

Hands on Arithmetic

Dr. Rena Gelb

Jewish Education Project

July 29, 2025

9:30 am - 11:30 am

Overview

The objective of the presentation is to demonstrate ways to use manipulatives to enhance learning of arithmetic.

1. Why use manipulatives?
2. Introduction to the base 10 system
3. Using manipulatives in operations
4. Multiples- using patterns
5. Number bonds
6. Resources
7. Feedback survey

Why use manipulatives in teaching math?

Constructivist Educational Theory emphasizes that students actively build their own understanding of mathematical concepts, rather than passively receiving information.

- Engaging with problems
- Making connections to prior knowledge
- Developing own strategies for solving problems
- Hands-on Activities
- Mathematical Modeling
- Open-Ended Problems

Benefits:

- Deeper Understanding
- Increased Motivation
- Development of Problem-Solving Skills
- Preparation for Advanced Math

History of counting

cuneiform



1



10



60



22

Egyptian Numerals

1



a staff

10



a heel bone

100



a scroll

1,000



a lotus flower

10,000



a bent finger

100,000



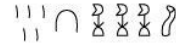
a tadpole

1,000,000



a man in
astonishment

13,015



History of counting

8/4

Roman Numerals

I	1
V	5
X	10
L	50
C	100
D	500
M	1000

Greek Numerals

1	
5	⌐
10	Δ
100	Η
1000	Χ
2857	ΧΧΓΗΗΗΗΓΓ

History of counting

Babylonian



Egyptian



Greek



Roman



0 allows for place value

Changes in our Numerals

1	2	3	AD 1197
7	7	3	AD 1275
1	2	3	AD 1294
1	7	3	AD 1303
1	2	3	AD 1360
1	2	3	AD 1442

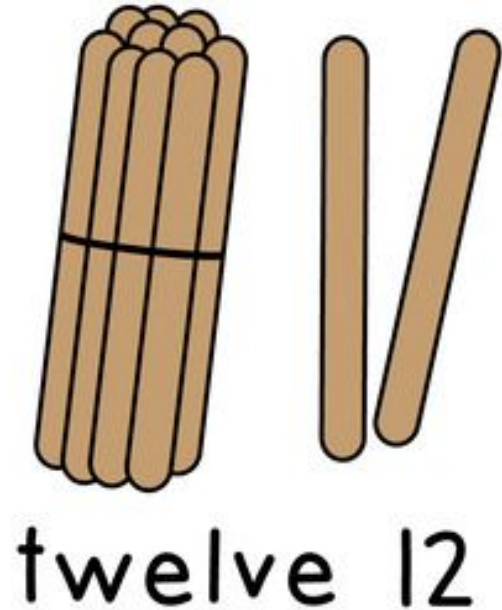
Big concept: Place value

Building up to place value:

- Counting
- Making bundles of 10, 100, 1000

Example:

Demonstration- let's count to 100



Sensorial approach to place value

Geometric approach- cube, rods, squares, cubes

Place Value Chart

			
thousands	hundreds	tens	ones

_____ + _____ + _____ + _____



Learning objectives: Perform arithmetic operations (addition, subtraction, multiplication, division)

Materials:

