

ADDITION BOARD (aka Strip Board)

PREREQUISITE:

Addition with Golden Bead materials
Addition with Colored Beads

Direct Aim:

To memorize Addition Tables
Linear structure of addition

Indirect Aim:

Analysis of number

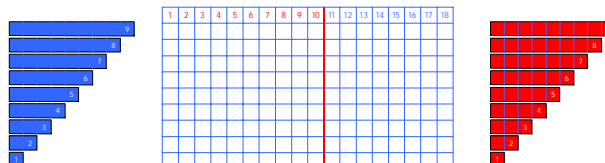
PRESENTATION SUMMARY:

Build each set of strips with the “1” strip at the bottom and the “9” at the top. Edges should be flush on the left side with the numbers stair-stepped on the right (Note to yourself this is the same way we laid out the red and blue rods.) The blue strips should be beside the board on the left, and the red strips beside the board on the right. Introduce the material saying: “This is the Addition Strip Board.”

Exercise 1:

The strips are laid across the top row of empty squares on the addition board. Explore with random combinations choosing and placing horizontally first a blue strip followed by a red. Saying for example: “I am going to add ___ to ___.” or “How much is ___ and ___? Pointing to the answer, found above the last section of the red strip on the number line at the top of the board, Say $__ + __ = __$ Check Chart #1.

Exercise 2: “How many ways can we make ___” Choose a number and see how many combination pairs you can add together to get that number. Line up the combinations on the rows of the board. Use Chart #3 as a control.



Addition Board

MATERIALS:

- Addition Board

The Addition Board has a blue grid with a red line at the number 10. Across the top are the numbers 1-10 printed in red and 11-18 in blue. The vertical red line after the ten corresponds to the Snake Game marker when used to indicate a ten. The red line reinforces the decimal system, showing with addition math facts how many units make a ten and how many are left over.

- Two sets of Addition Strips

Both the blue and red strips are numbered 1-9. Only the red strips are segmented with blue lines to mark each unit on the strip.

Addends are the numbers which are added together, and the answer to an addition equation is called the **sum**. When working out the equation the blue strip is placed first on the board, representing the first addend in the equation. The red strip is for the second addend, and is placed on the board after the blue strip. In the early works the unit markings can help the child start with the first addend and then count the red. For example with $4 + 3$ there is no need to count 1,2,3,4 - start by saying 4, then point to the units on the red strip saying 5,6,7. The unsegmented blue strips indicate that a *group* of units already exists and through addition you are adding ___ more units.

ADDITION CHARTS

PREREQUISITE:

Addition Strip Board

Direct Aim:

To memorize Addition Tables
Recognition of number patterns

Indirect Aim:

Transfer from concrete to abstract addition

PRESENTATION SUMMARIES:

Each succeeding chart is a variation of the one before it. The series of charts are a graded progression of difficulty and abstractness. In this way, repetition is provided to help maintain interest in practicing the facts and to fix the combinations in the child's memory. All of these charts have the same number of math facts problems, only they are presented in different ways.

1+1=2	2+1=3	3+1=4	4+1=5	5+1=6	6+1=7	7+1=8	8+1=9	9+1=10	
1+2=3	2+2=4	3+2=5	4+2=6	5+2=7	6+2=8	7+2=9	8+2=10	9+2=11	
1+3=4	2+3=5	3+3=6	4+3=7	5+3=8	6+3=9	7+3=10	8+3=11	9+3=12	
1+4=5	2+4=6	3+4=7	4+4=8	5+4=9	6+4=10	7+4=11	8+4=12	9+4=13	
1+5=6	2+5=7	3+5=8	4+5=9	5+5=10	6+5=11	7+5=12	8+5=13	9+5=14	
1+6=7	2+6=8	3+6=9	4+6=10	5+6=11	6+6=12	7+6=13	8+6=14	9+6=15	
1+7=8	2+7=9	3+7=10	4+7=11	5+7=12	6+7=13	7+7=14	8+7=15	9+7=16	
1+8=9	2+8=10	3+8=11	4+8=12	5+8=13	6+8=14	7+8=15	8+8=16	9+8=17	
1+9=10	2+9=11	3+9=12	4+9=13	5+9=14	6+9=15	7+9=16	8+9=17	9+9=18	
1+10=11	2+10=12	3+10=13	4+10=14	5+10=15	6+10=16	7+10=17	8+10=18	9+10=19	

