, making this question accessible through scaffolding.	[No transcript] (223)  [Student gave interviewer ‘thumbs down’ to indicate difficulty level too high] (708, 25:44)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Writing: Numbers (341)					
1		Deconstruct Numbers Into Digits (769) NME (708)	-			
2				-		

Unanticipated strategies by grade level and number range for NRR.B.6.c.

<b>Grade</b>	<b>0-5</b>	<b>0-10</b>	<b>0-19</b>	<b>0-50</b>	<b>0-99</b>	<b>0-199</b>
<b>K</b>	Tools: (I) Linking Cubes (CK) B.5.b. (CK)					
<b>1</b>		Zero (769) Basic Operations: Add (769) B.5.b. (769)	-			
<b>2</b>				Basic Operations: Add (352) B.5.c. (352) B.5.e. (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.6.c. activity.

NRR.B.6.c. Anticipated Strategies

<b>NRR.B.6.c.</b>	Decompose a <b>number</b> into <b>three or more</b> parts.	
<b>Content Question</b>	What three numbers can you use to break apart the number ____?	
<b>Reasoning Question</b>	*How do you know that ____ breaks into ____, ____, and ____? What strategy do you like to use to break apart numbers? Tell me more about what you did...	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>B6c_E_NOT-Part-part-part-whole</i>	Part-part-part-whole figure was given to child.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B6c_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B6c_A_Add</i>	Child adds numbers to find sum. Evidence of vocabulary use (e.g., add, addend, plus, sum, NOT make) or writing symbols must be evident.
	<i>B6c_A_Count on</i>	Child acknowledges whole number, then counts on from a part then stops at whole number.
	<i>B6c_A_Subtract</i>	Child subtracts number from whole to find part. Evidence of vocabulary use (e.g., subtract, difference, minus, NOT take away) or writing symbols must be evident. Excluding “take away” to differentiate computational subtraction from the act of decomposing a number.
	<i>B6c_A_Unit</i>	Child breaks given whole number into 1s, 10s, and/or 100s.
	<i>B6c_A_Zero</i>	Child recognizes the identity property of addition (i.e., the sum of zero and a number is that number).
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, consider the strategy as unanticipated.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child’s reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
						decompose a number up to 25 into <b>three or more</b> parts using <b>equipartitioning</b> .		

**Student Expectation**

Students were expected to think about the possible ways that the given number of cow pictures could be arranged into equal groups. Then students were expected to arrange the cow pictures into equal groups using counting and grouping strategies.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Writing: Equation.</i> Child wrote an equation to show a two-part composition. The child was expected to interact with the tools to show equipartitioning but student chose to write an equation to explain thinking instead.	Student wrote the equation $12 + 12 = 24$ to represent cows in two barns (352, 31:24)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-	-			
2				Writing: Equation (352)		

Unanticipated strategies by grade level and number range for NRR.B.6.d.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Distributed Equal Groups (CK, 341) B.6.b. (CK, 341) Counting: On (CK) Counting: Doubles (CK)					
1		Distributed Equal Groups (708, 769) B.6.c. (708) B.6.b. (769) Zero (708)	Distributed Equal Groups (223) Different Number Combinations (223)			
2				B.5.a. (352) B.6.b. (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.6.d. activity.

NRR.B.6.d. Anticipated Strategies

<b>NRR.B.6.d.</b>	Decompose a number up to 25 into <b>three or more</b> parts using <b>equipartitioning</b> .	
<b>Content Question</b>	Before you move the animals, how many animals do you think will be in each barn?	
<b>Reasoning Question</b>	*What if there were ____ barns, how would that change how many animals are in each barn? How did you figure out that there are ____ animals in each barn? Can you prove that there would be ____ animals in each barn by using these things [ <i>point to the barns and animal cards</i> ]?	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>B6d_E_NOT-Pictures</i>	Pictures of cows and barns were provided to child.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B6d_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B6d_A_Array</i>	Child arranges cow in an array rather than a grouping.
	<i>B6d_A_Fair share</i>	Child distributes one cow to each barn individually.
	<i>B6d_A_Groups</i>	Child assigns groups of cows to each barn, then balances the number of cows in each barn.
<b>A different way</b>	<i>B6d_D_Different</i>	The required reasoning question adds a barn and asks that child how adding the barn changes the number of animals in each barn. A different way is coded if child is able to redistribute the cows evenly with the additional barn.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child's reasoning that are not captured in the current NRR learning progressions are considered unanticipated.



**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
			Decompose a <b>number</b> into <b>two or more</b> parts using <b>different number combinations</b> .					

**Student Expectation**

Students were expected to select number cards that represented at least two different ways of decomposing the given number.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Compare Numbers to Find Same/Different. Student compared one numbers with other (or part of the other number) to compare two numbers to decide which one is bigger and/or smaller among given three numbers.</i>	In response to pick two numbers that will add up to the number five, student picked two and one, put them together to make twelve (CK, 21:42 – 22:26)
<i>Construct Numbers Using Digits. Student put cards with different digits on them next to each other to construct new numbers.</i>	In response to breaking a number, Students said this one is two and this one is two, and this one is three and four (Different) (708, 32:43) Students compared two numbers to said they both have five (Same) (352, 39:12)
<i>Writing: Expression. Child wrote mathematical expression (not equations) to work on the given task and to explain his/her mathematical understanding.</i>	Student wrote “two plus two” and verbally said it is four (341, 24:49)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		Doubles (769)	Doubles (223) Count parts (223)			
2				Digits (352)		

Unanticipated strategies by grade level and number range for NRR.B.6.e.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Count on (341) Add (CK) Count all (CK) B.5.b. (CK) Write it out (341) Digits (CK)					
<b>1</b>		General tools (708) Zero (769) Add (769) Different Way (769) B.6.b. (769) B.6.c. (769)	General tools (223) Count all (223) Different way (223) B.6.a. (223) B.6.b. (223)			
<b>2</b>				Add (352) Zero. (352) Different way (352) B.5.b. (352) B.5.d. (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.6.e. activity.

NRR.B.6.e. Anticipated Strategies

<b>NRR.B.6.e.</b>	Decompose a <b>number</b> into <b>two or more</b> parts using <b>different number combinations</b> .	
<b>Content Question</b>	Here are some number cards. Can you show me two different ways to break apart the number_? Are there other ways to break apart the number_____?	
<b>Reasoning Question</b>	*What is similar about the number combinations you chose? How do you know that_____and_____is the same as_____and_____? Show me what you saw in your head using pictures, words, or numbers.	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity. Child was given cards with numbers. These cards were not intended as tools. However, examples of the cards as tools include and is not limited to, if the child uses the cards to create number sentences or places on an open number line.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B6e_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B6e_A_Add</i>	Child adds numbers to find sum. Evidence of vocabulary use (e.g., add, addend, plus, sum, NOT make) or writing symbols must be evident.
	<i>B6e_A_Count all</i>	Child starts counting from one for the first card and continues to count each number individually until reaching the given whole number.
	<i>B6e_A_Count on</i>	Child acknowledges whole number, then counts on from a part then stops at whole number.
	<i>B6e_A_Subtract</i>	Child subtracts number from whole to find part. Evidence of vocabulary use (e.g., subtract, difference, minus, NOT take away) or writing symbols must be evident. Excluding “take away” to differentiate computational subtraction from the act of decomposing a number.
	<i>B6e_A_Zero</i>	Child recognizes the identity property of addition (i.e., the sum of zero and a number is that number).
<b>A different way</b>	<i>B6e_D_Different</i>	The content question specifically asks for two different number combinations. A different way is coded if child is able to break apart the given number using at least two different number combinations.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child’s reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
		Decompose a <b>number</b> with two or more parts using <b>concepts of place value.</b>						

**Student Expectation**

Students were expected to use mathematical reasoning and place value to determine the number of ones and tens needed to decompose a given number.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Construct Numbers Using Digits. Student put cards with different digits on them next to each other to construct new numbers.</i>	[Interviewer asked how many tens and ones to make 14, child searched for number cards] <i>1. 1. 1.... And two 4's... because it makes 14 (769, 26:33- 24:43). Because 10 plus 10 equals 20, and 20 plus 4 equals 24 (352, 40:32).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K						
1		Digits (769)				
2				Units (352)		

Unanticipated strategies by grade level and number range for NRR.B.6.f.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (341, CK)					
1		General Tool (708) Count all (708)	Count all (223)			
2				Add (352) Doubles (352) B.6.a. (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.6.f. activity.

NRR.B.6.f. Anticipated Strategies

<b>NRR.B.6.f.</b>	Decompose a <b>number</b> into <b>two or more</b> parts using <b>concepts of place value</b> .	
<b>Content Question</b>	How many ones and how many tens would you need to make ____?	
<b>Reasoning Question</b>	*How could you prove that ____ can be made using ____ ones and ____ tens? Is there another way to make ____ with tens and ones (OR hundreds, tens, and ones)? Show me what you saw in your head using pictures, words or numbers.	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity. Child was given cards with numbers. These cards were not intended as tools. However, examples of the cards as tools include and is not limited to, if the child uses the cards to create number sentences or places on an open number line.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B6f_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B6f_A_Add</i>	Child adds numbers to find sum. Evidence of vocabulary use (e.g., add, addend, plus, sum, NOT make) or writing symbols must be evident.
	<i>B6f_A_Count all</i>	Child starts counting from one for the first card and continues to count each number individually until reaching the whole number given.
	<i>B6f_A_Count on</i>	Child acknowledges whole number, then counts on from a part then stops at whole number.
	<i>B6b_A_Doubles</i>	Child uses doubles
	<i>B6f_A_Representation</i>	Child draws a representation such as tallies or dots and lines to aid in thinking.
	<i>B6f_A_Subtract</i>	Child subtracts number from whole to find part. Evidence of vocabulary use (e.g., subtract, difference, minus, NOT take away) or writing symbols must be evident. Excluding “take away” to differentiate computational subtraction from the act of decomposing a number.
<b>A different way</b>	<i>B6f_D_Different</i>	The content question specifically asks for two different number combinations. A different way is coded if child is able to break apart the given number using at least two different number combinations.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child’s reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

NRR.B.7. Applying and Representing Composition and Decomposition Core Concept

7. Applying and Representing Composition and Decomposition										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.B.7.a.		Given one part of a <b>number</b> , identify the <b>missing part</b> .								
NRR.B.7.b.		Given a <b>unit</b> , identify the <b>missing part</b> .								
NRR.B.7.c.					Given one part of a <b>number</b> , identify two or more <b>missing parts</b> .					
NRR.B.7.d.					Given one part of a <b>number</b> , identify two or more <b>missing parts</b> using different number combinations					
NRR.B.7.e.		Write an expression to represent the decomposition of a <b>number</b> .								

NRR.B.7.a. Synthesis

Unanticipated strategies: NRR.B.7.a-c

Skill Code			B.7.a.			B.7.b.			B.7.c.				
Unanticipated Strategies			C	N M E	Unfounded: Take Away	C	N M E	Constructing Numbers Using Digits	Unfounded: Take Away	C	Constructing Numbers Using Digits	Counting	Writing
SID	Grade	Number Range											
CK	K	0-5	1	-	-	1	-	-	-	0	-	-	-
341	K		1	-	-	1	-	-	-	0	-	-	-
708	1	0-10	0	-	-	0	-	-	1	8	-	-	-
769	1		0	-	1	0	-	1	-	0	1	-	Equation
223	1	0-19	0	1	-	0	1	-	-	[0-10] 0	-	All	-
352	2	0-50	1	-	-	1	-	-	-	1	-	-	-
Strategies Total by Skill Code			3	1	1	3	1	1	1	1	1	1	1

Unanticipated strategies: NRR.B.7.d-e

Skill Code			B.7.d.					B.7.e.		
Unanticipated Strategies			C	Writing	Counting	Constructing Numbers Using Digits	NME	C	NME	Writing
SID	Grade	Number Range								
CK	K	0-5	0	Numbers	-	-	-	0	-	-
341	K		0	-	-	-	-	0	-	-
708	1	0-10	8	-	-	-	-	8	-	-
769	1		0	-	-	1	-	8	-	-
223	1	0-19	[0-10] 0	Numbers	All	-	-	[0-10] 0	1	-
352	2	0-50	0	-	-	-	1	1	-	Equation
Strategies Total by Skill Code			0	2	1	1	1	1	1	1

Anticipated strategies: NRR.B.7.a-b

Skill Code			B.7.a.						B.7.b.				
Anticipated Strategies			C	NME	Counting	Tool	Basic Operation	B.5.b.	C	NME	Counting	Tool	Basic Operation
SID	Grade	Number Range											
CK	K	0-5	1	1	-	-	-	-	1	1	-	-	-
341	K		1	-	All	-	-	1	1	-	All	(I) Square Tiles	-
708	1	0-10	0	-	-	(I) Linking Cubes	-	-	8	-	-	(I) Linking Cube	-
769	1		0	-	-	-	-	-	8	-	-	-	-
223	1	0-19	0	-	-	-	-	-	0	-	-	-	-
352	2	0-50	1	-	-	-	Subtraction	-	1	-	-	-	Addition, Subtraction
Strategies Total by Skill Code			3	1	1	1	1	1	3	1	1	2	2

Anticipated strategies: NRR.B.7.c-e

Skill Code			B.7.c.							B.7.d.					B.7.e.	
Anticipated Strategies			C	NME	Tool	Counting	Basic Operation	B.5.b.	B.5.c.	C	Counting	Tool	Basic Operation	B.5.c.	C	NME
SID	Grade	Number Range														
CK	K	0-5	0	1	-	-	-	-	-	0	-	-	-	-	0	1
341	K		0	-	(I) Linking Cubes	All	-	-	-	0	All	(I) Linking Cubes	-	-	0	1
708	1	0-10	0	1	-	-	-	-	-	8	-	-	-	-	8	-
769	1		0	-	-	-	Addition	1	-	0	-	-	Addition	1	8	-
223	1	0-19	[0-10] 0	-	(I) Square Tiles	-	-	-	-	[0-10] 0	-	(S) Square Tiles	-	-	[0-10] 0	-
352	2	0-50	1	-	-	-	Addition	-	1	0	-	-	-	-	1	-
Strategies Total by Skill Code			1	2	2	1	2	1	1	0	1	2	1	1	1	2



**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Given one part of a <b>number</b> , identify the <b>missing part</b> .								

**Student Expectation**

Students were expected to use deductive reasoning skills and addition/subtraction strategies, to determine the number of cubes that remain in a bag when told the total number and then given one part of the cubes.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>NME.</i> Children in Grade 1 were expected to use counting or subtraction strategies to generate an answer. Child did not provide any mathematical information or reasoning.	<i>I don't know</i> (223, 32:38, 32:45)
<i>Unfounded: Take Away.</i> Children used the term "take away" to compare the initial quantity with the remaining quantity after removing a portion.	<i>In response to interviewer question 'there were 9 marbles in the bag, I gave you 4, how many are still left in this bag' student said '4, because when you take away 4, there was 4 more left' (769, 29:19 – 29:51).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		Unfounded: Take Away (769)	NME (223)			
2				-		

Unanticipated strategies by grade level and number range for NRR.B.7.a.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (CK) Count all (341) B.5.b. (341)					
1		Tools: (I) Linking Cubes (708)	-			
2				Basic Operation: Subtraction (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.7.a. activity.

NRR.B.7.a. Anticipated Strategies

<b>NRR.B.7.a.</b>	Given one part of a <b>number</b> , identify the <b>missing part</b> .	
<b>Content Question</b>	There are <u>   </u> tiles in this bag. I'm going to give you <u>   </u> of the tiles. How many tiles are still in the bag?	
<b>Reasoning Question</b>	*How do you know that there are <u>   </u> tiles still in the bag? Can you use one of these tools to prove that there are <u>   </u> cubes left in the bag? Show me what you saw in your head using pictures words or numbers.	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>B7a_E_NOT-tiles</i>	Colored square tiles as counters.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B7a_A_Count all</i>	Child attempts to count all counters in the bag.
	<i>B7a_A_Count on</i>	Child starts with total of tiles removed from bag, then counts on until the total number of tiles that were in the bag
	<i>B7a_A_Subtract</i>	Child subtracts tiles removed from total in bag to find number of tiles left in bag. Evidence of vocabulary use (e.g., subtract, difference, minus, NOT take away) or writing symbols must be evident. Excluding "take away" to differentiate computational subtraction from the act of decomposing a number.
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, consider the strategy as unanticipated.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child's reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Given a <b>unit</b> , identify the <b>missing part</b> .								