Golden beads

Base 10 blocks

Unifix cubes

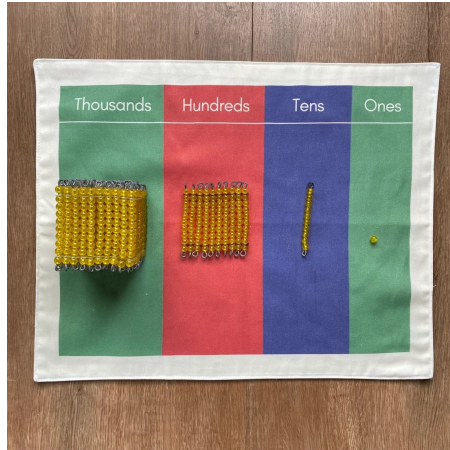
DIY



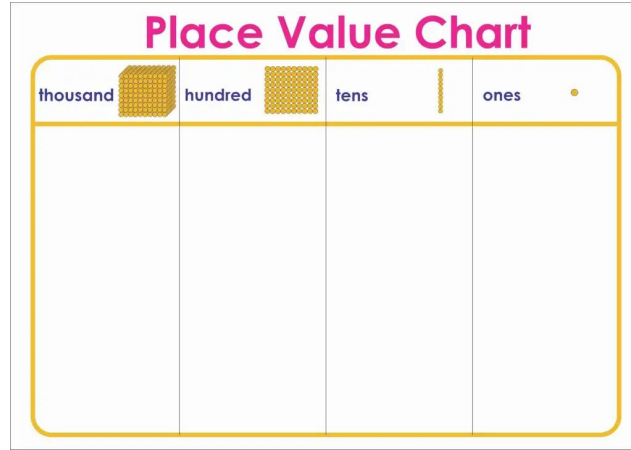
- Popsicle sticks
- Gold beads
- Printable [10 bead](#) and [100 bead](#) templates
- Glue sticks

Materials (continued)

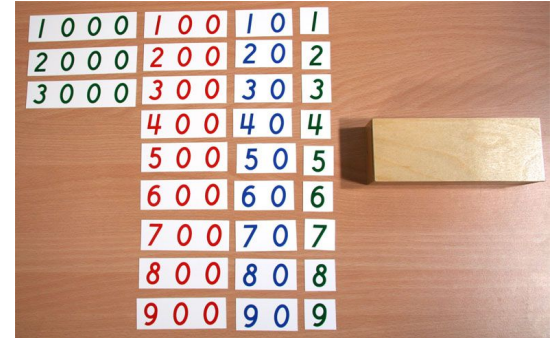
Place value mat



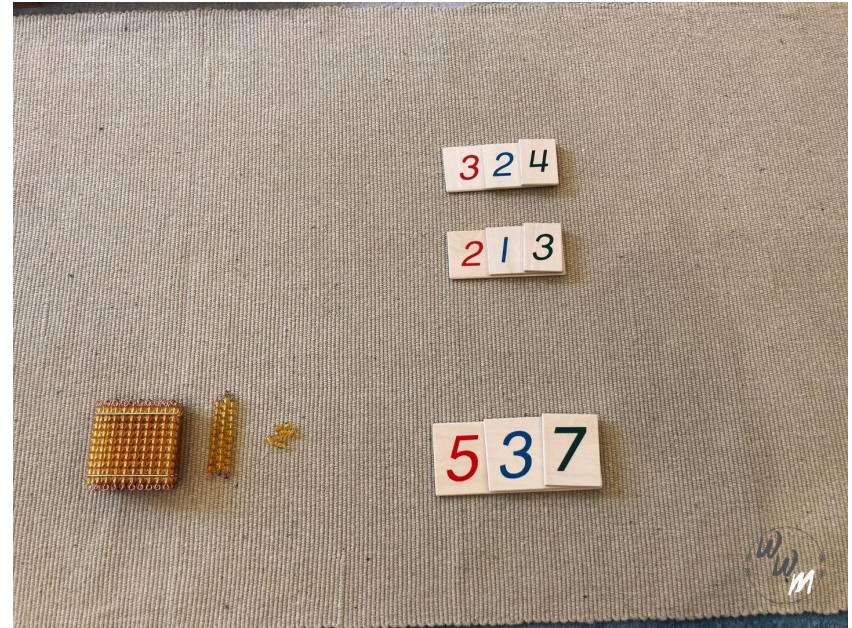
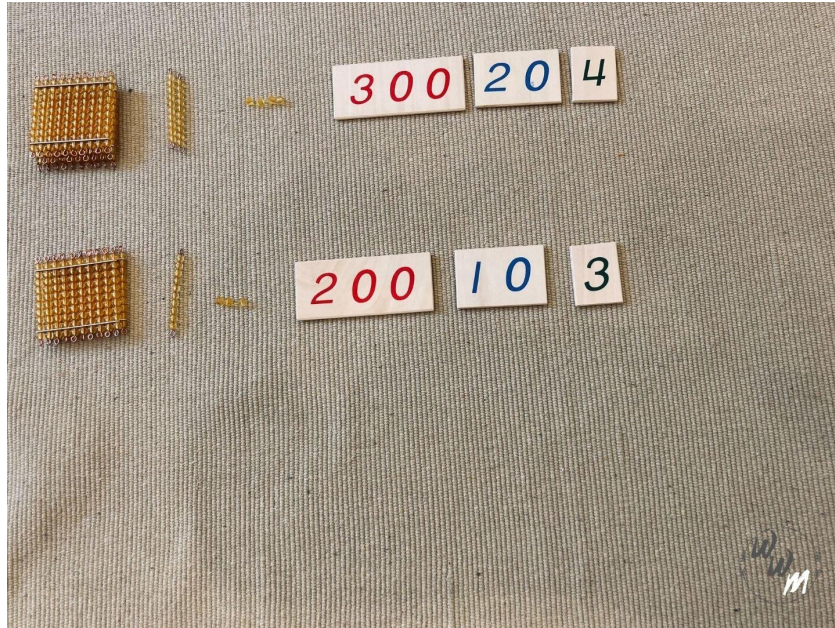
DIY [\(Printable\)](#)