Chart # 1 Control Chart

This chart contains all the necessary combinations of addition facts for the tables from 1-18. These charts only include equations with addends of nine or less. This chart can be used as a control with the Addition Strip Board, Addition Tables Cards, and Equation Cards

1+1=2	2+1=3	3+1=4	4+1=5	5+1=6	6+1=7	7+1=8	8+1=9	9+1=10	
1+2=3	2+2=4	3+2=5	4+2=6	5+2=7	6+2=8	7+2=9	8+2=10	9+2=11	
1+3=4	2+3=5	3+3=6	4+3=7	5+3=8	6+3=9	7+3=10	8+3=11	9+3=12	
1+4=5	2+4=6	3+4=7	4+4=8	5+4=9	6+4=10	7+4=11	8+4=12	9+4=13	
1+5=6	2+5=7	3+5=8	4+5=9	5+5=10	6+5=11	7+5=12	8+5=13	9+5=14	
1+6=7	2+6=8	3+6=9	4+6=10	5+6=11	6+6=12	7+6=13	8+6=14	9+6=15	
1+7=8	2+7=9	3+7=10	4+7=11	5+7=12	6+7=13	7+7=14	8+7=15	9+7=16	
1+8=9	2+8=10	3+8=11	4+8=12	5+8=13	6+8=14	7+8=15	8+8=16	9+8=17	
1+9=10	2+9=11	3+9=12	4+9=13	5+9=14	6+9=15	7+9=16	8+9=17	9+9=18	
1+10=11	2+10=12	3+10=13	4+10=14	5+10=15	6+10=16	7+10=17	8+10=18	9+10=19	

Chart # 2 Commutative Control Chart

This chart has only one combination of each math fact family. Pairs of addends are not repeated. You can illustrate the commutative property by starting with Chart #1 and using Chart #2 as the control. Use a wipe off marker to cross out, or slips of paper to cover up the eliminated combinations. (Or you can have the child duplicate the chart on paper or on a marker board.) Start by saying, "Let's see how many combinations we can eliminate." Starting with 1+,1 this combination must be left as there are no other addition combinations for the number two. Next go to the combinations for the number three. You will find 1+2 and 2+1 so the second combination 2+1 can be eliminated because with a commutative equation it does not matter which number comes first, the sum is the same. Next go to the combinations for the number four. Of the combinations 1+3, 2+2, and 3+1, keep the combinations 1+3 and 2+2 and 3+1 can be eliminated because it is the same as 1+3. Continue this process as you work diagonally across Chart #1 to create Chart #2.

0	1	2	3	4	5	6	7	8	9
1	2	3	4	5	6	7	8	9	10
2	3	4	5	6	7	8	9	10	11
3	4	5	6	7	8	9	10	11	12
4	5	6	7	8	9	10	11	12	13
5	6	7	8	9	10	11	12	13	14
6	7	8	9	10	11	12	13	14	15
7	8	9	10	11	12	13	14	15	16
8	9	10	11	12	13	14	15	16	17
9	10	11	12	13	14	15	16	17	18

Chart # 3 Finger Chart

This chart is for practice in the memorization of addition facts. The numbers in the blue row are the first addends and the numbers in the red column are the second addends. The white squares are the sums. Mark the first addend in blue row with the right index finger and then mark the second addend in the red column with the left index finger. Move the right finger straight down until it is parallel and in the same row as the left finger. Next move the left finger over until it meets the right finger. Where they meet is the answer. Always start with blue and go down first before moving across.

1	2								
2	3	4							
3	4	5	6						
4	5	6	7	8					
5	6	7	8	9	10				
6	7	8	9	10	11	12			
7	8	9	10	11	12	13	14		
8	9	10	11	12	13	14	15	16	
9	10	11	12	13	14	15	16	17	18

Chart # 4 Half Chart

Chart #4 has no blue horizontal addends, and horizontally it is half of Chart #3. Begin by doing some random combinations, finding both the addends in the red column. First, move the finger which is higher to the right, to the end of the horizontal row, then move the same finger down to the row where the other number is. Move the second finger to the right to meet the first. If the addends are the same (e.g. 4 + 4) put both fingers on the number in the red column and move both fingers to the end of the row to find the answer. Chart #4 still has the same number of problems as Chart #3 - but it has been simplified by eliminating commutative duplicates. Use Chart #2 as the control for this chart.

