Teaching Math Facts for Understanding and Mastery

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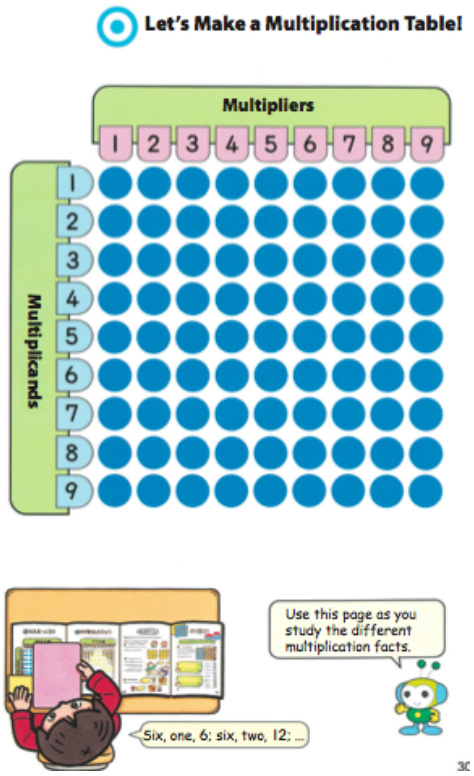


There are six sets of math facts that children should learn in Elementary School.

1. Addition to 10 (Grade 1)
    - These are the addition facts with sums of 10 or less, needed to add without regrouping (e.g. 4 + 5).
    - Can begin to be committed to mastery after Math In Focus lesson 3.1, practiced throughout the year, and reviewed if necessary in subsequent grades.
2. Subtraction to 10 (Grade 1)
    - These are the subtraction facts with minuends that are 10 or less, needed to subtract without regrouping (e.g. 9 – 5).
    - Can begin to be committed to mastery after lesson 4.1.
3. Addition to 20 (Grade 1)
    - These are the addition facts with sums from 11-18, needed to add with regrouping (e.g. 4 + 8).
    - Can begin to be committed to mastery after lesson 8.1.
4. Subtraction to 20 (Grade 1)
    - These are the subtraction facts with minuends from 11-18, needed to subtract with regrouping (e.g. 12 – 4).
    - Can begin to be committed to mastery after lesson 8.2.
5. Multiplication tables from 2-5, and 10 (Grade 2)
    - These are the multiplication facts with multipliers from 1-10 and multiplicands of 2-5 and 10 (multiplier x multiplicand) (e.g. 1 x 2, 2 x 2 … 10 x 2).
    - The table of 2 can be committed to mastery after 6.2, the table of 5 after 6.4, the table of 10 after 6.5, the table of 3 after 15.2, and the table of 4 after 15.4.
6. Multiplication tables from 6-9 (Grade 3)
    - These are the multiplication facts with multipliers from 1-10 and multiplicands of 6-9 (e.g. 1 x 6, 2 x 6 … 10 x 6).
    - The table of 6 can be committed to mastery after 6.2, the table of 7 after 6.3, the table of 8 after 6.4, and the table of 9 after 6.5.

General suggestions for teaching facts

1. Facts should be committed to memory only after they are taught first conceptually.

2. Teachers in later grades should continue to work on all sets of facts with students who have not mastered them.

3. Facts should be taught throughout the year. (The first 5 minutes of each class can be devoted to short facts drills.)

4. Facts should be taught conceptually by having children look for patterns (e.g. students may notice that if you increase an addend by 1, 2, etc., the sum will also increase by 1, 2, etc.; or I can find 7 x 6 by adding 2 x 6 and 5 x 6).

5. Simple games, chants, flash card drills, and well-designed drill sheets are all helpful.

6. Parents can help by practicing with their children at home. This should not be done, however, until after students have learned the facts conceptually at school.

What is mastery?

Mastery means that students should be able to recall the facts quickly from memory, without counting on their fingers. Two seconds per fact is a good general guideline but recall time will vary from student to student as some children may need more time to process.

When should math facts be mastered?

The table below outlines what mastery should be attempted and realistically expected in each grade. For example, first grade teachers should attempt for all students to master the addition and subtraction facts to 20 but make sure that all students at least master the facts to 10. The next year, the second grade teacher will continue to work on and reinforce these facts if necessary.