Number cards [\(Printable\)](#)



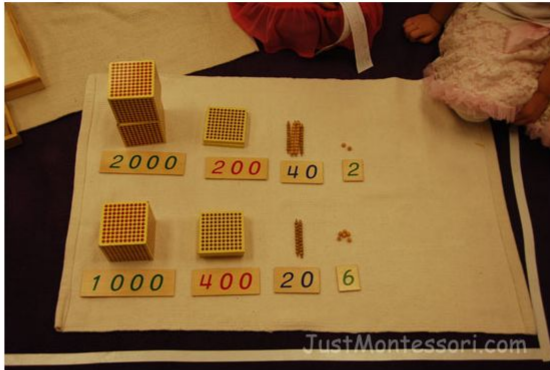
Lesson objective: Students will be able to add 2-3 digit numbers using concepts of place value



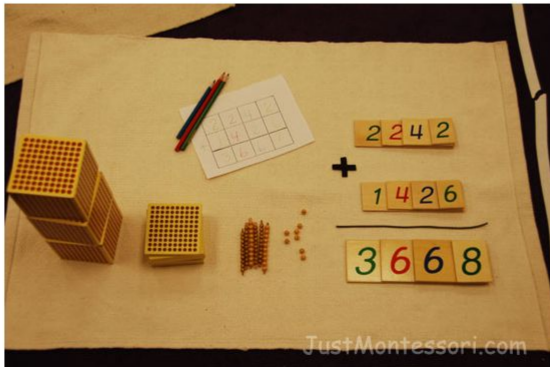
Example

$$156 + 432$$

Lesson objective: Students will be able to add 2-3 digit numbers using concepts of place value and regrouping



Addition with Beads (each child gathers beads from the bank)



Regrouping ones



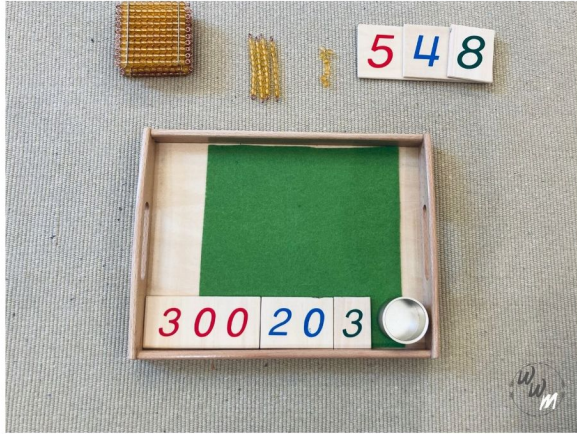
Regrouping tens



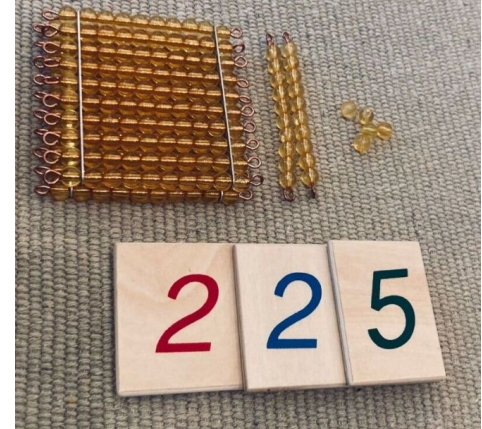
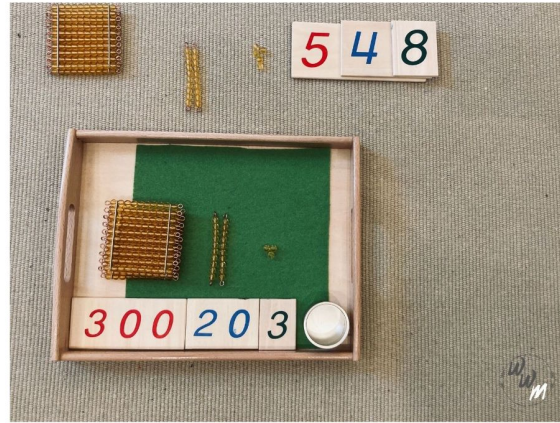
Example

