

Part 2: Interim Measures and Learning Trajectory Approaches to Progress Monitoring

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Student Learning Objectives

- are a student academic growth goal that an educator sets for his or her students. SLOs are monitored over the duration of time the students are with the teacher for instruction, which may be a full academic year, a semester, or quarter (depending on the context in which the teacher leads instruction). – South Carolina Department of Education
- are content- and grade/course-specific learning objectives that can be validly measured to document student learning over a defined and significant period of time (e.g., semester or year). – National Center for the Improvement of Educational Assessment

Teaching Questions

- What do I want my students to know (my target)?
 - My students will conceptualize and fluently solve multi-step word and applied problems that include multiplication and division within 100.

How does student reasoning grow more sophisticated as a child learns?

A	B	C	D	E	F
	Beginning	Developing	Approaching Target	On Target	Above Target
Conceptualization	Equipartitions manipulatives of odd and even numbers (e.g., 27 divided in 3 groups; 24 divided in 4 groups) and explains equal or fair shares	Places manipulatives within 100 into arrayed groups of more than two and explains (verbally or in written form) the relationship between repeated addition and multiplication	Self-creates models (e.g., manipulatives or drawings) within 100 into arrayed groups more than two to demonstrate the relationship between addition and multiplication	Places manipulatives within 100 into arrayed groups of more than two and explains (verbally or in written form) the relationship between multiplication and division	Models and explains how models can show the relationship between multiplication and division
Fluency		Automates multiplication facts when factors are less than 5	Automates multiplication facts for benchmark factors of 10 or less (e.g., 7×7 , 8×8 , 10×7) and uses repeated addition to work around multiplication	Automates multiplication facts for factors of 10 or less and solves division as unknown factor problems by finding missing numbers in any position	Automates division facts for factors of 12 or less
Operations	Adds equal groups of more than two that sum to 100 or less (e.g. $9 + 9 + 9$)	Solves word problems and applied involving equal groups with factors that are less than or equal to 5	Uses a variety of strategies to solve single-step word and applied problems involving equal groups, measurement quantities, area and perimeter when quotients and divisors are less than 100	Solves a variety of multi-step word problems requiring multiplication and division within 100 using measurement quantities, perimeter and area	Uses relationships between multiplication and division within 144 to solve multi-step word and applied problems involving equal groups, arrays, and measurement quantities, and the relationship between perimeter and area

Learning Trajectory Alone

Miss Ibeh asked Sam to get chairs for all the tables in the classroom. There can be five chairs at each table, and there are five tables in the classroom. How many chairs will Sam need? Show at least two ways to answer this problem correctly.

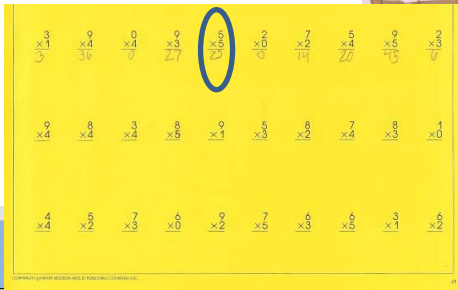
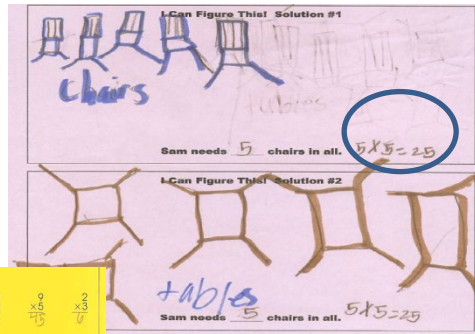
I can figure this! Solution #1

I can figure this! Solution #2

A	B
	Beginning
Conceptualization	Equipartitions manipulatives of numbers (e.g., 27 divided in 3 or 4 groups) and explains equal or
Fluency	
Operations	Adds equal groups of more than or less (e.g. $3+3+3$)

E	F
	Above Target
in 100 into arrayed groups of more than or less (e.g. 100 divided in 2 or 4 groups) and explains equal or	Models and explains how models can show the relationship between multiplication and division
facts for factors of 10 or less and in factor problems by finding division	Automates division facts for factors of 12 or less
step word problems requiring multiplication within 100 using measurement area	Uses relationships between multiplication and division within 144 to solve multi-step word and applied problems involving equal groups, arrays, and measurement quantities, and the relationship between perimeter and area

Learning Trajectory Alone



		C	D	E	F
		Approaching	Approaching Target	On Target	Above Target
Conceptualization	Equipartitions manipulatives of odd and even numbers (e.g., 27 divided in 3 groups; 24 divided in 4 groups) and explains equal or fair shares	Places manipulatives within 100 into arrayed groups of more than two and explains (verbally or in written form) the relationship between repeated addition and multiplication	Self-creates models (e.g., manipulatives or drawings) within 100 into arrayed groups more than two to demonstrate the relationship between addition and multiplication	Places manipulatives within 100 into arrayed groups of more than two and explains (verbally or in written form) the relationship between multiplication and division	Models and explains how models can show the relationship between multiplication and division
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Incorporating Interim Measures

- NWEA Fall MAP is 197 which is right on the border of meets and student is projected to be 208 in the spring which is a projection of exceeds. Exceeds on PASS likely meets the national trend for “on track.”