Note that Chart #1 is similar to Chart #3, while Chart #4 is similar to Chart #2.

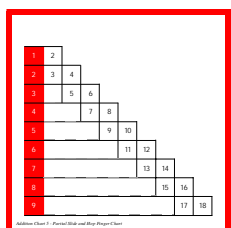


Chart # 5 Slide & Hop Finger Chart

This chart is greatly simplified, yet it still has the same number of problems as Chart #3. The child finds both addends in the red vertical column, same as in Chart #4. To find the answer slide the fingers each to the end of their respective rows. Then hop the fingers simultaneously on the diagonal stair steps, towards each other. If both fingers land in the same square after an equal number of hops that is the answer - if the hops end with each finger in their own square then slide slightly down and in to the left to the number on the diagonal between the two outer squares.

(e.g. for $2 + 5$ each finger travels to the end of the row from the red 2 landing on 4 and from the red 5 landing on 10. Left finger hops from 4 down to 6, and right finger travels from 10 up to 8. Since there is no square left in between then both fingers slide to 7 for the answer.)

The answers on the outer diagonal are even numbers and the answers on the inner diagonal are odd numbers. After time the child will realize that when two even numbers are added together, the sum is even, and when the two addends are odd the sum is also even. But when one addend is odd and one is even the sum is an odd number.

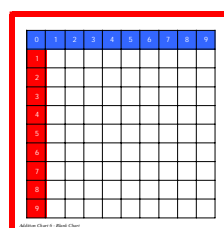


Chart # 6 Blank Chart

This chart is a self test for the child. He is to recall from memory the sums, then to find the tile and place on the board. So here the child gives the answer instead of finding it. This chart is the same as Chart #3 except that the sums are filled in with the Bingo tiles. Prepare the work space by setting up the Bingo tiles sorted in piles by number. The child does the fingering the same as chart #3 and then places the tile where the answer should be. You may use Equation slips or Table Cards as a means to fill in this chart. Check with Chart #3 for control.

SUBTRACTION BOARD (aka Strip Board)

PREREQUISITE:

Subtraction with Golden Bead materials
Subtraction with Colored Beads

Direct Aim:

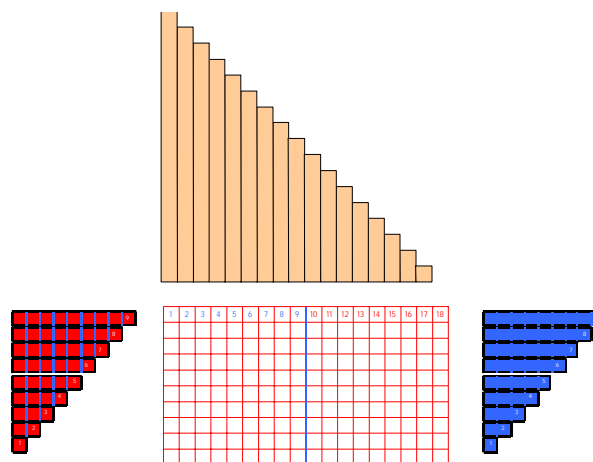
To memorize Subtraction Tables.
Linear structure of subtraction.

Indirect Aim:

Analysis of number

PRESENTATION SUMMARY:

Set up the materials with the blue strips on the right of the board and red strips on the left. The tan strips without numbers are placed vertically above the subtraction board, from left to right, longest to shortest, respectively above the numbers 1-17. As with the Addition Board, the blue strips are still placed first, however they are placed from left to right now. Depending on the age and understanding of your child, the first few times you present the subtraction facts on this board you may choose to do the work of laying the blue strips only on the top row with the numbers. Later when working through an entire facts table you will still place the blank strips directly over the numbers on the top row to mark the minuend, but you can lay the blue and red strips on the blank rows of squares below the numbers of the top row to do the work of each equation. Explain that the blank strips are to cover the numbers we do not need, and that the blue strips (the subtrahend) are used to “take away.” Again, the blue unsegmented strips indicate you are removing a *group* of ___ to see how many units are left (red strip).