356+174

Learning objectives: Students will be able to subtract 2-3 digit numbers using concepts of place value



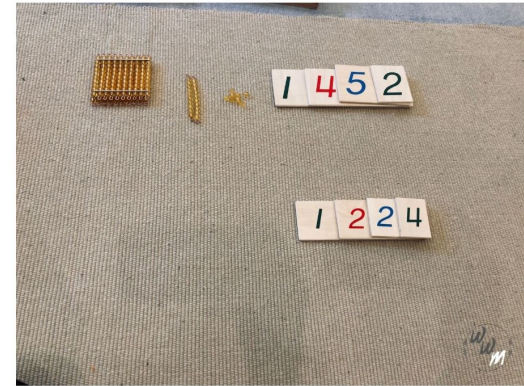
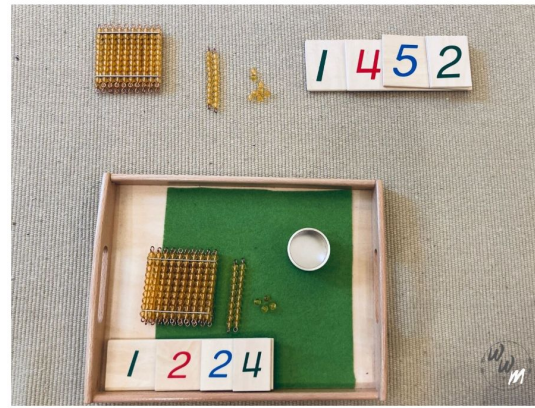
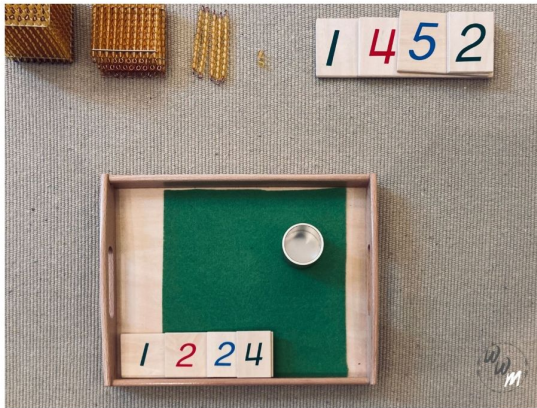
Group Operations: Static subtraction



Example

536-124

Learning objectives: Students will be able to subtract 2-3 digit numbers using concepts of place value and regrouping

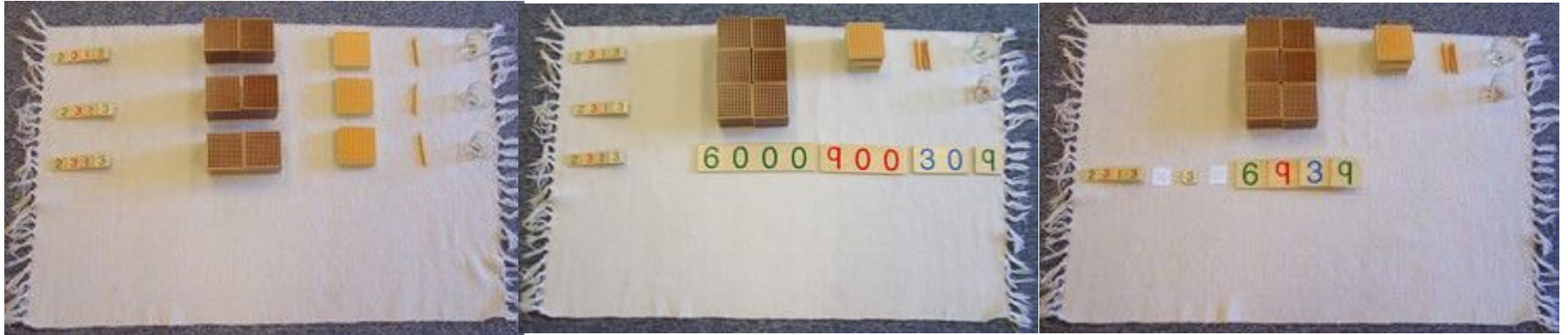


Group Operations: Dynamic subtraction

Example

342-156

Lesson objective: Students will be able to multiply 1 digit by 2-4 digit numbers using concepts of place value