**Student Expectation**

Students were expected to use deductive reasoning skills and addition/subtraction strategies, to determine the number of cubes that remain in a bag when told the total number and then given one part of the cubes.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>NME. Children in Grade 1 were expected to use counting or subtraction strategies to generate an answer. Child did not provide any mathematical information or reasoning.</i>	<i>I don't know (223, 32:54, 33:03). Because uh.. um.. I forgot (708, 42:22- 73:03).</i>
<i>Constructing Numbers Using Digits. Student put different digits next to each other to construct a new numbers.</i>	54, because 5 and 4 make 54 (769, 30:42)
<i>Unfounded: Take Away. Children used the term "take away" to compare the initial quantity with the remaining quantity after removing a portion.</i>	<i>Because those 8 are here and you took away two, and I think there is one more (708, 42:22)</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		Constructing Numbers Using Digits (769) Unfounded: Take Away (708)	NME (223)			
2				Add (352)		

Unanticipated strategies by grade level and number range for NRR.B.7.b.

<b>Grade</b>	<b>0-5</b>	<b>0-10</b>	<b>0-19</b>	<b>0-50</b>	<b>0-99</b>	<b>0-199</b>
<b>K</b>	NME (CK, 708) Tool: (I) Square Tiles (341) Counting: All (341)					
<b>1</b>		Tools: (I) Linking Cubes (769) Basic Operations: Addition (769)	Tools: (I) Square Tiles (223)			
<b>2</b>				Basic Operations: Addition, Subtraction (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.7.b. activity.

NRR.B.7.b. Anticipated Strategies

<b>NRR.C.7.b.</b>	Given a <b>unit</b> , identify the <b>missing part</b> .	
<b>Content Question</b>	Now there are <u>   </u> tiles in the bag. I am going to give you <u>   </u> tile. How many tiles are still in the bag?	
<b>Reasoning Question</b>	*Tell me more about how you figured out that <u>   </u> Show me what you saw in your head using pictures words, or numbers.	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>B7b_E_NOT-tiles</i>	Colored square tiles as counters.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B7b_A_Count all</i>	Child attempts to count all counters in the bag.
	<i>B7b_A_Count on</i>	Child starts with total of tiles removed from bag, then counts on until the total number of tiles that were in the bag
	<i>B7b_A_Subtract</i>	Child subtracts tiles removed from total in bag to find number of tiles left in bag. Evidence of vocabulary use (e.g., subtract, difference, minus, NOT take away) or writing symbols must be evident. Excluding “take away” to differentiate computational subtraction from the act of decomposing a number.
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, consider the strategy as unanticipated.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child’s reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
				Given one part of a <b>number</b> , identify two or more <b>missing parts</b> .				

**Student Expectation**

Students were expected to use deductive reasoning skills and addition/subtraction strategies to determine the missing part of the whole using the information given in the prompt. Students were shown a part-part-whole table with the total and one of three parts filled in.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Counting: All.</i> Child counted all counters instead of counting on from the given part of the whole. Child recognized that the response was incorrect and did not successfully correct, but the child demonstrated a prerequisite skill to counting on.	<i>One, two, three, four, five, six, seven, eight nine, ten (223 35:01).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-	Count all (223)			
2				-		

Unanticipated strategies by grade level and number range for NRR.B.7.c.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Tools: (I) Linking Cubes (341) NME (CK) Counting: All (341)					
1		Basic Operations: Addition (769) B.5.b. (769)	Tools: (I) Square Tiles (223)			
2				Basic Operations: Addition (352) B.5.c. (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.7.c. activity.

NRR.B.7.c. Anticipated Strategies

<b>NRR.B.7.c.</b>	Given one part of a <b>number</b> , identify <b>two or more missing parts</b> .	
<b>Content Question</b>	I want to use three numbers to make _____. I already have _____. What other two numbers could I use to make _____?	
<b>Reasoning Question</b>	*How do you know that _____, _____, and _____ make _____? How did you figure out that the other two numbers could be _____ and _____? Show me what you saw in your head using pictures, words, or numbers.	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>B7c_E_NOT-Part-part- whole</i>	Part-part-whole figure was given to child.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B7c_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B7c_A_Add</i>	Child adds numbers to find sum. Evidence of vocabulary use (e.g., add, addend, plus, sum, NOT make) or writing symbols must be evident.
	<i>B7c_A_Count on</i>	Child acknowledges whole number, then counts on from a part then stops at whole number.
	<i>B7c_A_Doubles</i>	Child uses doubles
	<i>B7c_A_Representation</i>	Child draws a representation such as tallies or dots and lines to aid in thinking.
	<i>B7c_A_Subtract</i>	Child subtracts number from whole to find part. Evidence of vocabulary use (e.g., subtract, difference, minus, NOT take away) or writing symbols must be evident. Excluding “take away” to differentiate computational subtraction from the act of decomposing a number.
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, consider the strategy as unanticipated.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child’s reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
				Given one part of a <b>number</b> , identify two or more <b>missing parts</b> using different number combinations				

**Student Expectation**

Students were expected to determine a different combination of numbers that total the same whole given in the previous prompt.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>NME.</i> Child was expected to engage with the question based on age in Grade 2, but did not provide verbal or action evidence of understanding or reasoning.	[Child shook head no when asked to explain or draw; transcript and video showed student not responding to prompts and scaffolding] (352).
<i>Counting: All.</i> Child (grade 1, number range 0-19) counted all counters instead of counting on from the given part of the whole. Child recognized that the response was incorrect and did not successfully correct, but the child demonstrated a prerequisite skill to counting on.	In response to ‘can you make number 7 using any three numbers’ student wrote and said, One, two, three, four, five, six, and seven (223, 37:58)
<i>Constructing Numbers Using Digits.</i> Student put different digits next to each other to construct a new numbers.	For the question to add given numbers 3, 3, and 1, student said it will be 31 and then said 3 plus 3 plus 1 will be 103
<i>Writing: Numbers.</i> Children (KG and Grade 1) were expected to be construct a number with three parts but students wrote individual numbers/digits	In response to ‘use three numbers to make number 5’ student wrote 2, 64, and 70 and said because when I thinked in my head and then what I did was, I thinked in my then I thinked I might grow slow (CK, 31:55)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Writing: Numbers (CK)					
<b>1</b>		Constructing Numbers Using Digits (769)	Writing: Numbers (223) Counting: All (223)			
<b>2</b>				NME (352)		

Unanticipated strategies by grade level and number range for NRR.B.7.d.



<b>Grade</b>	<b>0-5</b>	<b>0-10</b>	<b>0-19</b>	<b>0-50</b>	<b>0-99</b>	<b>0-199</b>
<b>K</b>	NME (CK) Tools: (I) Linking Cubes (341) Count all (341)					
<b>1</b>		Basic Operations: Addition (769) B.5.b. (769) NME (708)	Tools: (I) Sq. Tiles (223)			
<b>2</b>				Basic Operations: Addition (352) B.5.c. (352)		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.7.d. activity.

NRR.B.7.d. Anticipated Strategies

<b>NRR.B.7.d.</b>	Given one part of a <b>number</b> , identify two or more <b>missing parts</b> using different number combinations.	
<b>Content Question</b>	Let's look back at the numbers you used to make ____ [number from last item]. .... I already have _____. Can you think of two other numbers that we can use to make ____?	
<b>Reasoning Question</b>	*Can you show me how ____ and ____ and ____ and ____ can both make ____? Tell me more about how you figured out that _ Show me what you saw in your head using pictures, words or numbers.	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>B7d_E_NOT-Part-part- whole</i>	Part-part-whole figure was given to child.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B7d_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B7d_A_Add</i>	Child adds numbers to find sum. Evidence of vocabulary use (e.g., add, addend, plus, sum, NOT make) or writing symbols must be evident.
	<i>B7d_A_Count on</i>	Child acknowledges whole number, then counts on from a part then stops at whole number.
	<i>B7d_A_Doubles</i>	Child uses doubles
	<i>B7d_A_Representation</i>	Child draws a representation such as tallies or dots and lines to aid in thinking.
	<i>B7c_A_Subtract</i>	Child subtracts number from whole to find part. Evidence of vocabulary use (e.g., subtract, difference, minus, NOT take away) or writing symbols must be evident. Excluding "take away" to differentiate computational subtraction from the act of decomposing a number.
<b>A different way</b>	<i>B7d_D_Different</i>	The content question specifically asks for two different number combinations. A different way is coded if child is able to break apart the given number using at least two different number combinations.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child's reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

**Essentialized Skill Statement**

Kindergarten			Grade 1			Grade 2		
F	B	T	F	B	T	F	B	T
Write an expression to represent the decomposition of a <b>number</b> .								

**Student Expectation**

Students were expected to write an equation using the numbers combined to make the whole in the previous two prompts.

**Unanticipated Strategies**

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>NME.</i> Transcript not provided because interviewer omitted question based on student engagement or ability, or child did not respond to content questions with any mathematical evidence of reasoning.	<i>I don't know</i> [response given 5 times to differently scaffolding questions] (223)
<i>Writing: Equation.</i> Children (Grade 2) were expected to understand the difference between mathematical expression and equation. Student wrote a mathematical equation in response to the question of writing expression involving three numbers.	<i>In response to writing an expression using 20, 10, and 5 to represent 35, student wrote a mathematical equation <math>20 + 10 + 5 = 35</math>.</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-					
1		-	NME (223)			
2				Writing: Equation (352)		

Unanticipated strategies by grade level and number range for NRR.B.7.e.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (341, CK)					
1		-	-			
2				-		

Anticipated strategies and skill codes used by grade level and number range for the NRR.B.7.e. activity.

NRR.B.7.e. Anticipated Strategies

<b>NRR.B.7.e.</b>	Write an expression to represent the decomposition of a <b>number</b> .	
<b>Content Question</b>	Let's look back at the numbers you used to make ____ [number from last item]. .... Can you write a number sentence to show that these three numbers make __?	
<b>Reasoning Question</b>	*How do you know that this number sentence represents ____? Is there another way that you could write this number sentence?	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>B7e_E_NOT-Part-part- whole</i>	Part-part-whole figure was given to child.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>B7e_A_General tool</i>	Child uses a concrete object to demonstrate the skill.
	<i>B7e_A_Expression</i>	Child adds numbers to find sum. Evidence of vocabulary use (e.g., add, addend, plus, sum, NOT make) or writing symbols must be evident.
	<i>B7e_A_Equation</i>	Child acknowledges whole number, then counts on from a part then stops at whole number.
<b>A different way</b>	*	The reasoning question that specifically asks for another number sentence was not a required reasoning question. If the question was asked, then a different way was anticipated. If the question was not asked, then a different way was not anticipated.
<b>NRR Essentialized Skills</b>	<i>Other NRR Skill Codes</i>	Consider ESSs not specifically listed here; refer to learning progressions. - Skills prior to this skill code are considered anticipated. - Skills beyond this skill code are considered unanticipated.
	<i>Non-NRR Skill Codes</i>	Content evident in child's reasoning that are not captured in the current NRR learning progressions are considered unanticipated.

# Appendix D – Integrated Strategies Document: Properties of Operations<sup>2</sup>

## NRR.C.8. Equivalence of Quantity and Number Core Concept

8. Equivalence of Quantity and Number									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.8.a.	Given equivalent sets of <b>quantities</b> , recognize that the <b>quantity</b> of each set remains the same regardless of <b>size, color, or arrangement</b> . ( <b>conservation of number</b> )								
NRR.C.8.b.	Given a <b>quantity</b> broken into two parts, recognize that <b>order does not change</b> the <b>quantity</b> . ( <b>commutative property</b> )								
NRR.C.8.c.	Given a <b>quantity</b> , recognize that the <b>quantity</b> remains the same after joining/removing a part then removing/joining the same part. ( <b>undoing or additive inverse</b> )								
NRR.C.8.d.				Given two associated parts and another part, recognize that the <b>quantity</b> of the three parts remains the same if the parts are reassociated. ( <b>associative property</b> )					
NRR.C.8.e.	Given a <b>quantity</b> , recognize an equivalent expression that demonstrates one or more <b>property of operations</b> .								
NRR.C.8.f.	Recognize <b>two equivalent expressions</b> that demonstrate one or more <b>property of operations</b> .								
NRR.C.8.g.				Recognize two equivalent expressions that demonstrate <b>decomposition and at least one property of operations</b> .					

<sup>2</sup> C.8.b paper coded copies are missing.

NRR.C.8. Synthesis Data

Unanticipated strategies: NRR.C.8.a-c

Skill Code			C.8.a.			C.8.b		C.8.c			
Unanticipated			C	Change in Total	N M E	C	Unfounded	C	Compare Quantities Between Cards	Change in Total	N M E
SID	Grade	Number Range									
RK	K	0 - 5	1	-	1	0	1	0	1	-	-
768	K	0 - 5	1	-	-	0	-	0	1	-	-
385	K	0 - 10	1	Removing	-	1	-	0	1	-	-
495	K	0 - 10	1	-	-	1	-	1	-	-	-
223	1	0 - 10	1	-	-	0	-	0	-	-	1
946	1	0 - 10	0	-	-	1	-	1	1	-	-
152	1	0 - 19	1	-	-	1	-	0	1	-	-
793	1	0 - 19	0	-	1	0	-	1	-	-	-
993	2	0 - 50	1	Removing	-	1	-	1	-	-	-
284	2	0 - 99	1	-	-	1	-	1	-	-	-
563	2	0 - 99	1	-	-	1	-	1	-	-	-
676	2	0 - 199	1	Removing	-	1	-	1	-	Adding	-
Strategies Total by Skill Code				3	2		1		5	1	1

**Unanticipated strategies: NRR.C.8.d-g**

Skill Code			C.8.d		C.8.e		C.8.f		C.8.g		
Unanticipated			<i>C</i>	<i>NME</i>	<i>C</i>	<i>NME</i>	<i>C</i>	<i>Counting</i>	<i>C</i>	<i>Compare Quantities Between Cards</i>	<i>Unfounded</i>
SID	Grade	Number Range									
RK	K	0 - 5	0	-	1	-	0	-	0	-	-
768	K	0 - 5	0	-	1	1	0	-	1	-	-
385	K	0 - 10	1	-	1	-	1	-	0	-	-
495	K	0 - 10	0	-	1	1	0	All	0	1	-
223	1	0 - 10	0	1	1	1	1	All	1	-	1
946	1	0 - 10	0	-	1	-	0	-	1	-	-
152	1	0 - 19	0	-	0	-	1	All	0	-	1
793	1	0 - 19	0	-	1	1	1	-	1	-	-
993	2	0 - 50	1	-	1	-	0	-	1	-	-
284	2	0 - 99	1	-	1	-	1	-	1	-	-
563	2	0 - 99	1	-	1	-	1	-	1	-	-
676	2	0 - 199	1	1	1	-	1	3	0	-	-
Strategies Total by Skill Code				2		4				1	3

Anticipated strategies: NRR.C.8.a-b

Skill Code			C.8.a.				C.8.b				
Anticipated			C	NRR.A.1	Counting	No Counting & No Change in Numbers	C	NRR.A.1	Match Cards	Counting	Tell a Story
SID	Grade	Number Range									
RK	K	0 - 5	1	-	-	-	0	-	-	-	-
768	K	0 - 5	1	A.1.a	-	-	0	A.1.a	-	-	-
385	K	0 - 10	1	-	-	-	1	A.1.a	1	-	1
495	K	0 - 10	1	-	-	1	1	-	1	-	-
223	1	0 - 10	1	-	-	1	0	-	-	All	-
946	1	0 - 10	0	-	All	-	1	-	-	-	1
152	1	0 - 19	1	-	-	1	1	A.1.a	-	-	1
793	1	0 - 19	0	-	-	-	0	-	-	-	1
993	2	0 - 50	1	-	-	-	1	-	-	-	-
284	2	0 - 99	1	-	-	-	1	-	-	-	1
563	2	0 - 99	1	-	-	1	1	-	1	Skip(3)	-
676	2	0 - 199	1	-	-	-	1	-	-	-	-
Strategies Total by Skill Code				1	1	4		3	3	2	5