186



198

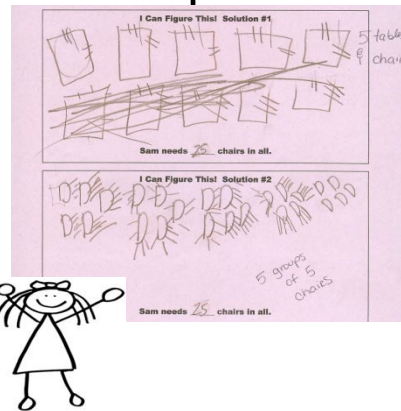
208

218

A	B	C	D	E	F
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Operations	Adds equal groups of more than two that sum to 100 or less (e.g. $9 \times 9 + 9$)	Solves word problems and applied involving equal groups with factors that are less than or equal to 5	Uses a variety of strategies to solve single-step word and applied problems involving equal groups, measurement quantities, area and perimeter when quotients and divisors are less than 100	Solves a variety of multi-step word problems requiring multiplication and division within 100 using measurement quantities, perimeter and area	Uses relationships between multiplication and division within 144 to solve multi-step word and applied problems involving equal groups, arrays, and measurement quantities, and the relationship between perimeter and area

Triangulating Information

- What does each student already know?
 - NWEA Fall MAP is 197 (SEM is 3 points so ..)



	A	B	C	D	E	F
		Beginning	Developing	Approaching Target	On Target	Above Target
Conceptualization		Equipartitions manipulatives of odd and even numbers (e.g., 27 divided in 3 groups; 24 divided in 4 groups) and explains equal or fair shares	Places manipulatives within 100 into arrayed groups of more than two and explains (verbally or in written form) the relationship between repeated addition and multiplication	Self-creates models (e.g., manipulatives or drawings) within 100 into arrayed groups more than two to demonstrate the relationship between addition and multiplication	Places manipulatives within 100 into arrayed groups of more than two and explains (verbally or in written form) the relationship between multiplication and division	Models and explains how models can show the relationship between multiplication and division
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Connecting the Objective Statement to Scale Scores

My Grade 3 students will conceptualize and fluently solve multi-step word and applied problems that include multiplication and division within 100.

9	Enter First Name	Enter Last Name	Enter Score
10	First Name	Last Name	Source 1
11	William	Tell	175
12	Hello	Kitty	199
13	Jake	Wiggins	205
14	Zuzu	Bilello	180
15	Benjamin	Bunny	195
16	Roger	Rabbit	189
17	Peter	Cottontail	191
18	Flopsy	Cottontail	196
19			
20			

Consideration: What is the connection to the state assessment?

MATH-Current Season							
Cut Scores and Percentiles for each State Performance Level							
Grade	Level 1	Level 2		Level 3		Level 4	
	Cut Score	Cut Score	Percentile	Cut Score	Percentile	Cut Score	Percentile
2	< 186	186	35	197	69		
3	<198	198	35	208	69		
4	<203	203	27	218	69		
5	<212	212	32	231	78		
6	<218	218	34	235	75		
7	<223	223	36	241	77		
8	<231	231	43	247	79		
High	<223	223	21	238	47	250	74

*

	Enter First Name	Enter Last Name	Enter Score	Enter
	First Name	Last Name	Source 1	Sour
11	William	Tell	175	IE
12	Hello	Kitty	199	C
13	Jake	Wiggins	205	C
14	Zuzu	Bilello	180	C
15	Benjamin	Bunny	195	C
16	Roger	Rabbit	189	C
17	Peter	Cottontail	191	C
18	Flopsy	Cottontail	196	C
19				
20				
21				
22				
23				
24				

COVER SHEET Baseline Preparednes

Ready Calculate

MATH-Current Season

Cut Scores and Percentiles for each State Performance Level

Grade	Level 1	Level 2		Level 3		Level 4	
	Cut Score	Cut Score	Perce- tile	Cut Score	Perce- tile	Cut Score	Perce- tile
2	<186	186	35	197	69		
3	<198	198	35	208	69		
4	<203	203	27	218	69		
5	<212	212	32	231	78		
6	<218	218	34	235	75		
7	<223	223	36	241	77		
8	<231	231	43	247	79		
High	<223	223	21	238	47	250	74

http://legacysupport.nwea.org/sites/www.nwea.org/files/resources/SC%20Linking%20Study%20August2010_Revised_Final.pdf