Example

213 x 2

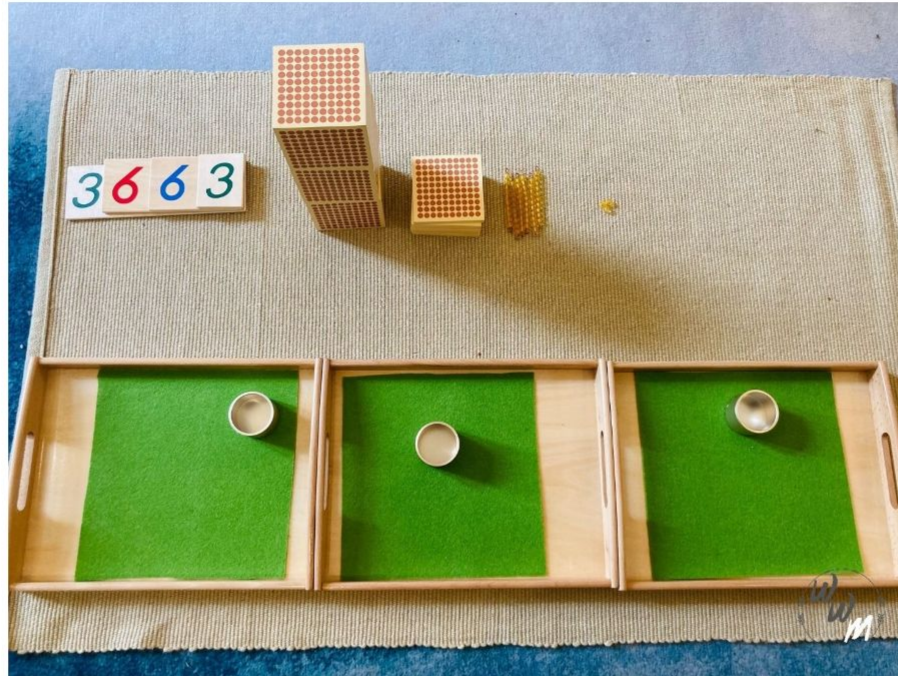
Lesson objective: Students will be able to multiply 1 digit by 2-4 digit numbers using concepts of place value and regrouping



Example

245 x 4

Learning objective: Students will be able to divide 2-3 digit by 1 digit numbers using concept of place value