Subtraction Board MATERIALS:

- Subtraction Board
Traditionally made of wood, this board has a red grid with a blue line at the number 9. Across the top are the numbers 1-9 printed in blue and 10-18 in red. The blue line after the nine is to serve as a reminder that subtraction facts with a difference (answer) of more than nine need not be memorized. There is also another version of the Subtraction board, a simplified version of this one, consisting only of the top line of this board.
- Two sets of Numbered Strips
The blue and red strips are marked exactly the same as those with the Addition Board.
- Blank Strips
The Subtraction Board has an additional set of strips without any markings having lengths from one to seventeen. They are used to mark the subtrahend by covering up all subtrahends greater than the number needed. (The child may choose to use only the longest blank strip to mark the minuend.)

SUBTRACTION BOARD

Exercise 1:

Present equations with minuends 1-9. Starting with "9" as the first minuend, first cover all numbers to the right of the minuend. Take the vertical blank strip immediately above the "9" and use it to horizontally cover the numbers 10 to 18. Then proceed through the subtraction facts tables for "9". For "9-8" take the blue strip marked "8" and place it to the left of the blank strip covering the numbers 9 to 2. If you are doing the work on the numbered row of the board, all the blue numerals on the board will now be covered except for the number "1" - this is the answer. For the next equation "9-7" the blank strip will remain in place covering 10-18, then place the blue strip marked "7" and the board will show the blue number "2." When doing the work on only the top row of numbers it is not necessary to use the red strips, however to compare equations you will want to place the corresponding red strips on the board to the left of the blue strips to indicate the answer.

Supplements:

As with any of the math boards, the Equations slips can be used to draw random equations to work out on the board. The child's work can be recorded on Tables Cards, in Table Booklets or on blank paper with a squared grid.

Extension:

This work could be extended for older children working with negative numbers, using a second board placed to the left of the Subtraction Strip Board for the negative numbers on the number line. This second board would use grey strips (to correspond with the grey Snake Game beads.)

Exercise 2:

Present equations with minuends 10-18. If the answer is a number in "red" at the top of the equation, it is not one that needs to be memorized or recorded. Set up with 18 as the minuend, there is no need for a blank strip. You may want to start by saying something like: "Let's see how many numbers we can take away from 18 and have a remainder of less than 10. Place the first blue subtrahend over the numbers 18-9 resulting in the equation "18-9=9." If you place the blue strip numbered "8" next, the result of 18-8 will equal 10 and since 10 is a red number in the top row it is not an equation that we will record or memorize. Continue on with this work, using the blank strips immediately above the minuend to cover unneeded numbers in the top row of numbers. Work through the math facts for the minuends 18-10. The facts Table Cards will help familiarize you with the equations that are necessary to this work of subtraction.

Variation:

Choose a subtrahend and use it to subtract from each number on the board, e.g. if you choose "1" as the subtrahend you may choose to work with 9-1, 8-1, 7-1, 6-1, 5-1, 4-1, 3-1, 2-1, 1-1. The blank strip will be moved for each equation. The aim of this variation is to lead the child to the discovery of the patterns of results of certain combinations, e.g. when "1" is subtracted from any number, the result is the next smallest number, or with "2" as the subtrahend when 2 is subtracted from an even number the result is even, and when subtracted from an odd number the result is odd.

SUBTRACTION CHARTS

PREREQUISITE:

Subtraction Strip Board

Direct Aim:

To memorize Subtraction Tables
Recognition of number patterns

Indirect Aim:

Transfer from concrete to abstract addition

PRESENTATION SUMMARIES:

Charts provide the child with immediate feedback by allowing the child to look up answers quickly while acquiring the ability to working out problems in the head. The following terminology need only to be introduced to an older child: The **minuend** is the first number in a subtraction equation. It is the number "to be made smaller." The **subtrahend** is the second number in a subtraction equation, it is the number "to be subtracted." The answer to a subtraction equation is called the **difference**.

