Levi Jaslow Number Facts Assessment
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Overview
This Number Facts Assessment was written to help teachers assess students' fluency with number facts. We consider a student to be fluent with a set of number facts if that student:

1. Uses relational thinking or recall
2. Chooses an efficient relational thinking strategy for a given fact
3. Obtains the correct answer
4. Works at an appropriate rate for her/his age

Students will be fluent with some sets of number facts (e.g. addition with sums less than 10) before others (e.g. multiplication with products to 100).

Learning number facts should hold an important place in elementary and middle school mathematics classes. When children first encounter number facts, they should be encouraged to figure them out in whatever way makes sense to them. When they first solve a problem about 8 groups of 6, they may draw a picture of 8 groups of 6 circles and then count all the circles. Doing many problems like this in Kindergarten and First Grade gives children a foundation for understanding multiplication. As children get more sophisticated, they might solve the problem 8×6 by adding 8 sixes. This strategy gives children an understanding of the relationship between multiplication and addition. As children continue to mature, they will start to use properties of multiplication along with facts they know to figure out those they don't know. A child might say, 8 times 6 would be 6 times 6, which is 36, plus another two sixes, which is 12, so 8 times 6 would be 36 plus 12 which is 48. This strategy relies on an understanding of the distributive property of multiplication over addition.

When fact instruction focuses on memorizing number facts, students miss the opportunity to learn properties of operations in conjunction with learning number facts. The Common Core State Standards for Mathematics views Number and Operation and Algebraic Thinking as a unified domain. Providing opportunities for students to engage with properties of operations when learning number facts unifies number and operation and algebraic thinking.

We expect that most students will eventually know most facts from memory. (We know that many successful mathematicians don't rely on memory for many of their facts.) Knowing from memory doesn't mean that facts were learned by memorizing. In the end, students who use the properties of operations to help them learn number facts are as efficient and accurate as students who do a good job of memorizing their facts. They, however, have a great advantage in that they understand the important ideas of mathematics and are well prepared to learn further mathematics.

Directions for administering the Number Facts assessments

1. Meet with one student at a time.

2. Do not provide student with paper, pencil, or manipulatives.

3. Have the students put their hands where you can see them so you can tell if they are using them in some way to solve the problem.

4. Place the student copy of the assessment in front of the student. Provide student with a sheet of colored paper. Ask the student one fact at a time; can read the fact to the student or just ask the student to solve the next one on the list. Ask the student to move the paper down the student sheet one fact at a time so student can see facts they have already solved but not facts they are going to solve. Neither you nor the student will write anything on the student copy[1].

5. After the student provides an answer, ask the student how s/he got that answer if you don't already know how the student got the answer. For example, if you saw the child count on fingers, you don't need to ask (but you could if you wanted to); if the child answered immediately (1-2 seconds) you could assume for now that the child recalled the fact from memory.

6. Put a dot next to the number fact for each 3 or 4 seconds the student is working on the fact. Choose the time frame that is appropriate for your grade level and make a note of what each dot stands for.

7. Put a line over the number if the student gets the answer wrong.

8. If the student uses Relational Thinking, write down what the student says. See chart below for examples of what you might write

Number fact	**If student says**	**You could write down**
8 + 4	"8 and 2 is 10 and 2 more is 12"	8 + 2 → 10 + 2 → 12
14 - 7	"7 and 7 is 14 so 14 take away 7 is 7"	7 + 7 = 14 so 14 – 7 = 7
3×6	"I knew that 6 and 6 was 12 and then 13, 14, 15, 16, 17 , 18"	6 + 6 → 12, 13, 14, 15, 16, 17, 18
8×6	"I did 8 times 5 is 40 and then I knew I needed one more 8 so 48"	8×5 → 40 + 8 → 48 OR (8 x 5) + 8

[1] If you have a student with a language issues and you think the assessment would be more accurate if s/he wrote the answers, allow the student to write answers.