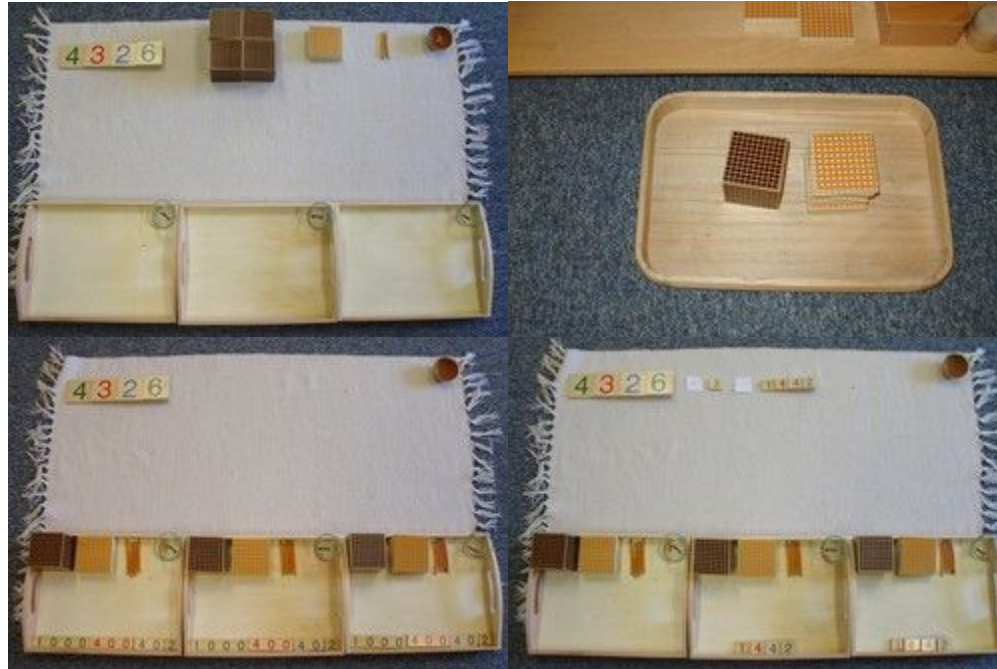


[Source](#)

Example

$$936 \div 3$$

Learning objective: Students will be able to divide 2-3 digit by 1 digit numbers using concept of place value and regrouping



Example

$$572 \div 2$$

Learning objectives: Perform arithmetic operations (addition, subtraction, multiplication, division) - Bridge to abstraction

Materials:

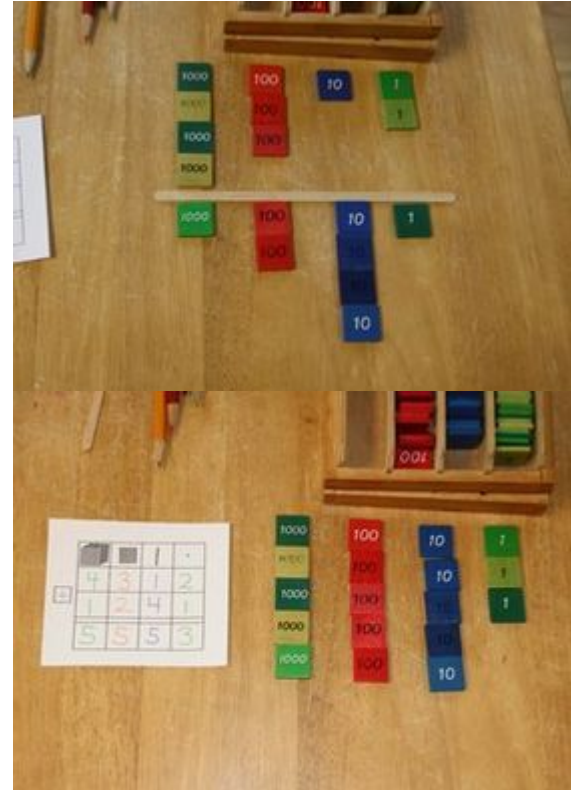
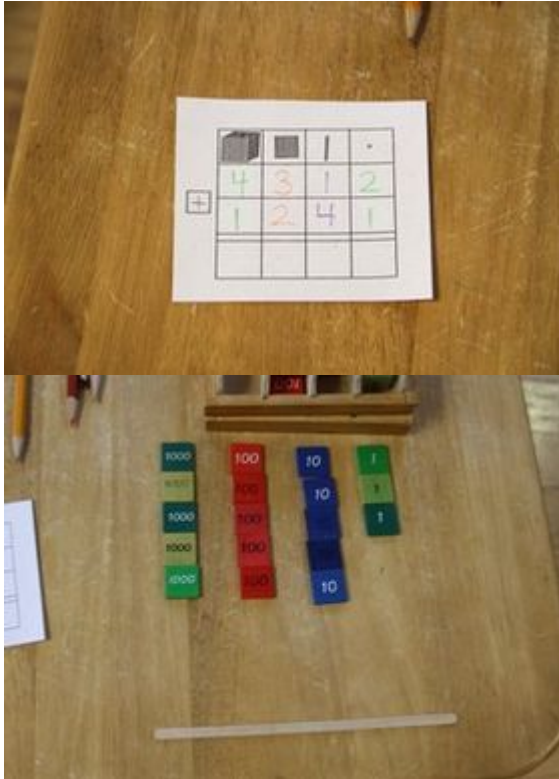
Stamp Game

[Printable](#)

[Equation Paper](#)