1-1=0	2-2=0	3-3=0	4-4=0	5-5=0	6-6=0	7-7=0	8-8=0	9-9=0	10-10=0	11-11=0	12-12=0	13-13=0	14-14=0	15-15=0	16-16=0	17-17=0	18-18=0
2-1=1	3-2=1	4-3=1	5-4=1	6-5=1	7-6=1	8-7=1	9-8=1	10-9=1	11-10=1	12-11=1	13-12=1	14-13=1	15-14=1	16-15=1	17-16=1	18-17=1	
3-1=2	3-2=1	4-3=2	5-4=2	6-5=2	7-6=2	8-7=2	9-8=2	10-9=2	11-10=2	12-11=2	13-12=2	14-13=2	15-14=2	16-15=2	17-16=2	18-17=2	
4-1=3	4-2=2	4-3=1	5-4=3	6-5=3	7-6=3	8-7=3	9-8=3	10-9=3	11-10=3	12-11=3	13-12=3	14-13=3	15-14=3	16-15=3	17-16=3	18-17=3	
5-1=4	5-2=3	5-3=2	5-4=1	6-5=4	7-6=4	8-7=4	9-8=4	10-9=4	11-10=4	12-11=4	13-12=4	14-13=4	15-14=4	16-15=4	17-16=4	18-17=4	
6-1=5	6-2=4	6-3=3	6-4=2	6-5=1	7-6=5	8-7=5	9-8=5	10-9=5	11-10=5	12-11=5	13-12=5	14-13=5	15-14=5	16-15=5	17-16=5	18-17=5	
7-1=6	7-2=5	7-3=4	7-4=3	7-5=2	7-6=1	8-7=6	9-8=6	10-9=6	11-10=6	12-11=6	13-12=6	14-13=6	15-14=6	16-15=6	17-16=6	18-17=6	
8-1=7	8-2=6	8-3=5	8-4=4	8-5=3	8-6=2	8-7=1	9-8=7	10-9=7	11-10=7	12-11=7	13-12=7	14-13=7	15-14=7	16-15=7	17-16=7	18-17=7	
9-1=8	9-2=7	9-3=6	9-4=5	9-5=4	9-6=3	9-7=2	9-8=1	10-9=8	11-10=8	12-11=8	13-12=8	14-13=8	15-14=8	16-15=8	17-16=8	18-17=8	
10-1=9	10-2=8	10-3=7	10-4=6	10-5=5	10-6=4	10-7=3	10-8=2	10-9=1	11-10=9	12-11=9	13-12=9	14-13=9	15-14=9	16-15=9	17-16=9	18-17=9	
11-1=10	11-2=9	11-3=8	11-4=7	11-5=6	11-6=5	11-7=4	11-8=3	11-9=2	11-10=1	12-11=10	13-12=10	14-13=10	15-14=10	16-15=10	17-16=10	18-17=10	
12-1=11	12-2=10	12-3=9	12-4=8	12-5=7	12-6=6	12-7=5	12-8=4	12-9=3	12-10=2	12-11=1	13-12=11	14-13=11	15-14=11	16-15=11	17-16=11	18-17=11	
13-1=12	13-2=11	13-3=10	13-4=9	13-5=8	13-6=7	13-7=6	13-8=5	13-9=4	13-10=3	13-11=2	13-12=1	14-13=12	15-14=12	16-15=12	17-16=12	18-17=12	
14-1=13	14-2=12	14-3=11	14-4=10	14-5=9	14-6=8	14-7=7	14-8=6	14-9=5	14-10=4	14-11=3	14-12=2	14-13=1	15-14=13	16-15=13	17-16=13	18-17=13	
15-1=14	15-2=13	15-3=12	15-4=11	15-5=10	15-6=9	15-7=8	15-8=7	15-9=6	15-10=5	15-11=4	15-12=3	15-13=2	15-14=1	16-15=14	17-16=14	18-17=14	
16-1=15	16-2=14	16-3=13	16-4=12	16-5=11	16-6=10	16-7=9	16-8=8	16-9=7	16-10=6	16-11=5	16-12=4	16-13=3	16-14=2	16-15=1	17-16=15	18-17=15	
17-1=16	17-2=15	17-3=14	17-4=13	17-5=12	17-6=11	17-7=10	17-8=9	17-9=8	17-10=7	17-11=6	17-12=5	17-13=4	17-14=3	17-15=2	17-16=1	18-17=16	
18-1=17	18-2=16	18-3=15	18-4=14	18-5=13	18-6=12	18-7=11	18-8=10	18-9=9	18-10=8	18-11=7	18-12=6	18-13=5	18-14=4	18-15=3	18-16=2	18-17=1	

Chart # 1 Control Chart

Chart #1 contains all basic subtraction facts for the tables 1-18.