**Anticipated strategies: NRR.C.8.c-d**

Skill Code			C.8.c.					C.8.d				
Anticipated			C	NRR. A.1	NRR. B.5	Counting	Tell a Story	C	NRR. A.1	NRR.B.5	Change in Total	Counting
SID	Grade	Number Range										
RK	K	0 - 5	0	A.1.a	B.5.b	-	-	0	A.1.a	B.5.b; B.5.c	-	-
768	K	0 - 5	0	A.1.a	-	-	-	0	A.1.a	-	-	-
385	K	0 - 10	0	-	-	-	-	1	-	-	-	-
495	K	0 - 10	1	A.1.a	-	All	-	0	-	-	-	All
223	1	0 - 10	0	-	-	-	-	0	-	-	-	-
946	1	0 - 10	1	A.1.a	B.5.b	-	-	0	-	-	-	All
152	1	0 - 19	0	A.1.a	-	-	-	0	-	-	-	-
793	1	0 - 19	1	-	-	-	1	0	-	-	-	All
993	2	0 - 50	1	-	-	-	1	1	-	-	-	-
284	2	0 - 99	1	-	-	-	1	1	-	-	Removing	-
563	2	0 - 99	1	-	-	-	1	1	-	-	Removing	-
676	2	0 - 199	1	-	-	-	-	1	-	-	-	-
Strategies Total by Skill Code				5	2	1	4		2	1	2	3

Anticipated strategies: NRR.C.8.e-f

Skill Code			C.8.e.				C.8.f.				
Anticipated			C	NRR. B.5	NRR. C.8.	Connect Pictures to Expressions	C	NRR. B.5	NRR. C.8.	Connect Pictures to Numbers	Compare Sums
SID	Grade	Number Range									
RK	K	0 - 5	1	-	C.8.b	-	0	-	-	-	-
768	K	0 - 5	1	-		-	0	-	-	-	-
385	K	0 - 10	1	-		1	1	B.5.b	C.8.b	-	1
495	K	0 - 10	1	-		-	0	B.5.b B.5.c	-	-	-
223	1	0 - 10	1	-		-	1	-	-	-	-
946	1	0 - 10	1	B.5.b		1	0	B.5.b	-	-	1
152	1	0 - 19	0	B.5.b		1	1	B.5.b B.5.c	-	1	-
793	1	0 - 19	1	-		-	1	-	-	-	1
993	2	0 - 50	1	B.5.b	C.8.b	-	0	-	C.8.b	-	1
284	2	0 - 99	1	-	C.8.c	1	1	-	C.8.b	-	1
563	2	0 - 99	1	-	C.8.c	1	1	-	-	-	-
676	2	0 - 199	1	B.5.b	C.8.c	1	1	B.5.b	C.8.b	1	-
Strategies Total by Skill Code				4	5	6		7	4	2	5

Anticipated strategies: NRR.C.8.g

Skill Code			C.8.g.				
Anticipated			C	NRR. C.8	Counting	Unfounded	Compare Sums
SID	Grade	Number Range					
RK	K	0 - 5	0	-	-	-	-
768	K	0 - 5	1	-	-	-	-
385	K	0 - 10	0	-	-	1	-
495	K	0 - 10	0	-	-	-	-
223	1	0 - 10	1	-	-	-	-
946	1	0 - 10	1	-	-	-	-
152	1	0 - 19	0	-	-		-
793	1	0 - 19	1	-	On	-	1
993	2	0 - 50	1	-	-	-	1
284	2	0 - 99	1	-	-	-	1
563	2	0 - 99	1	C.8.c	-	-	1
676	2	0 - 199	0	C.8.c	-	-	1
Strategies Total by Skill Code				2	1	1	5

NRR.C.8.a. Summary

**Essentialized Skill Statement**

<b>8. Equivalence of Quantity and Number</b>									
<b>Code</b>	<b>Kindergarten</b>			<b>Grade 1</b>			<b>Grade 2</b>		
	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>
NRR.C.8.a.	Given equivalent sets of <b>quantities</b> , recognize that the <b>quantity</b> of each set remains the same regardless of <b>size, color, or arrangement. (conservation of number)</b>								

**Student Expectation**

Children were expected to recognize that the total number of ducks was the same as the total number of rabbits and that the quantity did not change when the rabbits were spread out.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Removing.</i> Several students relied on the idea of removal to explain why there were still the same number of rabbits as ducks.	<p>[There is still the same number] <i>because you pushed them back and not deleted one</i> (385, 02:16).</p> <p>[There is still the same number] <i>because one's not missing</i> (993, 05:11).</p> <p>[There is still the same number] <i>because you didn't take any away</i> (676, 00:46).</p>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (RK)	Removing (385)				
1		-	NME (793)			
2				Removing (993)	-	-

Unanticipated strategies by grade level and number range for NRR.C.8.a.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	1a (768)	No Counting and No Change in Number (495)				
1		No Counting and No Change in Number (223) Count All (946)	No Counting and No Change in Number (152)			
2				-	Matching Without Specific Number (284) No Counting and No Change in Number (563)	Removing (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.8.a. activity

NRR.C.8.a. Anticipated Strategies

<b>NRR.C.8.a.</b>	Given equivalent sets of <b>quantities</b> , recognize that the <b>quantity</b> of each set remains the same regardless of <b>size, color, or arrangement. (conservation of number)</b>	
<b>Content Question</b>	(1) Are there the same number of rabbits as there are ducks? (2) What if the rabbits decided to hop off and play. Are there more rabbits now? More ducks? Or the same number of each?	
<b>Reasoning Question</b>	How do you know that_____?	
<b>Anticipated Skills</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>C8a_E_NOT-Animals</i>	Rabbits and ducks are embedded into the activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C8a_A_General tool</i>	Child uses a general tool as listed above.
	<i>C8a_A_Count all</i>	Child counts all rabbits and all ducks individually. [Counting]
	<i>C8a_A_Count by 2s</i>	Counting. Child counts animals in groups of 2; does not necessarily need to be a bunny paired with a duck. ("2, 4, 6, 8") [Counting]
	<i>C8a_A_One to one correspondence</i>	Child pairs each rabbit to a duck. [Counting]
	<i>C8a_A_Count pairs</i>	Child counts pairs ("1, 2, 3, 4") [Counting]. One to one correspondence should also be coded if child pairs a rabbit and a duck.
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.
<b>NRR Essentialized Skill Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>Current Skill Code</i> <i>01- Comparison</i>	Only specific student talk-turn within activity that is attributed to the current skill code. <ul style="list-style-type: none"><li>• Child compares total counted bunnies and total counted quantities. [Relations]</li><li>• Select skill code in core concept Comparison, that best fits child's approach.</li><li>• A counting strategy should also be selected within the current skill code. If the anticipated strategies are not reflective of what the child did, then code an unanticipated strategy to represent the child's approach to comparing quantities.</li></ul>

**Essentialized Skill Statement**

<b>9. Equivalence of Quantity and Number</b>									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.8.b.	Given a <b>quantity</b> broken into two parts, recognize that <b>order does not change the quantity. (commutative property)</b>								

**Student Expectation**

Children were expected to recognize that the total number of ducks did not change from one point in time to another point in time. First the big ducks when in then the little ducks, then later vice versa. All students were expected to be able to reason through this activity by acknowledging that the order in which the ducks entered the pond did not change the quantity.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Unfounded.</i> When asked if there were the same number of ducks in the pond, a Kindergarten student focused on counting the bumps in the ponds rather than the ducks. The child viewed the ponds as different and therefore each side could not be the same.	<i>Because, but the pond is different in the shape, though. Because, this one has ... let me see ... one, two, three, four. It has four bumps, and this one has one, two, three. That one has three (RK, 4:38).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Unfounded (RK)	-				
1		-	-			
2				-	-	-

Unanticipated strategies by grade level and number range for NRR.C.8.b.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	1a (768)	Tells a Story, Match Cards (385) Match Cards (495) 1a (385)				
1		Count All (223) Tells a Story (946)	Tells a Story (152, 793) 1a (152)			
2				Change of Order (993)	Tells a Story (284) Count by 3s, Matching (563)	Change of Order (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.8.b. activity.



NRR.C.8.b. Anticipated Strategies

<b>NRR.C.8.b.</b>	Given a <b>quantity</b> broken into two parts, recognize that <b>order does not change</b> the <b>quantity</b> . (commutative property)	
<b>Content Question</b>	Are there more, less, or the same number of ducks in the pond now?	
<b>Reasoning Question</b>	Can you make up a story that shows how the order doesn't change the total?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>C8b_E_NOT-Pictures</i>	Pictures of ducks in groups.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C8b_A_General tool</i>	Child uses a general tool as listed above.
	<i>C8b_A_Count all</i>	Child counts all ducks on each card. [Counting]
	<i>C8b_A_Count groups</i>	Child counts by groups of ducks. [Counting]
	<i>C8b_A_Count on</i>	<ul style="list-style-type: none"> <li>Differs from count all. [Counting]</li> <li>If a child counts all ducks on one card, then proceeds to count the ducks on the next card, this is count all. However, if the child identifies the amount of ducks on the first card without individually counting, then starts from the total of the first card to continue counting on the next card, this is considered counting on.</li> </ul>
	<i>C8b_A_Match cards</i>	<ul style="list-style-type: none"> <li>Child matches the cards that have the same quantities.</li> <li>Child may either point to the two cards that are the same or line up the cards that are the same by switching the order</li> </ul>
	<i>C8b_A_Immediate recognition</i>	<ul style="list-style-type: none"> <li>Immediate recognition of same pattern or groupings.</li> <li>Child does not count images on cards to be able to provide a response.</li> </ul>
	<i>C8b_A_Tell a story</i>	<ul style="list-style-type: none"> <li>Child tells a story that demonstrates order does not change the total.</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR</b>	<i>Current Skill Code</i>	Only specific student talk-turn within activity that is attributed to the current skill code.

<p><b>Essentialized Skill Statements</b>  <i>[Also consider ESSs not specifically listed here; refer to learning progressions.]</i></p>	<p><i>05- Composition</i></p>	<ul style="list-style-type: none"> <li>• Add two or more quantities together. [Composition &amp; Decomposition]</li> <li>• Select skill code in core concept Composition, that best fits child’s approach.</li> <li>• A counting strategy should also be selected within the current skill code. If the anticipated strategies are not reflective of what the child did, then code an unanticipated strategy to represent the child’s approach to comparing quantities.</li> </ul>
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**Essentialized Skill Statement**

<b>8. Equivalence of Quantity and Number</b>									
<b>Code</b>	<b>Kindergarten</b>			<b>Grade 1</b>			<b>Grade 2</b>		
	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>
NRR.C.8.c.	Given a <b>quantity</b> , recognize that the <b>quantity</b> remains the same after joining/removing a part then removing/joining the same part. <b>(undoing or additive inverse)</b>								

**Student Expectation**

Children were expected to recognize that the total number of rabbits did not change from the beginning of the day to the end of the day after a quantity of rabbits were removed during the middle of the day and rejoined at the end of the day. All students were expected to be able to reason through this activity.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Adding to Total.</i> The goal of the activity was for students to recognize that the quantity maintained the same given a situation involving additive inverse. Considering an additional amount to the total is beyond the additive inverse property.	[There are the same number of rabbits] <i>because you didn't add any</i> (676, 3:23).
<i>Compare Quantities Between Cards.</i> Instead of comparing the quantities at different times of the day, children compared quantities on the different cards and misunderstood the intended question.	<p><i>Because it has two and this one has one</i> (768, 8:21).</p> <p><i>Well this one has a little but [pointing to card with one bunny] because they only have one. This one has two because it has more [pointing to card with two bunnies]</i> (RK, 6:00).</p> <p><i>Because this square only has four...Oh, no, because one has four and this one has five</i> (152, 11:39).</p>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Compare Quantities Between Cards (RK, 768)	Compare Quantities Between Cards (385)				
<b>1</b>		NME (223) Compare Quantities Between Cards (946)	Compare Quantities Between Cards (152)			
<b>2</b>						Adding to Total (676)

Unanticipated strategies by grade level and number range for NRR.C.8.c.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	1a, 5a, 5b (RK) 1a (768)	Count All (495) 1a, (495)				
<b>1</b>		1a, 5a, 5b (946)	1a (152) Additive Inverse Story (793)			
<b>2</b>				Additive Inverse Story (993)	Additive Inverse Story (284, 563)	

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.8.c. activity.

NRR.C.8.c. Anticipated Strategies

<b>NRR.C.8.c.</b>	Given a <b>quantity</b> , recognize that the <b>quantity</b> remains the same after joining/removing a part then removing/joining the same part. ( <b>undoing or additive inverse</b> )	
<b>Content Question</b>	Are there more, less, or the same number of rabbits at home now?	
<b>Reasoning Question</b>	What makes you think that there are ____ rabbits now?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>C8c_E_NOT-Pictures</i>	Pictures of rabbits in groups.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C8c_A_General tool</i>	Child uses a general tool as listed above.
	<i>C8c_A_Act out</i>	Child moves cards to act out their thinking.
	<i>C8c_A_Count all</i>	Child counts all rabbits on each card. [Counting]
	<i>C8c_A_Count groups</i>	Child counts by groups of rabbits. [Counting]
	<i>C8c_A_Count on</i>	<ul style="list-style-type: none"> <li>• Differs from count all. [Counting]</li> <li>• If a child counts all rabbits on one card, then proceeds to count the rabbits on the next card, this is count all.</li> <li>• However, if the child identifies the amount of rabbits on the first card without individually counting, then starts from the total of the first card to continue counting on the next card, this is considered counting on.</li> </ul>
	<i>C8c_A_Immediate recognition</i>	<ul style="list-style-type: none"> <li>• Immediate recognition of same pattern or groupings.</li> <li>• Child does not count images on cards to be able to provide a response.</li> </ul>
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.
<b>NRR</b>	<i>Current Skill Code</i>	Only specific student talk-turn within activity that is attributed to the current skill code.

<p><b>Essentialized Skill Statements</b>  <i>[Also consider ESSs not specifically listed here; refer to learning progressions.]</i></p>	<p><i>05- Composition</i></p>	<ul style="list-style-type: none"> <li>• Add two or more quantities together. [Composition &amp; Decomposition]</li> <li>• Select skill code in core concept Composition, that best fits child’s approach.</li> <li>• A counting strategy should also be selected within the current skill code. If the anticipated strategies are not reflective of what the child did, then code an unanticipated strategy to represent the child’s approach to comparing quantities.</li> </ul>
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**Essentialized Skill Statement**

<b>8. Equivalence of Quantity and Number</b>									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.8.d.							Given two associated parts and another part, recognize that the <b>quantity</b> of the three parts remains the same if the parts are reassociated. <b>(associative property)</b>		

**Student Expectation**

UPDATE

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Adding to or Subtracting from Total.</i> The goal of the activity was for students to recognize that the quantity maintained the same given a situation involving the associative property. Considering an additional amount to the total or a removal from the total is beyond the associative property.	<p>[The amount doesn't change] <i>because these ducks are playing here but they didn't leave, they just went right here (563, 12:00).</i></p> <p>[The amount doesn't change] <i>because there is ducks and rabbits and no more animals came, so it's gonna be the same number (284, 12:19).</i></p>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K						
1		NME (223)				
2						NME (676)

Unanticipated strategies by grade level and number range for NRR.C.8.d.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	1a, 5b, 5c (RK) 1a (768)	Act Out (385) Count All (495)				
1		Count All (946)	Count All (793) 1c (152)			
2				Act Out (993)	Adding or Subtracting from Total (284, 563)	

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.8.d. activity.