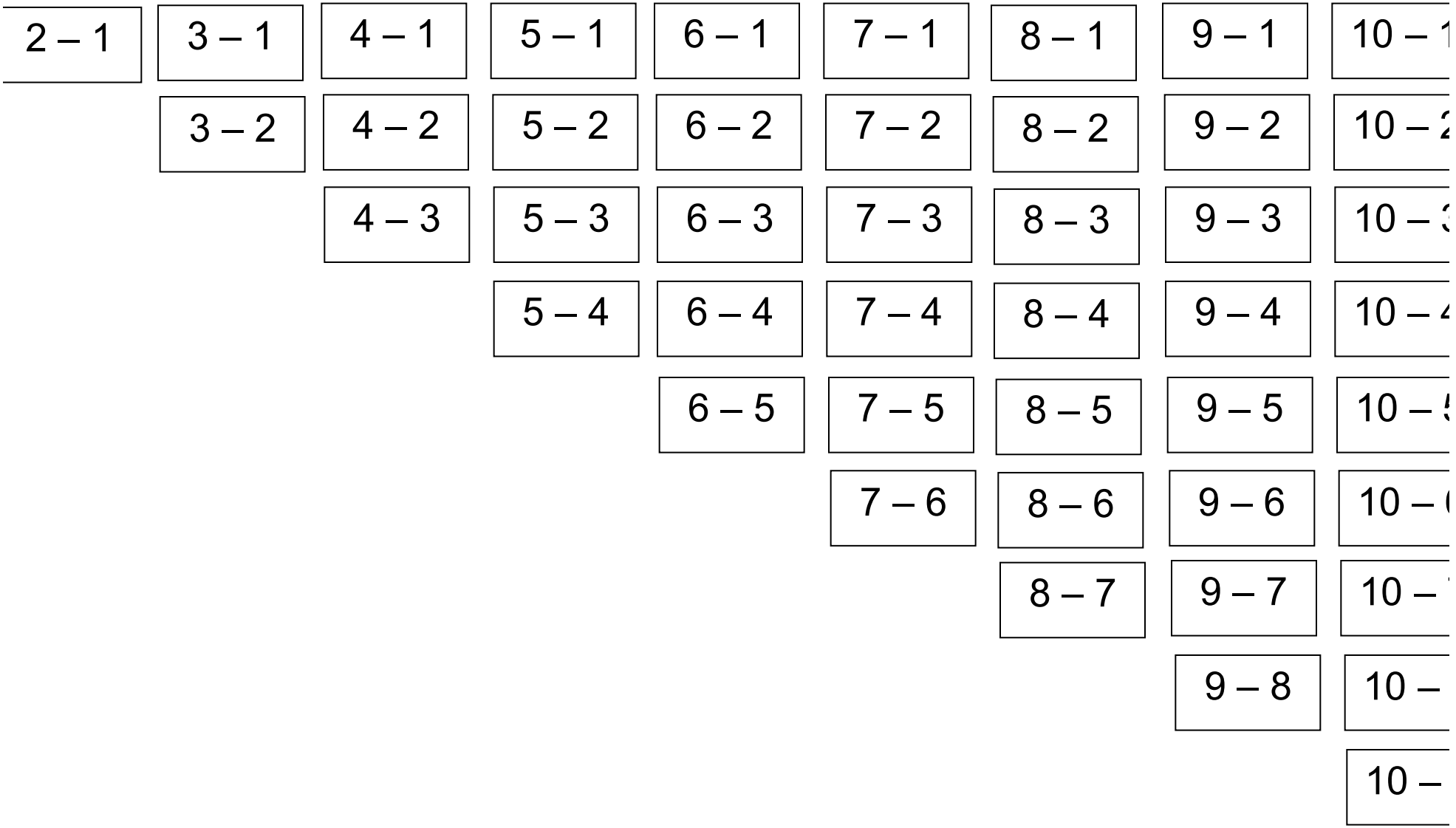
Grade	Expected Mastery	Attempted Mastery	Reinforce (if necessary)
K			
1	Addition and subtraction to 10	Addition and subtraction to 20	
2	Addition and subtraction to 20	Multiplication facts 2 to 5 and 10	Addition and subtraction to 10
3	Multiplication facts from 5 to 10	Multiplication facts from 6 to 9*	Addition and subtraction to 20 Multiplication facts from 2 to 5, and 10
4	Multiplication facts from 6 to 9		Addition and subtraction to 20 Multiplication facts 2 to 5 and 10
5			Addition and subtraction to 20 Multiplication facts 1 to 10

*Although there may be exceptions, students should have all of their multiplication facts mastered by the end of grade 3.

Addition facts to 10: Look for patterns below. What do you notice? Look in all directions.

1+1	2+1	3+1	4+1	5+1	6+1	7+1	8+1	9+1
1+2	2+2	3+2	4+2	5+2	6+2	7+2	8+2	
1+3	2+3	3+3	4+3	5+3	6+3	7+3		
1+4	2+4	3+4	4+4	5+4	6+4			
1+5	2+5	3+5	4+5	5+5				
1+6	2+6	3+6	4+6					
1+7	2+7	3+7						
1+8	2+8							
1+9								

Subtraction facts to 10: Look for patterns below. What do you notice? Look in all directions.



Addition facts to 20: Look for patterns below. What do you notice? Look in all directions.

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

Subtraction facts to 20: Look for patterns below. What do you notice? Look in all directions.

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

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

Multiplication facts to 5

Look for patterns in the cards. Look in all directions.

What do you notice about the lighter shaded cards?

Look at the 2's column. What happens to the answer when the first number increases by 1?

Multiplication facts 6 to 9

Do you notice any patterns? Look in all directions.

What do you notice about the lighter shaded cards?

I can add the answers of 3 X 6 and 5 X 6 to get the answer for 8 X 6. Why do you think this works?

Can you find two other cards that when added together make another one?

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