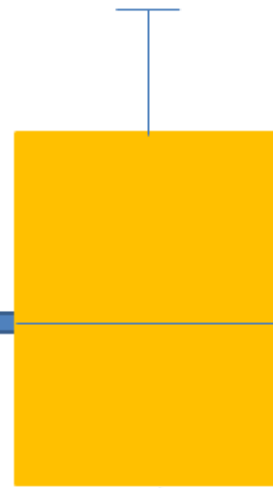


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Baseline means interpreting the present level of performance.

Data

	A	B
1	FA14 RIT	
2	189	
3	191	
4	196	
5	196	
6	196	
7	197	
8	199	
9	200	
10	201	
11	201	
12	201	
13	203	
14	203	
15	209	
16	212	
17	213	
18	214	
19		



Data Source: 3rd grade math MAP scores

- 17 students (one class) on a CAT administration
- Scores are sorted from low to high (ascending order)
- 201 is the median
- The box plot shows the interquartile range.
 - The top of the box shows the 25th percentile (196)
 - The bottom the 75th percentile (203)
 - The whiskers show the range without outliers – 25 points

208 is
important
on this scale

A child scores 220 – accelerate?

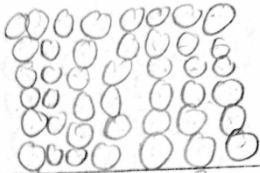
MATH-Current Season								
Cut Scores and Percentiles for each State Performance Level								
Grade	Level 1		Level 2		Level 3		Level 4	
	Cut Score	Cut Score	Percentile	Cut Score	Percentile	Cut Score	Percentile	
2	< 186	186	35	197	69			
3	<198	198	35	208	69			
4	<203	203	27	218	69			
5	<212	212	32	231	78			
6	<218	218	34	235	75			
7	<223	223	36	241	77			
8	<231	231	43	247	79			
High	<223	223	21	238	47	250	74	

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Triangulation can lead to surprises!

1. Put your chips into an array showing 6 groups of 8.

Draw your array.



Write your repeated addition sentence.

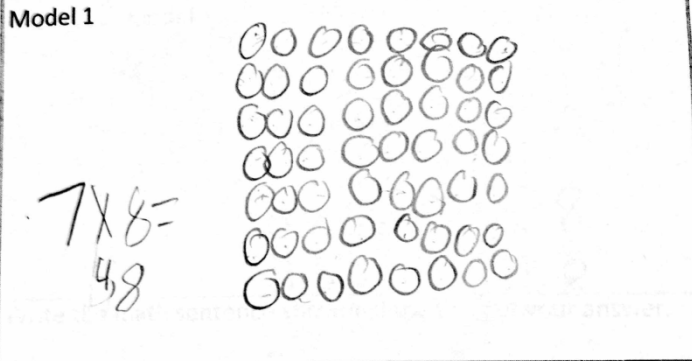
$$6 + 6 + 6 + 6 + 6 + 6 + 6 + 6$$

Write your multiplication sentence.

$$8 \times 6 = 48$$

2. Seven friends have 8 cents each. How much money do they have in total? Show two ways to answer this problem correctly (LA).

Model 1



Model 2

48 = 48

$$24 + 24 = 48$$

$$7 + 7 = 14$$

$$14 + 14 = 28$$

$$28 + 14 = 42$$

$$42 + 6 = 48$$

How is multiplication connected to addition?

It's connected because in multiplication you multiply one number then you multiply the other to get the answer just like adding you $6 + 6 + 6 + 6 + 6 + 6$ and you get the same answer.

Score of 220

Triangulation can lead to confirmation

4. Shaun saved 36 dollars. He saved an equal amount each week. What four different ways he could have saved the money?

Way	Dollars	Weeks
1.	6	6
2.	36	1
3.	9	4
4.	12	3

Handwritten student work for problem 4. The student has drawn a large rectangle divided into four smaller boxes, each representing a different way to save 36 dollars:

- Way 1: 6×6
- Way 2: 1×36
- Way 3: 9×4
- Way 4: 3×12

Score of 220

3. Four friends have 3 cents each. How much money do they have in all?

$$\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array}$$

Handwritten student work for problem 3 showing a multiplication problem: $4 \times 3 = 12$. There are also some faint scribbles and other numbers written nearby.

4. Shaun saved 36 dollars. He saved an equal amount each week. What are four different ways he could have saved the money?