NRR.C.8.d. Anticipated Strategies

<b>NRR.C.8.d.</b>	Given two associated parts and another part, recognize that the <b>quantity</b> of the three parts remains the same if the parts are reassociated. ( <b>associative property</b> )	
<b>Content Question</b>	If the ducks in the field join the ducks in the pond, will there be more, less, or the same number of animals?	
<b>Reasoning Question</b>	Can you show me how you know that there will be [more, less, or the same]?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>C8d_E_NOT-Pictures</i>	Pictures of ducks and rabbits.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C8d_A_General tool</i>	Child uses a general tool as listed above.
	<i>C8d_Act out</i>	Child moves cards to demonstrate thinking.
	<i>C8d_A_Count all</i>	Child counts all animals on each card. [Counting]
	<i>C8d_A_Count groups</i>	Child counts by groups of animals. [Counting]
	<i>C8d_A_Count on</i>	<ul style="list-style-type: none"> <li>Differs from count all. [Counting]</li> <li>If a child counts all animals on one card, then proceeds to count the animals on the next card, this is count all.</li> </ul> <p>However, if the child identifies the amount of animals on the first card without individually counting, then starts from the total of the first card to continue counting on the next card, this is considered counting on.</p>
	<i>C8d_A_Immediate recognition</i>	Immediate recognition of same pattern or groupings.
<b>A different way</b>	-	A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.
<b>NRR</b>	<i>Current Skill Code</i>	Only specific student talk-turn within activity that is attributed to the current skill code.
	<i>NRR.C.8.a.</i>	Identify cards with the same values. Child might point to cards. [Properties of Operations]

<p><b>Essentialized Skill Statements</b>  <i>[Also consider ESSs not specifically listed here; refer to learning progressions.]</i></p>	<p><i>05- Composition</i></p>	<ul style="list-style-type: none"> <li>• Add two or more quantities together. [Composition &amp; Decomposition]</li> <li>• Select skill code in core concept Composition, that best fits child’s approach.</li> <li>• A counting strategy should also be selected within the current skill code. If the anticipated strategies are not reflective of what the child did, then code an unanticipated strategy to represent the child’s approach to comparing quantities.</li> </ul>
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**Essentialized Skill Statement**

<b>8. Equivalence of Quantity and Number</b>									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.8.e.		Given a <b>quantity</b> , recognize an equivalent expression that demonstrates one or more <b>property of operations</b> .							

**Student Expectation**

Children were expected to use the total quantities of each card to connect to the expressions without having to compare the total of expressions to the total number of animals.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Count All.</i> For 8.e., children were expected to use the known quantities and connect the picture to the expressions. To convince themselves that the numbers were the same, children were still counting the numbers.	<i>There are one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve, thirteen- (793, 13:29).</i>  <i>Is it okay if I count them altogether? I counted 32 (152, 15:15, 15:35).</i>
<i>Matching and Counting.</i> Matching and counting strategies were not expected for children who were at least in first grade.	<i>Because this one is true because it has three and three which equals six and on here, as well, because six plus six is 12, and same thing right here because this one has 12 as well, so and then 12 plus 12 equals eight, I mean, plus eight (152, 16:25).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (768)	NME (495)				
1		NME (223)	NME (793)			
2						

Unanticipated strategies by grade level and number range for NRR.C.8.e.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	8b (RK)	Connect Pictures to Expressions (385)				
1		Connect Pictures to Expressions (946) 5b (946)	Connect Pictures to Expressions (152) 5b (152)			
2				5b, 8b (993)	Connect Pictures to Expressions (284, 563) 8c (284, 563)	Connect Pictures to Expressions (676) 5b, 8c (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.8.e. activity.

NRR.C.8.e. Anticipated Strategies

<b>NRR.C.8.e.</b>	Given a <b>quantity</b> , recognize an equivalent expression that demonstrates one or more <b>property of operations</b> .	
<b>Content Question</b>	Pick a number sentence that could describe all of the animals that Dasia saw.	
<b>Reasoning Question</b>	How is that number sentence related to the animals? Is there another number sentence that describes the situation?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>C8e_E_NOT-Pictures</i>	Pictures of ducks and rabbits.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	Counting and computational strategies were excluded here since the focus is on the expressions. Evidence of counting/computational strategies can be considered unanticipated and should be coded accordingly.	
	<b>Code</b>	<b>Description</b>
	<i>C8e_A_General tool</i>	Child uses a general tool as listed above.
	<i>C8e_A_Connect pictures to expressions</i>	Explain how the numbers represented on the cards are related to the quantities of animals that Dasia saw.
	<i>C8e_A_Move pictures</i>	Rearrange picture cards to find an equivalent expression.
<b>A different way</b>	<i>C8e_D_Another number sentence</i>	Another number sentence was anticipated for this essentialized skill statement. All number sentences are representative of the images, but not all are aligned. As long as child selected another number sentence <i>and</i> was able to demonstrate an understanding of their selection then a different way should be assigned.
<b>NRR Essentialized Skill Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>Current Skill Code</i>	Only specific student talk-turn within activity that is attributed to the current skill code.
	<i>NRR.C.8.b.</i>	Purposefully identify an expression demonstrating commutative property. [Properties of Operations] Child must demonstrate an understanding of the commutative property. Child may use vocabulary such as “switched”, “swap” or child may move cards to connect to expression.
	<i>NRR.C.8.c.</i>	Purposefully identify an expression demonstrating associative property. [Properties of Operations] Child must demonstrate an understanding of the associative property. Child may move cards and group ducks together to explain how the expression represents the images.
	<i>05- Composition</i>	<ul style="list-style-type: none"> <li>Add two or more quantities together. [Composition &amp; Decomposition]</li> <li>Select skill code in core concept Composition, that best fits child’s approach.</li> </ul>

**Essentialized Skill Statement**

<b>8. Equivalence of Quantity and Number</b>									
<b>Code</b>	<b>Kindergarten</b>			<b>Grade 1</b>			<b>Grade 2</b>		
	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>
NRR.C.8.f.		Recognize <b>two equivalent expressions</b> that demonstrate one or more <b>property of operations</b> .							

**Unanticipated Strategies**

Children were expected to compare two equivalent expressions without comparing total sums.

<b>Strategy. Justification/Description</b>	<b>Examples</b>
<i>Compare Number of Addends.</i> Child compared the number of addends in each expression to determine whether or not the expressions were the same/different. Child’s reasoning was not mathematically sound, and provides confirming evidence that this ESS may not be suitable at the foundational level for Kindergarten.	<i>Because these numbers [2+2+1] only have three, and these numbers [1 +4] only have two (RK, 14:24).</i>
<i>Count All.</i> Children counted by 1s to determine the total. For this essentialized skill statement, counting all individually was not expected for grades 1 and 2 because children should be able to use strategies such as composition and properties of operations to determine equivalence of expressions.	<p><i>Let me count out 4 and 4... 1,2,3,4... 1,2,3,4,5,6... So 4 plus 6 is 1,2,3,4,5,6,7,8,9,10 (495, 10:32 – 12:08).</i></p> <p><i>Six. One, two, three, four, five, six, seven, eight nine, 10.</i></p> <p><i>Four, 4+4. One, two, three, four, five, six, seven, eight, nine, 10 (223, 13:06).</i></p> <p><i>[Child pointed to each animal individually without verbalization] This one is the same as well....Because these two groups have together they make 24 and this one together they make eight, so if you were to put them together it would equal 32 (152, 17:17, 17:55).</i></p>
<i>Connect Pictures to Numbers.</i> This activity was intended for use with two expressions without pictorial representations. Two children connected the expressions to the ducks and rabbits from the previous activity. <i>Connect Pictures to Numbers. (cont.)</i>	<p><i>Because this one, well this one is right because over here there’s 24 and eight right here (152, 17:10).</i></p> <p><i>There’s one group of ducks all together and there’s one group of bunnies all together; so there’s two numbers and there’s two numbers and there’s two groups of animals (676, 7:30).</i></p>

<p><i>Write an Equation.</i> Child wrote <math>8 + 2 = 10</math> and <math>2 + 8 = 10</math>. This content is different than C.9.b. since quantities were not given on a balance or pictorial representation. The child was given two expressions.</p>	<p>[<i>Child writes <math>8 + 2 = 10</math></i>] (385, 13: 55)  [<i>Child also writes <math>2 + 8 = 10</math></i>] (385, 14:20)</p>
<p><i>Blocks.</i> Child described that a convincing explanation to a friend would include the use of blocks. While the blocks were always present on the table, the interviewer did not suggest that the child use the blocks for this activity; the child chose to select blocks without prompting.</p>	<p><i>I'll show them by using blocks, if I had some. And telling her which numbers are the same, because she has to know her numbers to know. So I would get the blocks and get six, and tell her the number sentences (284, 16:35).</i></p>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Compare Number of Addends (RK)	Count All (495) Write an Equation (385)				
<b>1</b>		Count All (223)	Count All (152) Connect Pictures to Numbers (152)			
<b>2</b>				-	Blocks (284)	Connect Pictures to Numbers (676)

Unanticipated strategies by grade level and number range for NRR.C.8.f.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	-	Compare Sums (385) 5b / 8b (385) 5b / 5c (495)				
<b>1</b>		Compare Sums (385) 5b (385)	Compare Sums (152) 5b / 5c (152)			
<b>2</b>				Compare Sums (993) 8b (993)	Compare Sums (284) 8b (284)	- 5b / 8b (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.8.f. activity.



NRR.C.8.f. Anticipated Strategies

<b>NRR.C.8.f.</b>	Recognize <b>two equivalent expressions</b> that demonstrates one or more <b>property of operations</b> .	
<b>Content Question</b>	Look at these two number sentences. Do they represent the same amounts or different amounts?	
<b>Reasoning Question</b>	If one of your friends didn't believe that these two number sentences were the same, how would you convince them that you are right?	
<b>Anticipated</b>		
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools embedded. The images were not intended to be associated with this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C8e_A_General tool</i>	Child uses a general tool as listed above.
	<i>C8f_A_Compare sums</i>	<ul style="list-style-type: none"> <li>Add numbers to find sums, compare</li> </ul> Write expressions out and calculate to find totals, then compare
	<i>C8f_A_Count on</i>	<ul style="list-style-type: none"> <li>Count on from first addend to find total</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>Current Skill Code</i>	Only specific student talk-turn within activity that is attributed to the current skill code.
	<i>NRR.C.8.b.</i>	Identify numbers that are the same in both expressions and use concepts of commutative property to explain how the expressions are the same. (CP, NP) [Properties of Operations]
	<i>NRR.C.8.c.</i>	Identify that the first number of each expression is the same and the combination of the last two addends in the literal expression is the same as the second addend of the associative property expression. (AP, L)
	<i>06- Decomposition</i>	<ul style="list-style-type: none"> <li>Decompose a number in an expression into two or more numbers present in the other expression. [Composition &amp; Decomposition]</li> <li>Select skill code in core concept Decomposition, that best fits child's approach.</li> </ul>

**Essentialized Skill Statement**

<b>8. Equivalence of Quantity and Number</b>										
<b>Code</b>	<b>Kindergarten</b>			<b>Grade 1</b>			<b>Grade 2</b>			
	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	
NRR.C.8.g.				Recognize two equivalent expressions that demonstrate <b>decomposition and at least one property of operations.</b>						

**Student Expectation**

Three expressions given to students were provided on two different cards; one card with one expression and the second card with two expressions to show the decomposition and commutative property. Children were expected to identify that all expressions were equivalent.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Unfounded.</i>	<p><i>I don't think [Olivia] wrote the right sentences and [Rene] wrote the right...[Rene] wrote the wrong and [Olivia] wrote the right...because I think [Rene] added up too many numbers (152, 20:41 – 21:02).</i></p> <p><i>I want to count [all of the addends in each expression] altogether (223, 17:23).</i></p>
<i>Compared Quantities.</i> Since the situation in this activity continued using the rabbits and ducks in the previous activities using quantities, a child compared the quantity of ducks to the quantity of rabbits. In the example provided, the child was comparing the addends in the expression $4 + 5$ .	<i>Because there was 5 rabbits and there were 4 ducks (495, 14:27).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K		Compared Quantities (495)				
1		Unfounded (223)	Unfounded (152)			
2						

Unanticipated strategies by grade level and number range for NRR.C.8.g.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (768) NME (RK)	Unfounded (385)				
1		Compared Addends (946)	Compare Sums (793) Count On (793)			
2				Compare Sums (993)	Compare Sums (284, 563) 8c (563)	Compare Sums (676) 8c (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.8.g. activity.

NRR.C.8.g. Anticipated Strategies

<b>NRR.C.8.g.</b>	Recognize two equivalent expressions that <b>demonstrate decomposition and at least one property of operations.</b>	
<b>Content Question</b>	Dasia saw <u>animals</u> playing in the field and <u>ducks</u> in the pond. Rene wrote down these two number sentences to count the animals. They both agreed that there were <u>animals</u> . Do you agree?	
<b>Reasoning Question</b>	Why do you agree or disagree?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools embedded. The images were not intended to be associated with this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the <i>General tool</i> code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C8e_A_General tool</i>	Child uses a general tool as listed above.
	<i>C8g_A_Count on</i>	<ul style="list-style-type: none"> <li>Count on from first addend to find total</li> </ul>
	<i>C8g_A_Compare sums</i>	<ul style="list-style-type: none"> <li>Add numbers to find sums, compare</li> <li>Write expressions out and calculate to find totals, then compare</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>Current Skill Code</i>	Only specific student talk-turn within activity that is attributed to the current skill code.
	<i>NRR.C.8.b.</i>	Identify numbers that are the same in both expressions and use concepts of commutative property to explain how the expressions are the same. [Properties of Operations]
	<i>NRR.C.8.c.</i>	Identify that the second addend in Dasia's expression is the sum of the last two addends in Renee's expressions.
	<i>06- Decomposition</i>	<ul style="list-style-type: none"> <li>Decompose a number in an expression into two or more numbers present in the other expression. [Composition &amp; Decomposition]</li> <li>Select skill code in core concept Decomposition, that best fits child's approach.</li> </ul>

NRR.C.9. Equal Sign as a Relational Symbol Core Concept

9. Equal Sign as a Relational Symbol									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.9.a.	Recognize the equality between two <b>quantities</b> using a balance.								
NRR.C.9.b.		Write a true equation using an equal sign to represent the relationship between given <b>quantities</b> on a balance or in a pictorial representation.							
NRR.C.9.c.				Recognize true and not true equations with different equation structures: <b>operations on the left side</b> ( $a + b = c$ ); <b>no operations</b> ( $a = a$ ); <b>operations on the right side</b> ( $c = a + b$ ).					
NRR.C.9.d.					Recognize true and not true equations with different equation structures: <b>operations on the both sides</b> ( $a + b = c + d$ ); <b>multiple instances of a number</b> .				

NRR.C.9. Synthesis Data

Unanticipated strategies: NRR.C.9.a-d

Skill Code			C.9.a		C.9.b	C.9.c				C.9.d		
Unanticipated			C	NME	C	C $a+b=c$	C $a=a$	C $c=a+b$	Unknown Equation Structure	C $a+b=c+d$	C $a+a=b+b$	Unknown Equation Structure
SID	Grade	Number Range										
RK	K	0 - 5	1	-	-	-	1	-	-	-	-	-
768	K	0 - 5	1	1	-	-	1	1	-	1	-	-
385	K	0 - 10	1	-	-	1	-	-	-	-	-	-
495	K	0 - 10	1	-	-	-	-	-	-	-	1	-
223	1	0 - 10	1	-	-	1	1	-	$a=a$	-	-	-
946	1	0 - 10	1	-	-	-	-	-	$a=a$	-	-	-
152	1	0 - 19	1	-	-	1	-	1	$a=a$	1	-	$a+a = b+b$
793	1	0 - 19	1	-	-	1	-	-	$a=a$	-	1	$a+b = c+d$
993	2	0 - 50	1	-	-	1	-	1	$a=a$	-	-	$a+b = c+d$ ; $a+a = b+b$
284	2	0 - 99	1	-	-	1	1	1	-	-	1	-
563	2	0 - 99	1	-	-	1	1	1	-	1	1	-
676	2	0 - 199	1	-	1	1	1	-	-	-	-	$a+b = c+d$
Strategies Total by Skill Code									5			5

Anticipated strategies: NRR.C.9.a-b

Skill Code			C.9.a				C.9.b						
Anticipated			C	Quantity	Height	Weight	C	N M E	Counting	Equation	Quantity	NRR. B.5.	Height
SID	Grade	Number Range											
RK	K	0 - 5	1	1	-	-	0	-	-	-	-	B.5.a	-
768	K	0 - 5	1	-	-	-	0	1	-	-	-	-	-
385	K	0 - 10	1	1	1	1	0	-	-	1	-	-	-
495	K	0 - 10	1	1	1	1	0	-	All	1	-	B.5.b	-
223	1	0 - 10	1	-	1	-	0	-	-	1	1	B.5.b	1
946	1	0 - 10	1	1	1	-	0	-	-	-	1	-	-
152	1	0 - 19	1	1	-	1	0	-	All	1	1	-	1
793	1	0 - 19	1	1	-	-	0	-	All	-	-	-	-
993	2	0 - 50	1	1	1	1	0	-	All	1	-	-	-
284	2	0 - 99	1	1	1	-	0	-	All	1	-	-	-
563	2	0 - 99	1	1	1	1	0	-	-	1	-	-	-
676	2	0 - 199	1	1	-	-	1	-	-	1	1	-	-
Strategies Total by Skill Code				10	7	5		1	5	8	4	3	2