9. You do not need to complete the entire interview if you feel you aren't going to get new information from the child. Many teachers choose to stop an interview if student repeatedly directly models for 3 or 4 problems in a row. Definitely stop the interview if the child gets tired or frustrated. ***Interview these students with the Entry Level Facts interview to see if they know any facts from memory or are able to use properties of operations under ideal conditions.*** You may choose to conduct these interviews at another time.

10. At the close of the interview, if the student answered several facts within 2 seconds go back and question to see if the student can use relational thinking. Ask specifically about the some of the problems in **bold.** If such a student repeatedly says, "I have that one memorized," try asking something like, "If you didn't have it memorized, how could you figure it out?" OR "If someone disagreed with you, how could you prove your answer is right?"

11. At the close of the interview, go back and ask the child to explain her/his thinking for any facts you might be curious about. Some teachers ask about the facts that the child got wrong at this time.

12. Complete summary sheet soon after interview. There is room on each summary sheet for interviews from 4 different dates.

13. To assess efficient rate, we recommend these guidelines:
    1st grade: 4 seconds per fact
    2nd and 3rd grade: 3 seconds per addition fact; 4 second per subtraction or multiplication fact
    4th - 6th grade: 3 seconds per fact
    7th grade and higher: 2 second per fact
    Please remember that the goal is to figure MOST facts at an efficient rate; having a few facts that take longer than this rate will not inhibit students' problem solving.

Adapt these instructions if you feel you need to do something different to get better information about a child's fact fluency. The goal is always to give you information, not to follow these procedures.

Name_____ Date _____

Addition Facts Assessment – teacher note taking sheet

Fact	**Answer**	**Strategy**
5 + 5		
7 + 3		
8 + 3		
2 + 7		
6 + 4		
5 + 6		
4 + 8		
2 + 8		
6 + 6		
7 + 7		
7 + 5		
7 + 6		
9 + 7		
5 + 7		
6 + 8		
8 + 9		
6 + 9		
8 + 7		

Addition Facts -- Student Sheet

5 + 5
7 + 3
8 + 3
2 + 7
6 + 4
5 + 6
4 + 8
2 + 8
6 + 6
7 + 7
7 + 5
7 + 6
9 + 7
5 + 7
6 + 8
8 + 9
6 + 9
8 + 7

Name_____ Date _____

ENTRY LEVEL ADDITION FACTS Assessment – teacher note taking sheet

This assessment will only be given to students who seem not to be able to derive any addition facts

Fact	**Answer**	**Strategy**
6 + 1		
1 + 7		
0 + 5		
2 + 2		
2 + 3		
4 + 4		
4 + 3		
4 + 5		
8 + 2		
2 + 8		
8 + 3		
3 + 3		
3 + 4		
4 + 3		
3 + 7		
4 + 6		

Addition Facts 2 -- Student Sheet

6 + 1
1 + 7
0 + 5
2 + 2
2 + 3
4 + 4
4 + 3
4 + 5
8 + 2
2 + 8
8 + 3
3 + 3
3 + 4
4 + 3
4 + 6
3 + 7

Name_____ Date _____

Subtraction Facts Assessment – teacher note taking sheet

Fact	Answer	Strategy
4 – 2		
10 – 5		
6 – 2		
8 – 4		
12 – 4		
14 – 7		
11 – 2		
12 – 8		
14 – 6		
15 – 7		
13 – 6		
12 – 5		
17 – 8		
12 – 3		
16 – 9		
18 - 9		
15 - 8		
13 - 9		

Subtraction Facts -- Student Sheet

4 – 2
10 – 5
6 – 2
8 – 4
12 – 4
14 – 7
11 – 2
12 – 8
14 – 6
15 – 7
13 – 6
12 – 5
17 – 8
12 – 3
16 – 9
18 – 9
15 – 8
13 – 9

Name_____ Date _____

ENTRY LEVEL Subtraction FACTS Assessment – teacher note taking sheet

This assessment will only be given to students who seem not to be able to derive any subtraction facts

Fact	**Answer**	**Strategy**
3 + 3		
6 – 3		
6 + 4		
6 – 0		
10 – 4		
10 – 3		
11 – 3		
12 – 4		
6 + 6		
12 – 6		