Way	Dollars	Weeks
1.	6	Monday
2.	36	Tuesday
3.	9	Wednesday
4.	3	Thursday

$$\begin{array}{r} 36 \\ \times 4 \\ \hline 144 \end{array}$$

Handwritten student work for problem 4 showing a multiplication problem: $36 \times 4 = 144$. There are also some faint scribbles and other numbers written nearby.

Score of 178

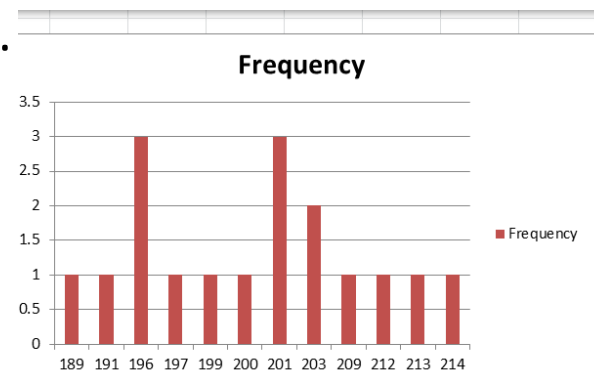
Data

	A	B
1	FA14 RIT	
2	189	
3	191	← School -192 48 th percentile Fall
4	196	
5	196	
6	196	
7	197	→ 69 th percentile in Fall
8	199	
9	200	
10	201	← CLASS - 201 76 th percentile Fall
11	201	
12	201	
13	203	
14	203	
15	209	→ CCR Cut for Spring Grade 3
16	212	
17	213	
18	214	
19		

Interpretation

Seventeen students in a Grade 3 mathematics advanced placement course took a computer adaptive test in the Fall of 2014. The average score for the fall mathematics test for **the class** was 201 with a standard deviation of 7, indicating theoretically 68% (reality is 64%) of the students in the class would have scores ranging from 194 to 208. Sixty-four % of students are *just below* being “on track” for the year-end college and career readiness indicator.

Students are in different places in their learning. Four students are predicted to **already** be at the year-end Grade 3 goal. Evidence from this test is that they are ready to access the Grade 4 curriculum. Eleven students are predicted to be well prepared to be CCR at the end of the year. They appear to be able to move quickly, without remediation, through the Grade 3 curriculum. Two students appear to be at risk for not being on track. Their scores (189, 191) are more consistent with scores of students in Grade 2.



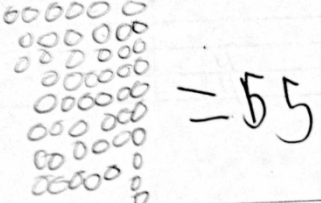
Report continued

- Students whose scores fall within one standard deviation are *likely* in similar places in their learning (projected to be around the College and Career Ready cut in the Spring).
- Students below a score of 194 may be lagging beyond their peers in the class and additional evidence of their learning from classroom must be collected to help understand their present level of performance. These are the two students that did not meet the state-identified gifted criteria, but have on other assessment occasions shown performance at the 80th percentile. What happened?

Triangulating information

3. Five friends and you have 9 cents each. How much money do you have in all?

Show your model.



Write the math sentence showing how you got your answer.

$$9 \times 6 = 54$$

Write a **different** sentence that you could have also used to solve your problem.

$$9 + 9 + 9 + 9 + 9 + 9 = 54$$

Student score of 191 on MAP.

Student can set up problem using numbers.

Student does catch two-step problem $(5+1) \times 9$

Student memorized fact.

Student cannot generate the model that shows conceptual understanding.

Student did not use reasoning between model and facts.

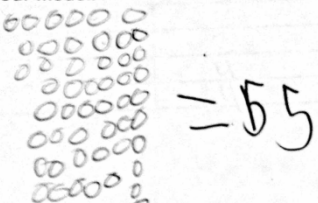
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When interim measures **in any grade** show low achievement you must play detective.

Where is the child's present level of functioning in the curriculum?

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Show your model.



Write the math sentence showing how you got your answer.

$$9 \times 6 = 54$$

Write a **different** sentence that you could have also used to solve your problem.

$$9 + 9 + 9 + 9 + 9 + 9 = 54$$

3. Four friends have 3 cents each. How much money do they have in all?

$$\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array}$$

$$\begin{array}{l} 4 \times 1 = 4 \\ 4 \times 2 = 8 \\ 4 \times 3 = 12 \end{array}$$

4. Shaun saved 36 dollars. He saved an equal amount each week. What are four different ways he could have saved the money?

Way	Dollars	Weeks
1.	6	Monday
2.	9	Tuesday
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4.	9	Thursday

$$\begin{array}{r} 36 \\ \times 4 \\ \hline \end{array}$$

$$4 \times 9 = 36$$

For more information:

Center for Assessment

www.nciea.org