Anticipated strategies: NRR.C.9.c

Skill Code			C.9.c							
Anticipated			C <i>a+b=c</i>	C <i>a=a</i>	C <i>c=a+b</i>	N M E	Unknown Equation Structure	Count	Relational	Operational
SID	Grade	Number Range								
RK	K	0 - 5	0	1	0	1	-	-	-	-
768	K	0 - 5	0	1	1	1	-	-	-	-
385	K	0 - 10	1	0	0	-	$c = a + b \mid a = a$	On	-	$c = a + b \mid a = a$
495	K	0 - 10	0	0	0	-	$c = a + b \mid a = a$	-	-	-
223	1	0 - 10	1	1	0	-	-	-	-	$c = a + b \mid a + b = c$
946	1	0 - 10	0	0	0	-	-	-	-	$c = a + b \mid a + b = c$
152	1	0 - 19	1	0	1	-	-	-	-	$c = a + b \mid a + b = c$
793	1	0 - 19	1	0	0	-	-	-	-	$c = a + b \mid a + b = c$
993	2	0 - 50	1	0	1	-	-	-	-	$c = a + b \mid a + b = c$
284	2	0 - 99	1	1	1	-	-	-	$a = a$	$c = a + b \mid a + b = c$
563	2	0 - 99	1	1	1	-	-	-	$a = a$	$c = a + b \mid a + b = c$
676	2	0 - 199	1	1	0	-	-	-	$a = a$	$c = a + b \mid a + b = c$
Strategies Total by Skill Code						2	4	1	3	18



Anticipated strategies: NRR.C.9.d

Skill Code			C.9.d						
Anticipated			C	C	N	NRR.	Unknown Equation	Relational	Operational
SID	Grade	Number Range	$a+b=c+d$	$a+a=b+b$	M	B.5.	Structure*		
RK	K	0 - 5	0	0	-	-	$a+b=c+d$   $a+a=b+b$	-	-
768	K	0 - 5	1	0	1	-	-	-	-
385	K	0 - 10	0	0	-	-	$a+b=c+d$   $a+a=b+b$	-	-
495	K	0 - 10	0	1	-	-	$a+b=c+d$   $a+a=b+b$	-	-
223	1	0 - 10	0	0	-	-	-	-	-
946	1	0 - 10	0	0	-	-	$a+b=c+d$   $a+a=b+b$	-	$a+b=c+d$   $a+a=b+b$
152	1	0 - 19	1	0	-	-	-	-	$a+b=c+d$   $a+a=b+b$
793	1	0 - 19	0	1	-	-	-	-	-
993	2	0 - 50	0	0	-	-	-	-	$a+b=c+d$   $a+a=b+b$
284	2	0 - 99	0	1	-	-	-	-	$a+b=c+d$   $a+a=b+b$
563	2	0 - 99	1	1	-	B.5.b	-	$a+b=c+d$	$a+a=b+b$
676	2	0 - 199	0	0	-	-	-	-	$a+b=c+d$   $a+a=b+b$
Strategies Total by Skill Code					1	1	8	1	11

**Essentialized Skill Statement**

<b>9. Equal Sign as a Relational Symbol</b>										
<b>Code</b>	<b>Kindergarten</b>			<b>Grade 1</b>			<b>Grade 2</b>			
	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	
NRR.C.9.a.	Recognize the equality between two <b>quantities</b> using a balance.									

**Student Expectation**

Children were expected to compare weights of three objects on each side of a balance, shown on a picture of the balance, and identify the equality between two quantities on both sides of the balance.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Different Terms for Balanced.</i> Terms such as <i>balanced</i> and <i>same</i> were expected for students to use and all the grade levels. What was not expected were students to connect to the term equals, particularly at the Kindergarten level. One Kindergarten student used the term equal to describe what the balance says about the apples.	<i>It tells me that they're equal (RK_ICC, 19:17).</i>  <i>Because there's three here and three here (RK_ICC, 19:39).</i>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (768)	-				
1		-	-			
2				-	-	-

Unanticipated strategies by grade level and number range for NRR.C.9.a.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Quantity (RK)	Quantity, Height, Weight 8a [color] (385, 495)				
1		Height (223)  Quantity and Height (946)	Quantity (793)  Quantity and Weight (152)			
2				Quantity, Height, Weight (993)	Quantity and Height (946)  Quantity, Height, Weight 8a [color] (563)	Quantity (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.9.a. activity.

NRR.C.9.a. Anticipated Strategies

<b>NRR.C.9.a.</b>	Recognize the equality between two <b>quantities</b> using a balance.	
<b>Content Question</b>	This is a picture of a balance. What does the balance tell you about the apples?	
<b>Reasoning Question</b>	What tells you that this side is [not] the same as the other side?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>C9a_E_NOT-Picture of balance</i>	Picture of balance was embedded into the activity.
	<i>C9a_E_NOT-Physical balance</i>	A physical balance was available for students as necessary. When a balance was used, counting bears were also included for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C9a_A_General tool</i>	Child uses a general tool as listed above.
	<i>C9a_A_Count all</i>	Child counts apples on each side of the balance
	<i>C9a_A_Height</i>	<ul style="list-style-type: none"> <li>Explain that both sides are equal using words such as same height or level.</li> <li>Child's response to reasoning question might include words such as lower or higher.</li> </ul>
	<i>C9a_A_Weight</i>	<ul style="list-style-type: none"> <li>Explain that both sides are equal using vocabulary such as same weight</li> <li>Child's response to reasoning question might include words such as heavier or lighter.</li> </ul>
	<i>C9a_A_Immediate recognition</i>	<ul style="list-style-type: none"> <li>Child might immediately recognize that the quantities on both sides of the balance are equivalent.</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>Current Skill Code</i>	Only specific student talk-turn within activity that is attributed to the current skill code.
	<i>NRR.C.8.a.</i>	Child compares the quantity of each side of the balance.

**Essentialized Skill Statement**

9. Equal Sign as a Relational Symbol										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.C.9.b.		Write a true equation using an equal sign to represent the relationship between given <b>quantities</b> on a balance or in a pictorial representation.								

**Student Expectation**

Children were expected to write a true equation, such as  $3 = 3$  or  $3 = 1 + 2$  to represent the apples on the given picture of a balance. Physical balances were available as needed for Kindergarten students and first-grade students performing at lower proficiency levels.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Additive Property of Zero.</i> A reasoning question for this ESS asked if $3=3$ represented the apples in the picture of the balance or the physical balance with bears. The anticipated responses were for students to either agree or disagree; it was unanticipated for students to provide a deeper explanation. One child explained using the additive property of zero which pairs with the child’s definition of number sentence.	[The equation $3=3$ ] <i>would have been like three plus zero, a plus right here and a zero right here, [pointing to after the 3 on the right side]</i> (993, 22:19).
<i>Defining Number Sentences.</i> During interviews, interviewers attempted to use language familiar to the students, such as using “number sentences” interchangeably for expressions and equations. One second-grade child provided insight into why the equation structure $a=a$ was not a “number sentence.” In a child’s view, a number sentence requires an operation such as a plus sign.	[ $3=3$ is not a number sentence] <i>because there’s not a plus sign in there</i> (993, 22:13).
<i>Associate <math>a=a</math> to pictorial balance.</i> Kindergarten children performing at a lower proficiency level were not expected to be able to write an equation to represent the apples and were expected to use a physical balance. The equation form with no operations ( $a=a$ ) first appears in skill code NRR.C.9.c at the target level of Kindergarten. One Kindergarten child, who was performing at a lower proficiency level, initially wrote 3 under the apples on each side of the balance. Then, the child associated the given equation of $3=3$ to the picture of the apples without questioning the equal sign.	[ $3=3$ describes the apples on the balance] <i>because there’s three and three, but this one’s a little bit lighter and this one’s a little bit darker</i> (RK, 21:08).  Note: This was one of the later interviews in which the student workbooks were printed in black and white rather than color.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Associate $a=a$ to pictorial balance. (RK)	-				
1		-	-			
2				Additive Property (993) Defining Number Sentences (993)	-	-

Unanticipated strategies by grade level and number range for NRR.C.9.b.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	5a (RK) NME (768)	Count All (495) Equation (495, 385) 5b (495)				
1		$c = a + b$ Weight Counting (793) Expression Equation ( $3+3=6$ ) Quantity Height Identify $a=a$ (223) 5b (223)	Equation (152) Quantity (152, 946) Identify $a=a$ (152) Count All Height			
2				Expressions Equations Counting Connecting Pictures to Numbers (993)	Equation (284, 563) Count All (284)	Equation Quantity (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.9.b. activity

NRR.C.9.b. Anticipated Strategies

<b>NRR.C.9.b.</b>	Write a true equation using an equal sign to represent the relationship between given <b>quantities</b> on a balance or in a pictorial representation.	
<b>Content Question</b>	Can you write a number sentence to describe the relationship between the apples on either side of the balance?	
<b>Reasoning Question</b>	How do you know that this number sentence describes the apples on the balance? What if we wrote $3=3$ . Could this number sentence represent the apples?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>C9b_E_NOT-Picture of balance</i>	Picture of balance was embedded into the activity.
	<i>C9b_E_NOT-Physical balance</i>	A physical balance was available for students as necessary. When a balance was used, counting bears were also included for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C9b_A_General tool</i>	Child uses a general tool as listed above.
	<i>C9b_A_Weight</i>	<ul style="list-style-type: none"> <li>Explain that both sides are equal using vocabulary such as same weight</li> <li>Child's response to reasoning question might include words such as heavier or lighter.</li> </ul>
	<i>C9b_A_Height</i>	<ul style="list-style-type: none"> <li>Explain that both sides are equal using words such as same height or level.</li> <li>Child's response to reasoning question might include words such as lower or higher.</li> </ul>
	<i>C9b_A_Expression</i>	<ul style="list-style-type: none"> <li>Child writes an expression (i.e. no equal sign present)</li> </ul>
	<i>C9b_A_Equation</i>	<ul style="list-style-type: none"> <li>Child writes an equation (i.e., <math>3 + 3 = 6</math>)</li> </ul>
	<i>C9b_A_Count all</i>	<ul style="list-style-type: none"> <li>Child counts all apples on the balance</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b> <i>[Also consider ESSs not specifically listed here;</i>	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
	<i>05- Composition</i>	<ul style="list-style-type: none"> <li>Compose a number with two parts. [Composition &amp; Decomposition]</li> <li>Select skill code in core concept Composition, that best fits child's approach.</li> </ul>

refer to learning progressions.]		
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**Essentialized Skill Statement**

9. Equal Sign as a Relational Symbol									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.9.c.				Recognize true and not true equations with different equation structures: <b>operations on the left side</b> ( $a + b = c$ ); <b>no operations</b> ( $a = a$ ); <b>operations on the right side</b> ( $c = a + b$ ).					

**Student Expectation**

For Kindergarten students performing at a high proficiency level and beyond, children are expected to accurately recognize true and not true equations given different equation structures. While the goal of core concept nine is for students to recognize the equal sign as a relational symbol, it was still anticipated that students may interpret the equal sign operationally.

<b>Strategy. Justification/Description</b>	<b>Examples</b>
<p><i>Unknown Equation Structure.</i> The grade band for NRR.C.9.c. begins at the target level of Kindergarten. It was not anticipated that by first grade students would still be struggling with the meaning of the equation structures, specifically <math>a=a</math>.</p>	<p><b>a = a:</b>                      [8=8 is true] <i>because it is adding...because they're both the same, because that's why they put the equal</i> (223, 25:16).                      [Student read card, 8=8] <i>Eight plus eight [is not true] because it still is the same...because you like make 8... [The equal sign means] like you be like something else...like make together</i> (946, 20:52 - 21:46).                      [Student read card, 16=16] <i>Sixteen plus sixteen... (793, 26:36)</i>  <i>I don't know what it means</i> (152, 26:24).  <i>I'm not sure...because there's no like thing that they're equal to</i> (993, 24:22, 24:27)</p>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-	-				
1		Unknown Equation Structure (a=a) (223, 946)	Unknown Equation Structure (a=a) (152, 793)			
2				Unknown Equation Structure (a=a) (993)	-	-

Unanticipated strategies by grade level and number range for NRR.C.9.c.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (RK, 768)	Unknown Equation Structure (c=a+b, a=a) (385, 495) Count on (c=a+b) (385) Operational (a=a, c = a+b) (385)				
1		Operational (a+b=c, c=a+b) (223, 946)	Operational (c=a+b, a+b=c) (152, 793)			
2				Operational (a+b=c, c=a+b) (993)	Operational (a+b=c, c=a+b) (284, 563) Relational (a=a) (284, 563)	Operational (a+b=c, c=a+b) (676) Relational (a=a) 676

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.9.c. activity

NRR.C.9.c. Anticipated Strategies

<p><b>*NRR.C.9.c.</b> <b>NRR.C.9.d.</b></p>	<p>Recognize true and not true equations with different equation structures: <b>operations on the left side</b> (<math>a + b = c</math>); <b>no operations</b> (<math>a = a</math>); <b>operations on the right side</b> (<math>c = a + b</math>). Recognize true and not true equations with different equation structures: <b>operations on the both sides</b> (<math>a + b = c + d</math>); <b>multiple instances of a number</b>.</p>				
<p><b>Content Question*</b></p>	<p>I'm going to give you a number sentence [equation]. If you think the number sentence is true, then place the card in this true area. If you think this is not true, then place the card in the not true area. [Motion to those areas on the work mat.]. If you are not sure about a card then put it in the center[unsure]area.</p>				
	<p><math>a + b = c</math>: Not True</p>	<p><math>a = a</math>: True</p>	<p><math>c = a + b</math>: Not True</p>	<p><math>a + b = c + d</math>: True</p>	<p><math>a + a + \dots + a = b + b + \dots + b</math>: Not True</p>
<p><b>Reasoning Question</b></p>	<p>Why is this card not true? What can you tell me about this card?</p>				
<p><b>Anticipated</b></p>					
	<p><b>Code</b></p>	<p><b>Description</b></p>			
<p><b>Embedded Mathematical Tools</b></p>	<p>-</p>	<p>No tools were embedded for this activity.</p>			
<p><b>General Mathematical Tools</b></p>	<p>These tools are located under Mathematical Tools &gt; a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.</p>				
	<p><i>Square tiles</i></p>	<p>Colored square tiles as counters</p>			
	<p><i>Linking cubes</i></p>	<p>Linking cubes as counters</p>			
	<p><i>Fingers</i></p>	<p>Fingers as counters</p>			
<p><b>Strategies</b></p>	<p><b>Code</b></p>	<p><b>Description</b></p>			
	<p><i>C9cd_A_General tool</i></p>	<p>Child uses a general tool as listed above.</p>			
	<p><i>C9cd_A_operational</i></p>	<ul style="list-style-type: none"> <li>Child uses the equal sign as an operation (i.e., equal sign means something “to do”).</li> </ul>			
	<p><i>C9cd_A_relational</i></p>	<ul style="list-style-type: none"> <li>Child uses the equal sign to show both sides are the same.</li> </ul>			
	<p><i>C9cd_A_Count on</i></p>	<ul style="list-style-type: none"> <li>Count on from one number in an equation to find the total [counting]</li> </ul>			
	<p><i>C9cd_A_Identify symbols</i></p>	<ul style="list-style-type: none"> <li>Identify numbers and symbols in the equation</li> </ul>			
<p><b>A different way</b></p>	<p>-</p>	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.</li> </ul>			
<p><b>NRR</b></p>	<p><i>Current Skill Code</i></p>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>			
	<p><i>05- Composition</i></p>	<ul style="list-style-type: none"> <li>Compose a number with two parts. [Composition &amp; Decomposition]</li> </ul>			

<b>Essentialized Skill Statements</b> <i>[Also consider ESSs not specifically listed here; refer to learning progressions.]</i>	<i>06 –Decomposition</i> <i>07 – Applying...</i>	<ul style="list-style-type: none"> <li>• Add or subtract part or all of the expression</li> </ul> Select skill code in Composition & Decomposition, that best fits child’s approach.
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\* NRR.C.9.c. and NRR.C.9.d. skill codes are combined and strategies are same.