Subtraction Facts 2 -- Student Sheet

3 + 3
6 – 3
6 + 4
6 – 0
10 – 4
11 – 1
10 – 2
11 – 3
12 – 4
6 + 6
12 – 6

Name_____ Date _____

Multiplication Facts Assessment – teacher note taking sheet

Fact	Answer	Strategy
3×5		
7×2		
6×5		
4×4		
3×6		
8×5		
5×6		
4×3		
4×9		
6×6		
5×7		
6×8		
7×6		
9×8		
8×6		
7×8		
4×8		
6×9		

Multiplication Facts -- Student Sheet

3×5
7×2
6×5
4×4
3×6
8×5
5×6
4×3
4×9
6×6
5×7
6×8
7×6
9×8
8×6
7×8
4×8
6×9

ENTRY LEVEL MULTIPLICATION FACTS Assessment – teacher note taking sheet

This assessment will only be given to students who seem not to be able to derive any multiplication facts

Fact	Answer	Strategy
2×6		
6×2		
7×1		
5×2		
2×5		
3×5		
1×8		
3×3		
4×3		
3×4		
4×4		
5×5		

Multiplication Facts 2 -- Student Sheet

2×6
6×2
7×1
5×2
2×5
3×5
1×8
3×3
4×3
3×4
4×4
5×5

Name_____ Date _____

Division Facts Assessment – teacher note taking sheet

Fact	Answer	Strategy
9 ÷ 9		
10 ÷ 2		
12 ÷ 4		
20 ÷ 5		
36 ÷ 6		
45 ÷ 5		
32 ÷ 4		
21 ÷ 3		
24 ÷ 6		
42 ÷ **6**		
56 ÷ 7		
72 ÷ 8		
48 ÷ 8		
54 ÷ 9		
63 ÷ 7		
63 ÷ 9		
54 ÷ 6		

Division Facts -- Student Sheet

9 ÷ 9
10 ÷ 2
12 ÷ 4
20 ÷ 5
36 ÷ 6
45 ÷ 5
32 ÷ 4
21 ÷ 3
24 ÷ 6
42 ÷6
56 ÷ 7
72 ÷ 8
48 ÷ 8
54 ÷ 9
63 ÷ 7
63 ÷ 9
54 ÷ 6

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Addition Fact Assessment Summary Sheet

Date				
Strategy Used Most Often (DM, counting, RT, recall)				
Most sophisticated strategy				
Evidence of use of Commutative Property of + (Look at: 2 + 7; 2 + 8 and others.)				
Evidence of use of associative property of + (Write out relationship used.)				
Can compare numbers?				
Number of Facts at efficient rate for grade level				

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Subtraction Fact Assessment Summary Sheet

Date				
Strategy Used Most Often (DM, count, RT, recall)				
Most sophisticated strategy				
Evidence of use of relationship between addition and subtraction				
Evidence of being able to build up to find the difference (e.g. for 12 – 8, 8 + 2 → 10 + 2 → 12, so 12 – 8 = 4)				
Evidence of being able to take away in chunks to find difference (e.g. for 12 – 4, 12 – 2 → 10 – 2 → 8 so 12 – 4 = 8)				
Uses appropriate strategy for given facts				
Number of Facts at efficient rate for grade level				

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Multiplication Fact Assessment Summary Sheet

Date				
Strategy Used Most Often (DM, skip count, RT, recall)				
Most sophisticated strategy				
Evidence of use of Commutative Property (Look at: 7×2; 5×n; 8×6)				
Evidence of use of distributive property (Write out relationship used.)				
Evidence of use of associative property (Write out relationship used.) (May be hard to find.)				
Number of Facts at efficient rate for grade level				

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Division Fact Assessment Summary Sheet

Date				
Strategy Used Most Often (DM, skip count,RT, recall)				
Most sophisticated strategy				
Evidence of use of relationship between multiplication and division				
Evidence of use of other use of relational thinking (What properties were used?) (Write out relationship used.)				
Uses appropriate strategy for given facts				
Number of Facts at efficient rate for grade level				