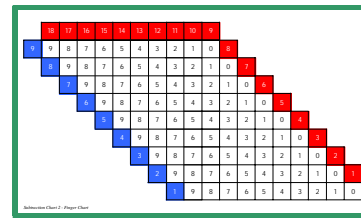


Chart # 2 Finger Chart

The minuends are the numbers in red squares along the top of this chart and down the right diagonal. The subtrahends are in blue along the left diagonal. Place the right finger on the red minuend (the number to be subtracted from) and the left finger on the blue subtrahend (the number to be taken away). Moving first down and then across, where the two fingers meet is the answer. In this chart, differences have been eliminated which would result in a negative number, or with an answer of more than 9.

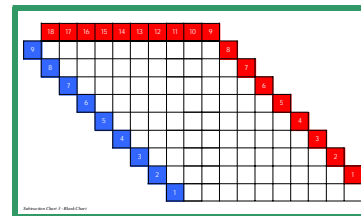


Chart # 3 Blank Chart

As with the other blank charts, this chart serves as a self test to the child as he fills in the differences with the Bingo tiles. On any of the blank charts you may use the Equation Cards as calling slips, and using extra photocopied or laminated copies of this chart for playing cards, more than one child can play Subtraction Bingo.

“When the child, left free to work as long as he wishes on these exercises, has finished them all, he has certainly learned the multiplication table.”
 Maria Montessori - speaking of the Math Facts Booklets

MULTIPLICATION BOARD (aka Bead Board)

PREREQUISITE:

Linear Skip Counting with the Bead Chains
 Multiplication with Golden Bead Materials
 Multiplication with Colored Bead Bar Layout

Direct Aim:

To memorize Multiplication Tables

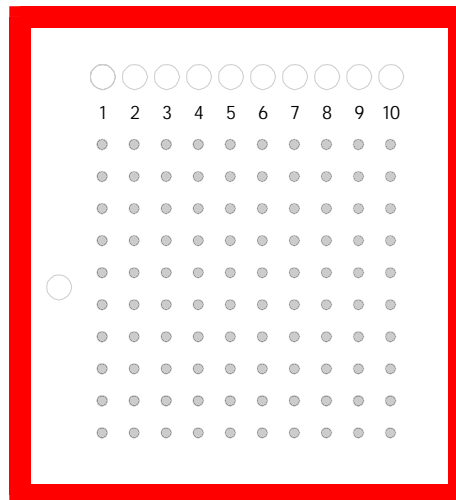
Indirect Aim:

Preparation for Division and Geometry

PRESENTATION SUMMARY:

Exercise 1:

The purpose of this board is to practice the multiplication tables. Randomly choose a Math Tables card. If, for example, it is the table of SIX then place the disc numbered “6” on the lone circle on the left side of the board. On the traditional wooden boards this is a windowed slot for numbered cards. Next place the red counter disc over the number “1” at the top of the board. Then place six red pins (or beads) in a vertical column under the number “1” - this represents “6 x 1”. For 6 x 2 add a column of six red pins under the number “2”, continue on until the table is complete. Use Control Chart #1 to check the work. The child may also recognize the geometrical forms (rectangles, squares) of the numbers as in works with the decanomial. A Great Work with this material would be to work consistently though each table 1-10 until the entire board is filled.



Multiplication Board MATERIALS:

The traditional board is made of wood with 100 indents for beads 10x10. My version is laminated paper glued onto a 12x12” cork board for push pins. The board is numbered 1-10 at the top to represent the multiplier. The multiplicand is represented by the numbered disc. The child may choose to determine the product by either linear counting, left to right and top to bottom, 1,2,3,4... or by skip counting the horizontal rows 2,4,6,...

The Math Facts Booklets are to accompany this work and the other Math Boards. They consist of a series of ten booklets for each family of Math Tables. Although each math Tables Booklet has the equations printed in the same order the child should record the answers in a random order on each page. Also, Equation Cards may be used with this board for drawing equations for random practice, and the Table Cards can be used as a guide when working on tables.

MULTIPLICATION CHARTS

PREREQUISITE:

Multiplication Board

Direct Aim:

To memorize Multiplication Tables
Recognition of number patterns

Indirect Aim:

Transfer from concrete to abstract multiplication

PRESENTATION SUMMARIES:

Multiplication is also known as fast addition, e.g. 3 x 4 is the same as 4+4+4. The multiplicand is simply an addend that is repeated. The **multiplier** of a multiplication equation is the number of times the **multiplicand** should be repeated. With 3x4, the “3” is the multiplier (the number of sets) and the “4” is the multiplicand (the number in each set). The result of multiplying is known as the **product**.