**Essentialized Skill Statement**

9. Equal Sign as a Relational Symbol									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.9.d.							Recognize true and not true equations with different equation structures: <b>operations on the both sides</b> ( $a + b = c + d$ ); <b>multiple instances of a number.</b>		

**Student Expectation**

For first-grade students performing at mid-level proficiency and beyond, children are expected to accurately recognize true and not true equations given different equation structures. While the goal of core concept nine is for students to recognize the equal sign as a relational symbol, it was still anticipated that students may interpret the equal sign operationally.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<p><i>Unknown Equation Structure.</i> The grade band for NRR.C.9.d. begins at the bridging level of first-grade. It was not anticipated that by second grade students would still be struggling with the meaning of the equation structures with operations on both sides.</p>	<p><b><math>a + b = c + d</math>:</b>  <i>[11 + 5 = 14 + 2 is not true] because eleven plus five equals fourteen is not two. (793, 27:31)</i></p> <p><i>I've never seen this before...with the equal sign in the middle...usually the equal sign is over here [pointing to plus sign after first addend on left side] and over there [pointing to plus sign before last addend on right side] (993, 26:03, 26:06, 26:15).</i></p> <p><i>[I'm not sure about 151 + 5 = 150 + 6] because there's too much numbers everywhere and it doesn't make sense...well, you can have enough numbers, but it just seems confusing right now because [151] is a bigger than [150], so that can't equal (676, 18:09, 18:18).</i></p> <p><b><math>a + a = b + b</math>:</b>  <i>...I don't know what [the +8] means [in the equation 4 + 4 = 8 + 8] (152, 25:56).</i></p> <p><i>This also has the equal sign in the middle...so I'm not sure (993, 26:46, 26:52).</i></p>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	-	-				
<b>1</b>			Unknown Equation Structure (152, 793)			
<b>2</b>				Unknown Equation Structure (993)	-	Unknown Equation Structure (676)

Unanticipated strategies by grade level and number range for NRR.C.9.d.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	Unknown Equation Structure (RK) NME (768)	Unknown Equation Structure (385, 495)				
<b>1</b>		Unknown Equation Structure (946) Operational (946)	Operational (152)			
<b>2</b>				Operational (993)	Operational (284) 5b (563) Relational (a+b=c+d) (563) Operational (a+a=b+b) (563)	Operational (676) Comparison (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.9.d. activity.

NRR.C.9.d. Anticipated Strategies

<p><b>*NRR.C.9.c.</b> <b>NRR.C.9.d.</b></p>	<p>Recognize true and not true equations with different equation structures: <b>operations on the left side</b> (<math>a + b = c</math>); <b>no operations</b> (<math>a = a</math>); <b>operations on the right side</b> (<math>c = a + b</math>). Recognize true and not true equations with different equation structures: <b>operations on the both sides</b> (<math>a + b = c + d</math>); <b>multiple instances of a number</b>.</p>				
<p><b>Content Question*</b></p>	<p>I'm going to give you a number sentence [equation]. If you think the number sentence is true, then place the card in this true area. If you think this is not true, then place the card in the not true area. [Motion to those areas on the work mat.]. If you are not sure about a card then put it in the center[unsure]area.</p>				
	<p><math>a + b = c</math>: Not True</p>	<p><math>a = a</math>: True</p>	<p><math>c = a + b</math>: Not True</p>	<p><math>a + b = c + d</math>: True</p>	<p><math>a + a + \dots + a = b + b + \dots + b</math>: Not True</p>
<p><b>Reasoning Question</b></p>	<p>Why is this card not true? What can you tell me about this card?</p>				
<p><b>Anticipated</b></p>					
	<p><b>Code</b></p>	<p><b>Description</b></p>			
<p><b>Embedded Mathematical Tools</b></p>	<p>-</p>	<p>No tools were embedded for this activity.</p>			
<p><b>General Mathematical Tools</b></p>	<p>These tools are located under Mathematical Tools &gt; a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.</p>				
	<p><i>Square tiles</i></p>	<p>Colored square tiles as counters</p>			
	<p><i>Linking cubes</i></p>	<p>Linking cubes as counters</p>			
	<p><i>Fingers</i></p>	<p>Fingers as counters</p>			
<p><b>Strategies</b></p>	<p><b>Code</b></p>	<p><b>Description</b></p>			
	<p><i>C9cd_A_General tool</i></p>	<p>Child uses a general tool as listed above.</p>			
	<p><i>C9cd_A_operational</i></p>	<ul style="list-style-type: none"> <li>Child uses the equal sign as an operation (i.e., equal sign means something “to do”).</li> </ul>			
	<p><i>C9cd_A_relational</i></p>	<ul style="list-style-type: none"> <li>Child uses the equal sign to show both sides are the same.</li> </ul>			
	<p><i>C9cd_A_Count on</i></p>	<ul style="list-style-type: none"> <li>Count on from one number in an equation to find the total [counting]</li> </ul>			
	<p><i>C9cd_A_Identify symbols</i></p>	<ul style="list-style-type: none"> <li>Identify numbers and symbols in the equation</li> </ul>			
<p><b>A different way</b></p>	<p>-</p>	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.</li> </ul>			
<p><b>NRR</b></p>	<p><i>Current Skill Code</i></p>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>			
	<p><i>05- Composition</i></p>	<ul style="list-style-type: none"> <li>Compose a number with two parts. [Composition &amp; Decomposition]</li> </ul>			

<b>Essentialized Skill Statements</b> <i>[Also consider ESSs not specifically listed here; refer to learning progressions.]</i>	<i>06 –Decomposition</i> <i>07 –Applying...</i>	<ul style="list-style-type: none"> <li>• Add or subtract part or all of the expression</li> </ul> Select skill code in Composition & Decomposition, that best fits child’s approach.
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\* NRR.C.9.c. and NRR.C.9.d. skill codes are combined.



NRR.C.10. Maintaining Equality Core Concept

10. Maintaining Equality									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.10.a.	Given a contextual situation with known <b>quantities</b> , use <b>one or more properties of operations</b> to recognize when equality is maintained.								
NRR.C.10.b.		Given a contextual situation with unknown <b>quantities</b> , use <b>one or more properties of operations</b> to recognize when equality is maintained.							
NRR.C.10.c.				Given a contextual situation with known <b>quantities</b> that models <b>one or more properties of operations</b> , write a true equation to represent the situation.					
NRR.C.10.d.							Recognize true and not true equations with known numbers using <b>one or more properties of operations</b> .		

NRR.C.10. Synthesis Data

Unanticipated strategies: NRR.C.10.a-d

Skill Code			C.10.a	C.10.b	C.10.c	C.10.d				
Unanticipated			<i>C</i>	<i>C</i>	<i>C</i>	<i>C</i>	<i>C</i>	<i>C</i>	<i>C</i>	<i>Unknown</i>
SID	Grade	Number Range				$a + b = b + a$	$a + b - b = a + 0$	$a - b + b = a$	$a + b + c = a + d$	<i>Equation Structure</i>
RK	K	0 - 5	1	-	-	-	-	-	-	-
768	K	0 - 5	-	-	-	1	-	1	-	-
385	K	0 - 10	1	1	1	-	-	-	-	-
495	K	0 - 10	1	-	-	-	-	1	1	-
223	1	0 - 10	1	-	-	-	-	1	-	-
946	1	0 - 10	1	-	-	1	-	1	-	-
152	1	0 - 19	1	1	1	-	-	-	-	-
793	1	0 - 19	1	-	-	-	1	-	1	-
993	2	0 - 50	1	1	-	1	1	1	1	-
284	2	0 - 99	1	1	1	-	1	-	1	-
563	2	0 - 99	1	1	1	1	-	-	-	-
676	2	0 - 199	1	1	-	-	1	-	-	1
Strategies Total by Skill Code										1

**Anticipated strategies: NRR.C.10.a**

Skill Code			C.10.a				
Anticipated			C	Counting	Match Groups	Change Order	NRR.C.8.
SID	Grade	Number Range					
RK	K	0 - 5	1	All	-	-	-
768	K	0 - 5	0	-	-	-	-
385	K	0 - 10	1	-	1	-	-
495	K	0 - 10	1	All	-	-	-
223	1	0 - 10	1	All	1	-	-
946	1	0 - 10	1	All	1	-	-
152	1	0 - 19	1	-	1	-	-
793	1	0 - 19	1	All	-	-	-
993	2	0 - 50	1	-	1	-	-
284	2	0 - 99	1	-	1	-	-
563	2	0 - 99	1	-	1	1	C.8.b
676	2	0 - 199	1	-	-	1	C.8.b
Strategies Total by Skill Code				5	7	2	2

**Anticipated strategies: NRR.C.10.b**

Skill Code			C.10.b				
Anticipated			C	Counting	Match Groups	Change Order	NRR.C.8
SID	Grade	Number Range					
RK	K	0 - 5	0	All	-	-	-
768	K	0 - 5	0	-	-	-	-
385	K	0 - 10	1	-	1	-	-
495	K	0 - 10	0	All	-	-	-
223	1	0 - 10	0	All	1	-	-
946	1	0 - 10	0	All	1	-	-
152	1	0 - 19	1	-	1	-	-
793	1	0 - 19	0	All	-	-	-
993	2	0 - 50	1	-	1	-	-
284	2	0 - 99	1	-	1	-	-
563	2	0 - 99	1	-	1	1	-
676	2	0 - 199	1	-	-	1	C.8.b
Strategies Total by Skill Code				5	7	2	1

Anticipated strategies: NRR.C.10.c

Skill Code			C.10.c			
Anticipated			C	NME	Counting	NRR.C.8
SID	Grade	Number Range				
RK	K	0 - 5	0	1	-	-
768	K	0 - 5	0	1	-	-
385	K	0 - 10	1	-	-	C.8.b
495	K	0 - 10	0	-	All	-
223	1	0 - 10	0	1	-	-
946	1	0 - 10	0	-	All	-
152	1	0 - 19	1	-	-	C.8.b
793	1	0 - 19	0	-	-	C.8.b
993	2	0 - 50	0	-	-	C.8.b
284	2	0 - 99	1	-	-	C.8.b
563	2	0 - 99	1	-	-	C.8.b
676	2	0 - 199	0	-	-	C.8.b
Strategies Total by Skill Code				3	2	7

Anticipated strategies: NRR.C.10.d

Skill Code			C.10.d						
Anticipated			<i>C</i>	<i>C</i>	<i>C</i>	<i>C</i>	N ME	Unknown Equation Structure	Operational
SID	Grade	Number Range	$a + b = b + a$	$a + b - b = a + 0$	$a - b + b = a$	$a + b + c = a + d$			
RK	K	0 - 5	0	0	0	0	1	-	-
768	K	0 - 5	1	0	1	0	1	-	-
385	K	0 - 10	0	0	0	0	1	-	-
495	K	0 - 10	0	0	1	1	-	1	-
223	1	0 - 10	0	0	1	0	1	-	-
946	1	0 - 10	1	0	1	0	-	-	-
152	1	0 - 19	0	0	0	0	-	1	1
793	1	0 - 19	0	1	0	1	-	1	1
993	2	0 - 50	1	1	1	1	-	-	-
284	2	0 - 99	0	1	0	1	-	-	1
563	2	0 - 99	1	0	0	0	-	-	1
676	2	0 - 199	0	1	0	0	-	-	-
Strategies Total by Skill Code							4	3	4

NRR.C.10.a. Summary

**Essentialized Skill Statement**

<b>10. Maintaining Equality</b>									
<b>Code</b>	<b>Kindergarten</b>			<b>Grade 1</b>			<b>Grade 2</b>		
	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>
NRR.C.10.a.	Given a contextual situation with known <b>quantities</b> , use <b>one or more properties of operations</b> to recognize when equality is maintained.								

**Student Expectation**

UPDATE

<b><i>Unanticipated Strategy.</i></b> <b>Justification/Description</b>	<b>Examples</b>
In the selected data, no evidence of unanticipated strategies found.	N/A

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K						
1						
2						

Unanticipated strategies by grade level and number range for NRR.C.10.a.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Count All (RK) 5a (768)	Count All (495) Match Groups (385) 1a (946)				
1		Count All, Match Groups (223, 946)	Count All (793) Match Groups (152) 10a (793)			
2				Match Groups (993)	Match Groups, Change Order (563)  Match Groups (284)  8b (563)	Change Order (676)  8b (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.10.a. activity.



NRR.C.10.a. Anticipated Strategies

<b>NRR.C.10.a.</b>	Given a contextual situation with known <b>quantities</b> , use <b>one or more properties of operations</b> to recognize when equality is maintained.	
<b>Content Question</b>	Julie thinks that more students rode on this bus since more students got on first. What do you think? Are there the same, more, or less number of students in the buses?	
<b>Reasoning Question</b>	Can you show me how you know that there are the same, more, or less?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	<i>C10a_E_NOT- Picture of students</i>	Quantities displayed on cards with pictures of students.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C10a_A_General tool</i>	Child uses a general tool as listed above.
	<i>C10a_A_Count all</i>	<ul style="list-style-type: none"> <li>Child counts all students</li> </ul>
	<i>C10a_A_Count groups</i>	<ul style="list-style-type: none"> <li>Child counts groups of students</li> </ul>
	<i>C10a_A_Match groups</i>	<ul style="list-style-type: none"> <li>Match groupings visually with or without counting</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b> <i>[Also consider ESSs not specifically listed here]</i>	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
	<i>NRR.C.8.b.</i>	<ul style="list-style-type: none"> <li>Identify that there are the same amount of students using words such as switch, swap, different order.</li> </ul>
	<i>05- Composition 06 – Decomposition 07 – Applying...</i>	<ul style="list-style-type: none"> <li>Compose a number with two parts. [Composition &amp; Decomposition]</li> <li>Add to find sums and compare</li> <li>Select skill code in Composition &amp; Decomposition, that best fits child's approach.</li> </ul>

NRR.C.10.b. Summary

**Essentialized Skill Statement**

<b>10. Maintaining Equality</b>									
<b>Code</b>	<b>Kindergarten</b>			<b>Grade 1</b>			<b>Grade 2</b>		
	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>	<b>F</b>	<b>B</b>	<b>T</b>
NRR.C.10.b.		Given a contextual situation with unknown <b>quantities</b> , use <b>one or more properties of operations</b> to recognize when equality is maintained.							

**Student Expectation**

Students were expected to be able to recognize that equality maintained the same in a situation involving the additive inverse property.

<b><i>Unanticipated Strategy.</i></b> <b>Justification/Description</b>	<b>Examples</b>
In the selected data, no evidence of unanticipated strategies found.	N/A

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K						
1						
2						

Unanticipated strategies by grade level and number range for NRR.C.10.b.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	Count All (RK) 5a (768)	Count All (495) Match Groups (385) 1a (946)				
1		Count All, Match Groups (223, 946)	Count All (793) Match Groups (152) 10a (793)			
2				Match Groups (993)	Match Groups, Change Order (563) Match Groups (284) 8b (563)	Change Order (676) 8b (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.10.b. activity.

NRR.C.10.b. Anticipated Strategies

<b>NRR.C.10.b.</b>	Given a contextual situation with <b>unknown quantities</b> , use <b>one or more properties of operations</b> to recognize when equality is maintained.	
<b>Content Question</b>	[KB-1B] Does he have the same, more, or less keys than he did before the school year started? [1T – 2T] Does Mr. King have the same, more, or less keys than he did before he gave Tina his keys?	
<b>Reasoning Question</b>	Can you show me how you know that there are the same, more, or less?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C10b_A_General tool</i>	Child uses a general tool as listed above.
	<i>C10b_A_Act out</i>	<ul style="list-style-type: none"> <li>Model with concrete objects. Also assign a mathematical tool</li> </ul>
	<i>C10b_A_Create example</i>	<ul style="list-style-type: none"> <li>Since both problems include unknown numbers, child might create a similar problem with known quantities to explain thinking.</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
	<i>NRR.C.8.c.</i>	<ul style="list-style-type: none"> <li>Additive inverse with known quantities.</li> </ul>

NRR.C.10.c. Summary

**Essentialized Skill Statement**

10. Maintaining Equality									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.10.c.									

Given a contextual situation with known **quantities** that models **one or more properties of operations**, write a true equation to represent the situation.

**Student Expectation**

Children were expected to write a true equation incorporating at least one property of operation to represent the given context.

<b><i>Unanticipated Strategy.</i></b> <b>Justification/Description</b>	<b>Examples</b>
In the selected data, no evidence of unanticipated strategies were found.	N/A

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	-	-				
<b>1</b>		-	-			
<b>2</b>				-	-	-

Unanticipated strategies by grade level and number range for NRR.C.10.c

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	NME (768,RK)	Count all (495) Same Numbers, 8.b (385)				
<b>1</b>		Count all (946) Order, 8.b (793) NME (223)	8.b (152)			
<b>2</b>				8.b (993)	Story, 8.b (563) 8.b (284)	8.b (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.10.c activity.

NRR.C.10.c. Anticipated Strategies

<b>NRR.C.10.c.</b>	Given a contextual situation with <b>known quantities</b> that models <b>one or more properties of operations</b> , write a true equation to represent the situation.	
<b>Content Question</b>	<ol style="list-style-type: none"> <li>1) What would this box look like as a number sentence?</li> <li>2) What would this box look like as a number sentence?</li> </ol>	
<b>Reasoning Question</b>	What can you tell me about the two number sentences?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C10c_A_General tool</i>	Child uses a general tool as listed above.
	<i>C10c_A_Count all</i>	Child counts all cupcakes to determine that the quantities are the same.
	<i>C10c_A_Count groups</i>	Child counts by groupings, 4s, 5s, 10s
	<i>C10c_A_Expression</i>	Child writes an expression to represent the total number of cupcakes (i.e. no equal sign present)
	<i>C10c_A_Equation</i>	Child writes an equation to represent the total number of cupcakes (i.e., $3 + 4 = 7$ )
	<i>C10c_A_One-to-one</i>	<ul style="list-style-type: none"> <li>• Child matches pictures of cupcakes</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>• A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill</b>	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>• Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
<b>Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>NRR.C.8.c.</i>	<ul style="list-style-type: none"> <li>• Additive inverse with known quantities.</li> </ul>
	<i>05 - Composition</i>	<ul style="list-style-type: none"> <li>• Add cupcakes together to find sum</li> <li>• Add cupcakes by groups (e.g. <math>5+5=10</math>, <math>10+5=15</math>)</li> <li>• Select skill code in Composition that best fits child's approach.</li> </ul>

**Essentialized Skill Statement**

10. Maintaining Equality										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.C.10.d.										Recognize true and not true equations with known numbers using <b>one or more properties of operations.</b>

**Student Expectation**

For this essentialized skill statement, students were given four equation structures to determine whether or not the equation was true. The four equation structures included: (1)  $a + b = b + a$ ; (2)  $a + b - b = a + 0$ ; (3)  $a - b + b = a$ ; and (4)  $a + b + c = a + d$ .

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<i>Unknown Equation Structure.</i> First-grade students at a high-proficiency level and beyond were expected to be able to use relational thinking to determine if each equation of the different equation structures were true or not true. The examples provided indicate confusion based on the equation structures.	[76 + 87 = 87 + 76] <i>So I don't really know what's going on because ... I wanna know why they put these in different ... like why did they swap them? (676, 24:43).</i>  <i>It's again they have the same numbers and it's confusing that they are just different sections. 'Cause I do not think that 134 - 56 + 56 = 134 (676, 25:43).</i>
<i>Compare Sums.</i> Child computed each side to determine whether each side had the same amount. In the example, the child made an error in computation; however, the strategy used was to compute each side and compare sums. At the second-grade level, children were expected to be able to either use a combination of associative and commutative properties without computation to determine whether or not the equation was true or not true.	[17 + 12 + 12 = 24 + 12] <i>36 for these two and 41 here and ... I forgot what I said for this one ... 36 ... They're not true (993, 40:45).</i> Interviewer Response: <i>I like how you added [the left side], and then you added all [of the right side] to find the same (EK, 41:30).</i>



Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-	-				
1		-	-			
2				Compare Sums $[a + b - b = c + d]$ (993)	-	Unknown Equation Structure (676)

Unanticipated strategies by grade level and number range for NRR.C.10.d.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (768, RK)	Unknown Equation Structure v(495) NME (385)				
1		(946) NME (223)	Operational, Unknown Equation Structure (152, 793)			
2				Relational (993) 8c (993) $[a-b+b=a, a+b-b=a+0]$	Operational (284, 563)	

Anticipated strategies by grade level and number range for NRR.C.10.d.

NRR.C.10.d. Anticipated Strategies

<b>NRR.C.10.d.</b>	Recognize true and not true equations with <b>known numbers</b> using <b>one or more properties of operations</b> .		
<b>Content Question*</b>	Here are some cards with different number sentences. Please sort them into a pile of cards you think are true and a pile you think are not true. Try to figure it out without adding up the numbers. If you're not sure about a card then put it in the center [unsure] pile.		
	$a + b = b + a$ : True	$a + b - b = a + 0$ : True	$a - b + b = a$ : True
<b>Reasoning Question</b>	What can you tell me about this card? Why did you put it here?		
<b>Anticipated</b>			
	<b>Code</b>	<b>Description</b>	
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity.	
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.		
	<i>Square tiles</i>	Colored square tiles as counters	
	<i>Linking cubes</i>	Linking cubes as counters	
	<i>Fingers</i>	Fingers as counters	
<b>Strategies</b>	<b>Code</b>	<b>Description</b>	
	<i>C10d_A_General tool</i>	Child uses a general tool as listed above.	
	<i>C10d_A_Count on</i>	Count on from one number in an equation to find the total [counting]	
	<i>C10d_A_Identify symbols</i>	<ul style="list-style-type: none"> <li>Identify numbers and symbols in the equation</li> </ul>	
	<i>C10d_A_Operational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign as an operation (i.e., equal sign means something "to do").</li> </ul>	
	<i>C10d_A_Relational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign to show both sides are the same.</li> </ul>	
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>	
<b>NRR Essentialized Skill Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>	
	<i>NRR.C.8.b.</i>	<ul style="list-style-type: none"> <li>Commutative property</li> </ul>	
	<i>NRR.C.8.c.</i>	<ul style="list-style-type: none"> <li>Additive inverse with known quantities.</li> </ul>	
	<i>NRR.C.8.d.</i>	<ul style="list-style-type: none"> <li>Associative property</li> </ul>	
	<i>05 - Composition</i>	<ul style="list-style-type: none"> <li>Add numbers to find partial sums</li> <li>Select skill code in Composition that best fits child's approach.</li> </ul>	

NRR.C.11. Solving for Unknown Values Core Concept

11. Solving for Unknown Values										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.C.11.a.										Solve for an unknown value in a true equation using a relational definition of equal sign.
NRR.C.11.b.										Given a contextual situation modeling a true equation, apply <b>one or two properties of operations</b> or property of equality to solve for an unknown value using concrete objects.
NRR.C.11.c.										Given a contextual situation modeling a true equation, apply <b>one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation .
NRR.C.11.d.										Apply <b>one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation.
NRR.C.11.e.										Given a contextual situation modeling a true equation, apply <b>decomposition with one or two properties of operations</b> or property of equality to solve for an unknown value using concrete objects.
NRR.C.11.f.										Given a contextual situation modeling a true equation, apply <b>decomposition with one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation.
NRR.C.11.g.										Apply <b>decomposition with one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation.

NRR.C.11. Synthesis Data

**Unanticipated strategies: NRR.C.11.a-g**

Skill Code			C.11.a	C.11.b		C.11.c		C.11.d		C.11.e	C.11.f			C.11.g
Unanticipated			C	C	N	C	N	C	N	C	C	Counting	N	C
SID	Grade	Number Range			M	M	M	M	E				E	
RK	K	0 - 5	0	0	-	0	-	0	-	0	8	-	-	8
768	K	0 - 5	0	0	-	0	-	0	-	0	0	-	-	0
385	K	0 - 10	0	1	-	0	-	0	-	1	0	-	-	0
495	K	0 - 10	1	0	-	0	-	0	-	0	0	-	-	0
223	1	0 - 10	0	0	1	0	1	0	1	0	8	-	-	8
946	1	0 - 10	0	0	1	0	-	0	-	0	0	-	-	0
152	1	0 - 19	0	1	-	0	-	0	-	1	1	-	-	1
793	1	0 - 19	0	8	-	8	-	8	-	8	8	-	1	8
993	2	0 - 50	0	1	-	0	-	0	-	1	0	-	-	8
284	2	0 - 99	0	1	-	0	-	1	-	0	0	All	-	1
563	2	0 - 99	1	1	-	0	-	1	-	1	1	-	-	1
676	2	0 - 199	0	1	-	0	-	1	-	1	0	-	1	0
Strategies Total by Skill Code					2		1		1			1	1	

Anticipated strategies: NRR.C.11.a-b

Skill Code			C.11.a.					C.11.b.				
Anticipated Strategies			C	NME	Counting	Relational	Operational	NRR.B.5.	C	NME	NRR.C.8.	Operational
SID	Grade	Number Range										
RK	K	0-5	0	1	-	-	-	-	0	1	-	-
768	K		0	1	-	-	-	-	0	1	-	-
385	K	0-10	[0-5] 0	1	-	-	-	-	[0-5] 1-1	-	C.8.c.	-
495	K		1-0	1	-	-	-	-	0	-	-	-
223	1	0-10	0	-	All	-	-	-	[0-5] 0	1	-	-
946	1		0	-	-	-	-	-	0	1	-	-
152	1	0-19	0	-	-	-	-	-	1-1	-	C.8.c.	-
793	1		0	-	On	-	-	-	S	S	-	-
993	2	0-50	0	-	-	-	-	B.5.b.	1-1	-	C.8.c.	-
284	2	0-99	0	-	All	-	-	-	1-1	-	C.8.c.	-
563	2		1-1	-	-	1	-	B.5.d.	1-0	-	-	Computation
676	3	0-199	0	-	-	-	Left Side	-	[0-99] 1-0	-	C.8.c.	-
Strategies Total by Skill Code			2-1	4	3	1	1	2	6-4	4	5	1

Anticipated strategies: NRR.C.11.c

Skill Code			C.11.c.					
Anticipated Strategies			C	NME	Counting	Operational	NRR.B.5.	NRR.B.6
SID	Grade	Number Range						
RK	K	0-5	0	1	-	-	-	-
768	K		0	1	-	-	-	-
385	K	0-10	[0-5] 0	1	-	-	-	-
495	K		0	1	-	-	-	-
223	1	0-10	0	1	-	-	-	-
946	1		0	-	-	-	-	-
152	1	0-19	0	-	On	-	-	-
793	1		S	S	-	-	-	-
993	2	0-50	0	-	-	-	B.5.c.	B.6.f.
284	2	0-99	0	-	On, Skip (5)	-	-	-
563	2		0	-	-	Left Side	B.5.c.	-
676	3	0-199	[0-99] 0	-	-	Left Side	B.5.c.	-
Strategies Total by Skill Code			0-11	5	3	2	3	1

**Anticipated strategies: NRR.C.11.d**

Skill Code			C.11.d.				
Anticipated Strategies			C	NME	Counting	Operational	NRR.C.8.
SID	Grade	Number Range					
RK	K	0-5	0	1	-	-	-
768	K		0	1	-	-	-
385	K	0-10	[0-5] 0	1	-	-	-
495	K			1	-	-	-
223	1	0-10	0	1	-	-	-
946	1		0	-	All	-	-
152	1	0-19	0	-	-	Left Side	-
793	1		S	S	-	-	-
993	2	0-50	0	-	-	Left Side	-
284	2	0-99	1-1	-	On	-	-
563	2		1-1	-	-	-	C.8.b.
676	3	0-199	[0-99] 1-0	-	-	-	-
Strategies Total by Skill Code				5	2	2	1

Anticipated strategies: NRR.C.11.e

Skill Code			C.11.e.					
Anticipated Strategies			C	NME	Counting	Relational	Operational	NRR.B.6.
SID	Grade	Number Range						
RK	K	0-5	0	1	-	-	-	-
768	K		0	1	-	-	-	-
385	K	0-10	[0-5] 1-0	-	-	-	-	-
495	K		0	-	-	-	-	-
223	1	0-10	0	1	-	-	-	-
946	1		0	1	-	-	-	-
152	1	0-19	1-1	-	On	-	-	-
793	1		S	S	-	-	-	-
993	2	0-50	1-0	-	-	1	Computation	-
284	2	0-99	0	-	All, On	-	-	-
563	2		1-1	-	-	1	-	1
676	3	0-199	[0-99] 1-0	-	-	1	-	1
Strategies Total by Skill Code				4	3	3	1	2



Anticipated strategies: NRR.C.11.f

Skill Code			C.11.f.			
Anticipated Strategies			C	NME	Counting	Relational
SID	Grade	Number Range				
RK	K	0-5	S	S	-	-
768	K		0	1	-	-
385	K	0-10	[0-5] 0	1	-	-
495	K		0	1	-	-
223	1	0-10	S	S	-	-
946	1		0	1	-	-
152	1	0-19	1-1	-	On	1
793	1		S	S	-	-
993	2	0-50	0	-	On	1
284	2	0-99	0	-	All	1
563	2		1-0	No Opp.	-	-
676	3	0-199	[0-99] 0	1	-	-
Strategies Total by Skill Code				4	3	3

Anticipated strategies: NRR.C.11.g

Skill Code			C.11.g.				
Anticipated Strategies			C	NME	Counting	NRR.B.5.	NRR.B.6.
SID	Grade	Number Range					
RK	K	0-5	S	S	-	-	-
768	K		0	1	-	-	-
385	K	0-10	[0-5] 0	1	-	-	-
495	K		0	1	-	-	-
223	1	0-10	S	S	-	-	-
946	1		0	1	-	-	-
152	1	0-19	1-0	-	On	-	-
793	1		S	S	-	-	-
993	2	0-50	-	-	-	B.5.e.	B.6.f.
284	2	0-99	1-1	-	-	-	B.6.f.
563	2		1-0	-	-	-	B.6.f.
676	3	0-199	[0-99] 0	-	-	-	B.6.f.
Strategies Total by Skill Code				4	1	1	4

**Essentialized Skill Statement**

11. Solving for Unknown Values										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.C.11.a.										Solve for an unknown value in a true equation using a relational definition of equal sign.

**Student Expectation**

Using relational understanding of equal sign, children were expected to find the unknown value in the given equation of format  $a + b = \text{-----} + d$ .

<b><i>Unanticipated Strategy. Justification/Description</i></b>	<b>Examples</b>
In the selected data, no evidence of unanticipated strategies found.	N/A

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	-	-				
<b>1</b>		-	-			
<b>2</b>				-	-	-

Unanticipated strategies by grade level and number range for NRR.C.11.a

Grade	0-5	0-10	0-19	0-50	0-99	0-199
<b>K</b>	NME (RK,768)	NME (495) NME (Guess385)				
<b>1</b>		Count all (223)	Make Friendly No.10 (152) Count on (793)			
<b>2</b>				Composition 5b (993)	Count all (223) Relational (563) Composition, 5d, 9d (563)	Left Side (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.11.a activity.

NRR.C.11.a. Anticipated Strategies

<b>NRR.C.11.a.</b>	Solve for an <b>unknown value</b> in a true equation using a relational definition of equal sign.	
<b>Content Question</b>	Here is a number sentence with a missing number. What is the missing number?	
<b>Reasoning Question</b>	Please show me using words, pictures, or numbers how you figured out that _____ is the missing number	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C11a_A_General tool</i>	Child uses a general tool as listed above.
	<i>C11a_A_Add all</i>	Add all numbers to find answer
	<i>C11a_A_Identify symbols</i>	Identify numbers and symbols in the equation
	<i>C11a_A_Left side</i>	Write out total number from left side of the equation
	<i>C11a_A_Operational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign as an operation (i.e., equal sign means something “to do”).</li> </ul>
	<i>C11a_A_Relational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign to show both sides are the same.</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b> <i>[Also consider ESSs not specifically listed here; refer to learning progressions.]</i>	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
	<i>05 - Composition</i> <i>06 - Decomposition</i>	<ul style="list-style-type: none"> <li>Find total then subtract part to find missing number</li> <li>Decompose number (add or subtract from either side) to find the missing value</li> <li>Select skill code in Composition that best fits child’s approach.</li> </ul>

**Essentialized Skill Statement**

11. Solving for Unknown Values										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.C.11.b.										Given a contextual situation modeling a true equation, apply <b>one or two properties of operations</b> or property of equality to solve for an unknown value using concrete objects.

**Student Expectation**

Using properties of operations (additive inverse), children were expected to solve a mathematical equation of the given contextual situation ( $a + b - b = \text{-----}$ ).

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
In the selected data, no evidence of unanticipated strategies found.	N/A

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-	-				
1		NME (223, 946)	NME (793_no interview data)			
2				-	-	-

Unanticipated strategies by grade level and number range for NRR.C.11.b

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (768,RK)	8c (385) Pictorial Reference (495)				
1			Act Out (152) 8c (152)			
2				8c (993)	8c (284) Compute (563)	8c (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.11.b activity.