Chart # 1 Control Chart

Chart #1 contains all basic multiplication tables and their products up to 10 x 10. This chart can be used to verbally quiz the child.

With Chart #1 as a control, you may also try a patterned chant of the math facts, reciting and clapping twice on the legs and once with the hands:

One (hands clap on legs)
times Two (hands clap on legs)
is Two (hands clap together)

Practice this chant with rhythm until the child can recite all of the facts tables without missing a beat...

one times one is one, (breath)
one times two is two, (breath)
one times three is three (breath)...

Chart # 2 Commutative Control Chart

This control chart avoids repetition by eliminating all the commutative factors so there is only one combination of numbers on the board. As with addition, the order of the numbers in the multiplication equation has no effect on the result. To understand this chart, start with Chart #1. The equation 1 x 2 remains, however the equation 2 x 1 is a commutative equation, so it is removed by covering it with a small slip of paper. Continue as you did with the Addition Commutative Control Chart, until what remains of Chart #1 is the same as Chart #2. Now, you will see, with this simplification, instead of memorizing 81 multiplication equations the child has only to memorize 45 - since there is also no need to memorize the duplicates, or the table of TEN (now a repetition of the ONE table with a zero).

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Chart # 3 Finger Chart

This chart is a summary of the multiplication tables. It may also be called the Pythagorean table. The multipliers 1-10 are in the top horizontal blue border. (Multipliers are the first part of the multiplication equation). The multiplicands 1-10 are located in the left vertical border in red. The rest of the white squares are the products. Just as with the Addition Finger Chart #3, the child moves one finger at a time to find the answer, starting with the right finger on the multiplier in the blue row and moving down to the row of the multiplicand, next moving the left finger across from the red column to meet the right finger.

Note that with a multiplier or multiplicand of “1” the operation of multiplication gives a number which will be found among the border squares.

Practice on this chart may be done by picking random numbers and following the fingering to the answer. This chart can also be used in combination with the Tables Cards, Tables Booklets, or Equations Cards. Check the work of this chart with Control Chart #1.

1									
2	4								
3	6	9							
4	8	12	16						
5	10	15	20	25					
6	12	18	24	30	36				
7	14	21	28	35	42	49			
8	16	24	32	40	48	56	64		
9	18	27	36	45	54	63	72	81	
10	20	30	40	50	60	70	80	90	100

Chart # 4 Half Chart

Horizontally this chart is half of the Multiplication Chart #3. Just as with the Addition Half Chart the child finds both numbers, the multiplier and multiplicand, in the red column. The finger that is higher moves to the end of the row and then vertically down to same row as the other finger. The second finger moves right to meet the first finger to find the answer. Note that the answers on the outer diagonal are the squares of numbers. Check with Multiplication Control Chart #2.

1	2	3	4	5	6	7	8	9	10
2									
3									
4									
5									
6									
7									
8									
9									
10									

Chart # 5 Blank Chart

Here are some variations for blank charts:

- Choose an equation card and place the answer tile on board.
- Choose an answer tile first, then write down the equation on squared grid paper, then place the tile on the board.
- Choose a number, think of all equations with that product. For example if 24 is chosen then tiles would be placed at 3 x 8, 4 x 6, 6 x 4, and 8 x 3

DIVISION BEAD BOARD

PREREQUISITE:

Multiplication Tables

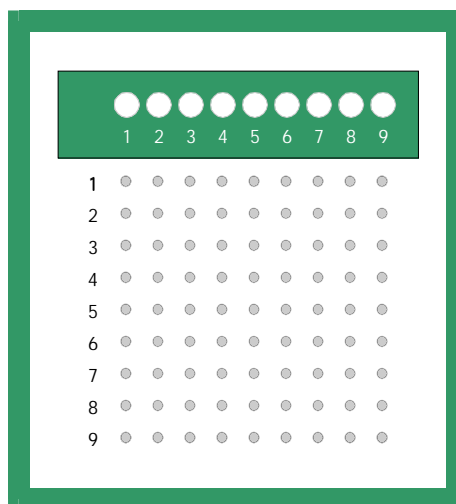
Division with Golden Beads and Stamp Game

PRESENTATION SUMMARY:

The purpose of this division board is to practice basic division facts through 81. Choose a Math Tables card. Gather the correct number of pins (or beads) for the divisor and place the pins box lid or a dish. (e.g, Table of 36 is chosen - you need 36 pins) With Tables, always begin by placing all nine skittles on the board.