NRR.C.11.b. Anticipated Strategies

<b>NRR.C.11.b.</b>	Given a contextual situation modeling a true equation, apply <b>one or two properties of operations</b> or property of equality to solve for an unknown value using concrete objects.	
<b>Content Question</b>	There are _____ bees in this beehive. _____ more bees fly into the beehive. Then, _____ bees leave the beehive. How many bees are in the beehive now?	
<b>Reasoning Question</b>	How do you know that there are _____ bees in the hive now?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	While concrete objects were intended to be used in this activity, not all children used concrete objects. For this activity, when a child uses a concrete object, assign as a general mathematical tool.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C11b_A_General tool</i>	Child uses a general tool as listed above.
	<i>C11b_A_Compute</i>	Add and then subtract following the operations in the equation.
	<i>C11b_A_Count on</i>	Count on from first number [counting]
	<i>C11b_A_Immediate recognition</i>	Immediately identify that adding and then subtracting the same number leaves the original addend. Also assign additive inverse skill code.
	<i>C11b_A_Operational</i>	Child uses the equal sign as an operation (i.e., equal sign means something “to do”).
	<i>C11b_A_Relational</i>	Child uses the equal sign to show both sides are the same.
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
	<i>NRR.C.8.c.</i>	<ul style="list-style-type: none"> <li>Additive inverse</li> </ul>



**Essentialized Skill Statement**

11. Solving for Unknown Values										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.C.11.c.				Given a contextual situation modeling a true equation, apply <b>one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation .						

**Student Expectation**

Using properties of operations (additive inverse), children were expected to solve a mathematical equation of the given contextual situation ( $a + b + c = \text{-----} + e$ ).

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
In the selected data, no evidence of unanticipated strategies found.	N/A

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-	-				
1		NME (223)	NME (793_no interview data)			
2				-	-	-

Unanticipated strategies by grade level and number range for NRR.C.11.c

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (RK) NME (Guess768)	NME (385, 495)				
1		Pictorial Reference (946)	Count on (152)			
2				6f (993) 5c (993)	Count on (284) Count by 5s (284) Left Side (563) 5c-three parts (563)	Left Side (676) 5c-three parts (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.11.c activity.

NRR.C.11.c. Anticipated Strategies

<b>NRR.C.11.c.</b>	Given a contextual situation modeling a true equation, apply <b>one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation.	
<b>Content Question</b>	Heather knows that she has the same total amount of fish as Max. How many fish does she have in her other pond?	
<b>Reasoning Question</b>	How do you know that there are _____ fish in this pond?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C11c_A_General tool</i>	Child uses a general tool as listed above.
	<i>C11c_A_Add all numbers across</i>	Child adds all numbers across all ponds to determine an answer.
	<i>C11c_A_Compute</i>	Child finds the sum for Max's ponds then uses the sum to decompose the number using Heather's known value. Differs from left side because in left child simply adds Max's ponds to determine an answer.
	<i>C11c_A_Count on</i>	Count on from first number [counting]
	<i>C11c_A_Left side</i>	Child adds all fish in Max's ponds to determine an answer.
	<i>C11c_A_Operational</i>	Child uses the equal sign as an operation (i.e., equal sign means something "to do").
	<i>C11c_A_Relational</i>	Child uses the equal sign to show both sides are the same.
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child's strategy.</li> </ul>
<b>NRR Essentialized Skill</b>	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
<b>Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>NRR.C.8.c.</i>	<ul style="list-style-type: none"> <li>Additive inverse</li> </ul>
	<i>05 - Composition</i> <i>06 - Decomposition</i>	<ul style="list-style-type: none"> <li>Add all to find the missing number</li> <li>Subtract parts from whole</li> </ul>

**Essentialized Skill Statement**

11. Solving for Unknown Values										
Code	Kindergarten			Grade 1			Grade 2			
	F	B	T	F	B	T	F	B	T	
NRR.C.11.d.										Apply <b>one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation.

**Student Expectation**

Using properties of operations or property of equality, children were expected to solve a mathematical equation of the given contextual situation ( $a + b = \text{-----} + a$ ).

<b><i>Unanticipated Strategy. Justification/Description</i></b>	<b>Examples</b>
Pattern: For the given equation $50 + 55 = \text{-----} + 50$ , child tried to switch addends to form a pattern of increasing numbers and find the missing number (like 50, 55, 60, 65, ..... ). In this case, student intended to swap the given numbers but it is not coded as Commutative Property because child intended to form increasing pattern instead of changing the order of addends to make both sides of the equation similar.	If you swap them, they would be a pattern: 50, 55, and if you switched them, then it would be 50 then 55 and then keep going on. But you switch them, so I thought that 55 is the answer (676, 32:43)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-	-				
1		NME (223)	NME (793_no interview data)			
2				-	-	Pattern (676)

Unanticipated strategies by grade level and number range for NRR.C.11.d

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (RK,768)	Confusing (385) NME (495)				
1		Count All (946)	Left Side (152)			
2				Operational (993) Left Side (993)	Count On (284) 8b (563)	

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.11.d activity.

NRR.C.11.d. Anticipated Strategies

<b>NRR.C.11.d.</b>	Apply <b>one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation.	
<b>Content Question</b>	Here is a number sentence with a missing number. What is the missing number?	
<b>Reasoning Question</b>	How do you know that _____ is the missing number?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C11d_A_General tool</i>	Child uses a general tool as listed above.
	<i>C11d_A_Add all numbers across</i>	Child adds all numbers across the equation to determine an answer.
	<i>C11d_A_Compute</i>	Child finds the sum for the left side the decomposes the sum using the number on the right side to determine the answer.
	<i>C11d_A_Count on</i>	Count on from first number [counting]
	<i>C11d_A_Immediate recognition</i>	<ul style="list-style-type: none"> <li>Immediately identify the ordering of the numbers are “switched” or “swapped”.</li> </ul> Also assign commutative property skill code.
	<i>C11d_A_Left side</i>	<ul style="list-style-type: none"> <li>Add all numbers on the left-side of the equation</li> </ul>
	<i>C11d_A_Operational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign as an operation (i.e., equal sign means something “to do”).</li> </ul>
	<i>C11d_A_Relational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign to show both sides are the same.</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.</li> </ul>
<b>NRR Essentialized Skill</b>	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
<b>Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>NRR.C.8.b.</i>	<ul style="list-style-type: none"> <li>Commutative property</li> </ul>
	<i>05 - Composition</i>	<ul style="list-style-type: none"> <li>Add all to find the missing number</li> </ul>
	<i>06 - Decomposition</i>	<ul style="list-style-type: none"> <li>Subtract parts from whole</li> </ul>

**Essentialized Skill Statement**

Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.11.e.							Given a contextual situation modeling a true equation, apply <b>decomposition with one or two properties of operations</b> or property of equality to solve for an unknown value using concrete objects.		

**Student Expectation**

For this essentialized skill statement, the student workbook displayed four rectangular fields, two each for Max and Heather. Concrete objects were intended to be used for this skill statement; however, they were not consistently available during the interviews. Numbers were written into the fields to demonstrate an equation involving decomposition and the associative property.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
<p><i>Unfounded.</i> In the number range 0-5, the situation given was associated with the equation <math>2 + 3 = 1 + \_</math>. In the example provided, the child did get the correct answer of four; however, the child followed a counting pattern to determine the missing number.</p> <p>A second-grade student used a different unfounded strategy by attempting to decrease both addends by one.</p>	<p>[The answer is four] <i>because you could do one, and then two, and then three, and then four</i> (385, 39:42).</p> <p><i>Since this one's [36 to 35] is going backwards, there will be 16 in this...because I feel like you're going backwards, like 36, so it will be 35. And 17, behind it it's 16</i> (284, 52:28, 52:42).</p>

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-	Unfounded (385)				
1		-	-			
2				-	Unfounded (284)	-

Unanticipated strategies by grade level and number range for NRR.C.11.e.

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (768, RK)	5e (495)				
1		NME (946) NME (223)	Skipped (793) Add All Numbers, Count On (152)			
2				Compute, Relational (993)	Count All, Count On (284) Decomposition, Relational (563)	Decomposition, Relational (676)

Anticipated strategies by grade level and number range for NRR.C.11.e.



<b>NRR.C.11.e.</b>	Given a contextual situation modeling a true equation, apply <b>decomposition with one or two properties of operations</b> or property of equality to solve for an unknown value using concrete objects.	
<b>Content Question</b>	If Max and Heather have the same number of cows all together, how many cows should Heather have in her other field if she has ____ cow(s) in one of her fields?	
<b>Reasoning Question</b>	How do you know that ____ is the missing number?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	While concrete objects were intended to be used in this activity, not all children used concrete objects. For this activity, when a child uses a concrete object, assign as a general mathematical tool.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C11e_A_General tool</i>	Child uses a general tool as listed above.
	<i>C11e_A_Add all numbers across</i>	Child adds all numbers in each of the fields to determine an answer.
	<i>C11e_A_Compute</i>	Add total then subtract to find the missing value.
	<i>C11e_A_Count on</i>	Count on from first number to find total [counting]
	<i>C11e_A_Left side</i>	Add all numbers on the left-side of the equation
	<i>C11e_A_Operational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign as an operation (i.e., equal sign means something “to do”).</li> </ul>
	<i>C11e_A_Relational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign to show both sides are the same.</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.</li> </ul>
<b>NRR Essentialized Skill Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
	<i>05 - Composition</i> <i>06 - Decomposition</i>	<ul style="list-style-type: none"> <li>Add all to find the missing number</li> <li>Decompose first addend on the left to equal the first addend on the right plus 1.</li> <li>Assign the appropriate skill code associated with decomposition.</li> </ul>

**Essentialized Skill Statement**

11. Solving for Unknown Values									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.11.f.							Given a contextual situation modeling a true equation, apply <b>decomposition with one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation.		

**Student Expectation**

Using properties of operations or property of equality, children were expected to apply decomposition to solve the given mathematical equation of the form  $(a + b = c + \text{-----})$ . It was anticipated that students will decompose  $c$  in the given equation to balance the equation and finding missing the number 'd' in the given equation.

<b>Unanticipated Strategy. Justification/Description</b>	<b>Examples</b>
Count All: For the given equation student started counting all numbers on RHS to make it equal to LHE (that student used counted on strategy to find sum of LHE). It was not anticipated for a 2 <sup>nd</sup> grade student to use Count On to find sum and balance both sides of the equation.	For the given equation $60+30 = 32 + \text{-----}$ , student used Count On from 60 to 100 to find $60 + 30$ . Then student started Counting All from 1 onward to count to 32 (on RHS) (284, 55:25)

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K						
1						
2				NME (793)	Count All (284) No Opportunity Provided (563)	NME (676)

Unanticipated strategies by grade level and number range for NRR.C.11.f

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME (768,RK)	NME (946, 223)				
1		NME (385, 495)	Count On (152) Relational (152)			
2				Count On (993) Relational (993)	Relational (284)	

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.11.f activity.

<b>NRR.C.11.f.</b>	Given a contextual situation modeling a true equation, apply <b>decomposition with one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation.	
<b>Content Question</b>	Roberta has \$___ and \$__. Megan has \$__ and another amount. Roberta and Megan have the same amount. How much is this amount [point to missing value]?	
<b>Reasoning Question</b>	Can you use the numbers on this side of the equation to help you figure out the missing number?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity.
<b>General Mathematical Tools</b>	These tools are located under Mathematical Tools > a_Type of Tool If any of these tools are used, the General tool code must also be coded under strategies.	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C11f_A_General tool</i>	Child uses a general tool as listed above.
	<i>C11f_A_Add all numbers across</i>	Add all numbers across
	<i>C11f_A_Compute</i>	Add total then subtract to find the missing value.
	<i>C11f_A_Count on</i>	Count on from first number [counting]
	<i>C11f_A_Left side</i>	Add all numbers on the left-side of the equation
	<i>C11f_A_Operational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign as an operation (i.e., equal sign means something “to do”).</li> </ul>
	<i>C11f_A_Relational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign to show both sides are the same.</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.</li> </ul>
<b>NRR Essentialized Skill</b>	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
<b>Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>NRR.C.8.b.</i>	<ul style="list-style-type: none"> <li>Commutative property</li> </ul>
	<i>05 - Composition</i> <i>06 - Decomposition</i>	<ul style="list-style-type: none"> <li>Add all to find the missing number</li> <li>Decompose first addend by 2.</li> <li>Assign the appropriate skill code associated with decomposition.</li> </ul>

**Essentialized Skill Statement**

11. Solving for Unknown Values									
Code	Kindergarten			Grade 1			Grade 2		
	F	B	T	F	B	T	F	B	T
NRR.C.11.g.							Apply <b>decomposition with one or two properties of operations</b> or Property of equality to solve for an unknown value in a true equation.		

**Student Expectation**

Using properties of operations or property of equality, children were expected to solve a mathematical equation by applying Decomposition to the given equation  $[a + b - (b - 1) = \text{-----}]$ .

<i>Unanticipated Strategy. Justification/Description</i>	Examples
In the selected data, no evidence of unanticipated strategies found.	N/A

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	-	-				
1			NME (793_no interview data)			
2				-	-	Pattern (676)

Unanticipated strategies by grade level and number range for NRR.C.11.g

Grade	0-5	0-10	0-19	0-50	0-99	0-199
K	NME(768) NME (RK_no interview data)	NME (385,495)				
1		NME (946) NME (223_no interview data)	Count on (152)			
2				6f (993) 5e (993)	6f (284) 6f (563)	6f (676)

Anticipated strategies and skill codes used by grade level and number range for the NRR.C.11.g activity.

NRR.C.11.g. Anticipated Strategies

<b>NRR.C.11.g.</b>	Apply <b>decomposition with one or two properties of operations</b> or property of equality to solve for an unknown value in a true equation.	
<b>Content Question</b>	Here is a number sentence with a missing number. What is the missing number?	
<b>Reasoning Question</b>	How do you know that the missing number is _____?	
<b>Anticipated</b>		
	<b>Code</b>	<b>Description</b>
<b>Embedded Mathematical Tools</b>	-	No tools were embedded for this activity.
<b>General Mathematical Tools</b>	<p style="text-align: center;">These tools are located under Mathematical Tools &gt; a_Type of Tool                      If any of these tools are used, the General tool code must also be coded under strategies.</p>	
	<i>Square tiles</i>	Colored square tiles as counters
	<i>Linking cubes</i>	Linking cubes as counters
	<i>Fingers</i>	Fingers as counters
<b>Strategies</b>	<b>Code</b>	<b>Description</b>
	<i>C11f_A_General tool</i>	Child uses a general tool as listed above.
	<i>C11g_A_operational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign as an operation (i.e., equal sign means something “to do”).</li> </ul>
	<i>C11g_A_relational</i>	<ul style="list-style-type: none"> <li>Child uses the equal sign to show both sides are the same.</li> </ul>
	<i>C11g_A_Count on</i>	<ul style="list-style-type: none"> <li>Count on from first number [counting]</li> </ul>
	<i>C11g_A_Left side</i>	<ul style="list-style-type: none"> <li>Add all numbers on the left-side of the equation</li> </ul>
	<i>C11g_A_Add all</i>	<ul style="list-style-type: none"> <li>Add all numbers across</li> </ul>
	<i>C11g_A_Compute</i>	<ul style="list-style-type: none"> <li>Add total then subtract to find the missing value.</li> </ul>
<b>A different way</b>	-	<ul style="list-style-type: none"> <li>A different strategy was not anticipated for this essentialized skill statement. If a different strategy was used, create an unanticipated node for the child’s strategy.</li> </ul>
<b>NRR Essentialized Skill</b>	<i>Current Skill Code</i>	<ul style="list-style-type: none"> <li>Only specific student talk-turn within activity that is attributed to the current skill code.</li> </ul>
<b>Statements</b> [Also consider ESSs not specifically listed here; refer to learning progressions.]	<i>NRR.C.8.c.</i>	<ul style="list-style-type: none"> <li>Additive inverse</li> </ul>
	<i>05 - Composition</i>	<ul style="list-style-type: none"> <li>Add all to find the missing number</li> </ul>
	<i>06 - Decomposition</i>	<ul style="list-style-type: none"> <li>Decompose second addend by subtracting 1.</li> <li>Assign the appropriate skill code associated with decomposition.</li> </ul>