Distribute the pins in rows, dividing equally by giving one pin to each skittle, continuing until you come to the end of a row evenly. If the beads in the last row do not distribute evenly, then you have a remainder. Next remove the "9" skittle and distribute evenly to 8 skittles. Continue working through the table removing one skittle at a time. In distributing, if the pins to be placed were to extend below the board then the answer would exceed "9" and the equation would not be applicable to this work. A great work with this material would be to complete all the math facts tables from 81 to 1. This is a work that will take several hours and most likely extend over several days.

Note: Racks and Tubes, for division, is a sister material to the Montessori Bead Frames, used for multiplication. To do long division, you need loose beads (or pins) thus the Racks and Tubes and Four Division Boards. Racks and Tubes will use the same division board as this one plus there will be three more division boards color coded according to the hierarchy of number: two green, one blue and one red.



Division Board MATERIALS:

The traditional Unit Division Board is made of wood with indents for 81 beads in a 9x9 grid. My version is laminated paper glued onto a 12x12" cork board for push pins. The **dividend**, the number to be divided, is represented by the total number of pins (or beads) used for the problem. The board is numbered 1-9 in a green border at the top, with nine placeholders for nine green skittles to represent the **divisor** (indicating how many sets there will be). The numbers along the vertical left edge of the board indicate the **quotient** (the answer of how many items there are in each set once they are distributed). Sets are vertical columns.

Direct Aim:

To memorize Division Tables

To distinguish between divisors that are equally divisible, and those with remainders

Indirect Aim:

Preparation for Short and Long Division

DIVISION CHARTS

PREREQUISITE:

Division Board

Direct Aim:

To memorize Division Tables

Indirect Aim:

Preparation for Long Division

PRESENTATION SUMMARIES:

The memorization of division is the synthesis of all four operations. Thus the reason for division being introduced last. With the basic division math facts the quotient should never be greater than 9 and the remainder may not be equal to or greater than the divisor.

Chart # 1 Finger Chart

Note the two colors for dividend numbers on the top row of the chart - the blue squares with white numbers are numbers that are equally divisible. The red numbers in white boxes are prime numbers (having only themselves and the number one as factors). Note the blue (divisor) numbers and the division signs are on the far left along the outer diagonal. Use this chart as a finger chart, e.g. to find $42 \div 7$ start with right finger on 42 at the top row and left finger on blue $\div 7$ on the left diagonal, moving right finger down, then left finger across until they meet at the answer (quotient).

Chart # 2 Blank Chart

This is the same chart as #1 except that it is blank. The fingering is the same and the answers are either written on the laminated chart with wipe-off markers, or numbered Bingo tiles are placed in the appropriate places on the chart. Use Chart #1 as a control.

Chart # 3 Master Chart with Remainders

This control chart is my original design and includes the remainders which will be found when working with the Division Board, Tables Cards or Booklets. This chart can be used as a control when working with Chart #1. If the quotient box is empty the equation has a remainder. From the empty box on Chart #1 move the right finger to the right until you reach a box with a number (quotient). To find the remainder subtract the dividend directly above the quotient from the original dividend, e.g. $64 \div 9$ move the right finger to "7" for the quotient, then subtract 63 from 64 for the remainder of "1." Try another: first do the fingering for $49 \div 9$, then move the right finger from the empty square on Chart #1 to the right, stopping at the quotient "5" then subtract 45 from 49 resulting in 4 as a remainder resulting in the answer of "5 Remainder 4" or "5R4".



MATH FACTS FOLDERS - charts, math tables cards, and equation cards.



Use a Plano 3705 tackle box to store the equation cards



ADDITION



SUBTRACTION



MULTIPLICATION



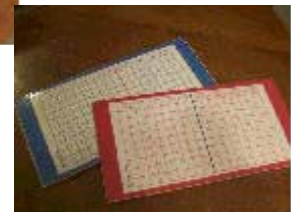
DIVISION



Tables Booklets



Multiplication and Division Boards



Addition and Subtraction Boards