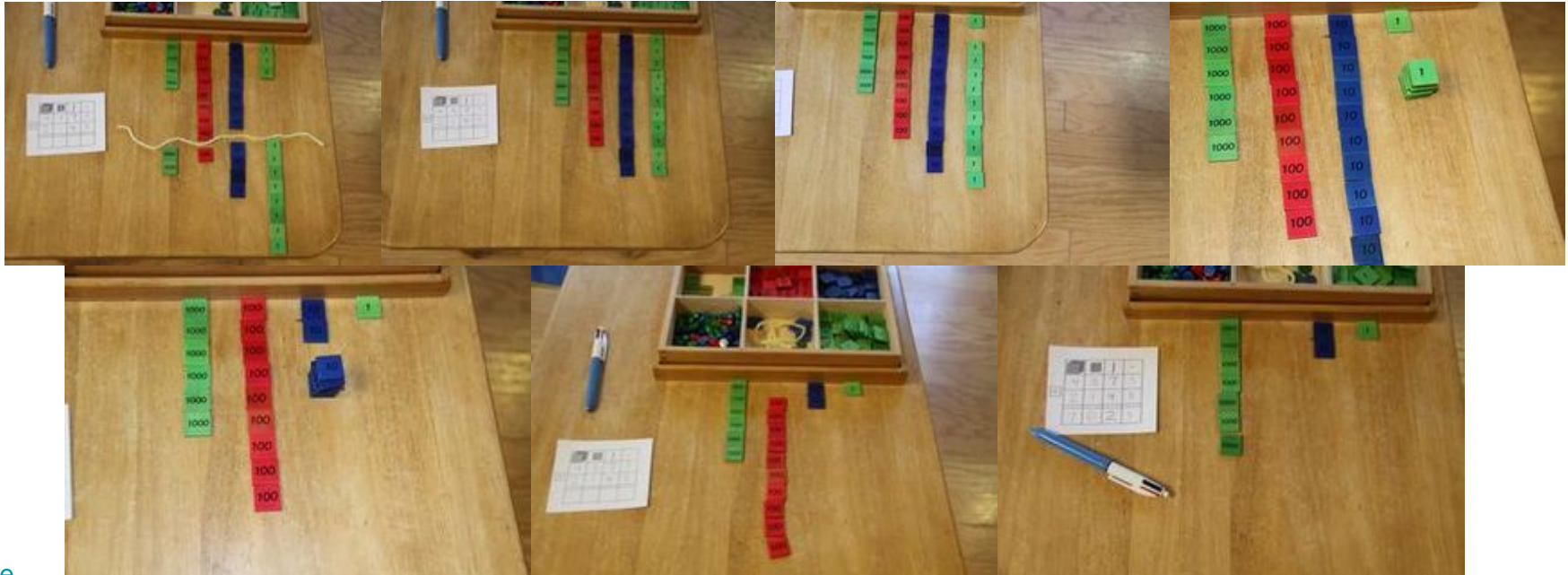
Lesson objective: Students will be able to add 2-3 digit numbers using concepts of place value



Example

$$156 + 231$$

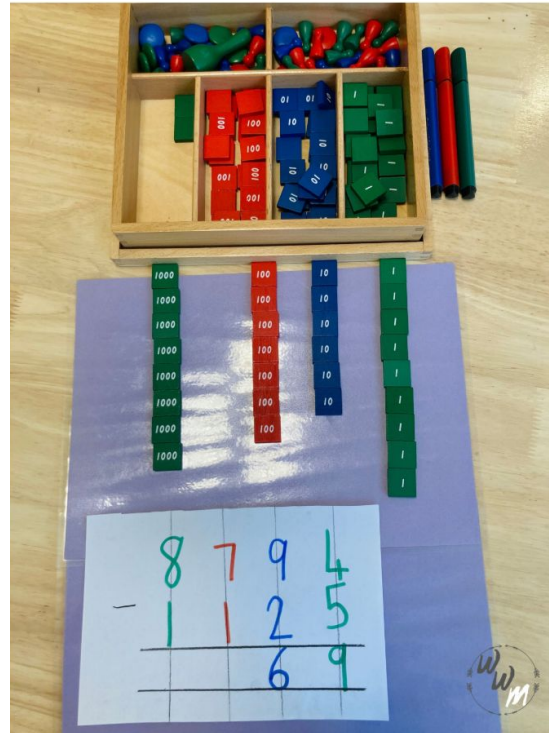
Lesson objective: Students will be able to add 2-3 digit numbers using concepts of place value and regrouping



Example

356+175

Learning objectives: Students will be able to subtract 2-3 digit numbers using concepts of place value and regrouping



Example

526-134

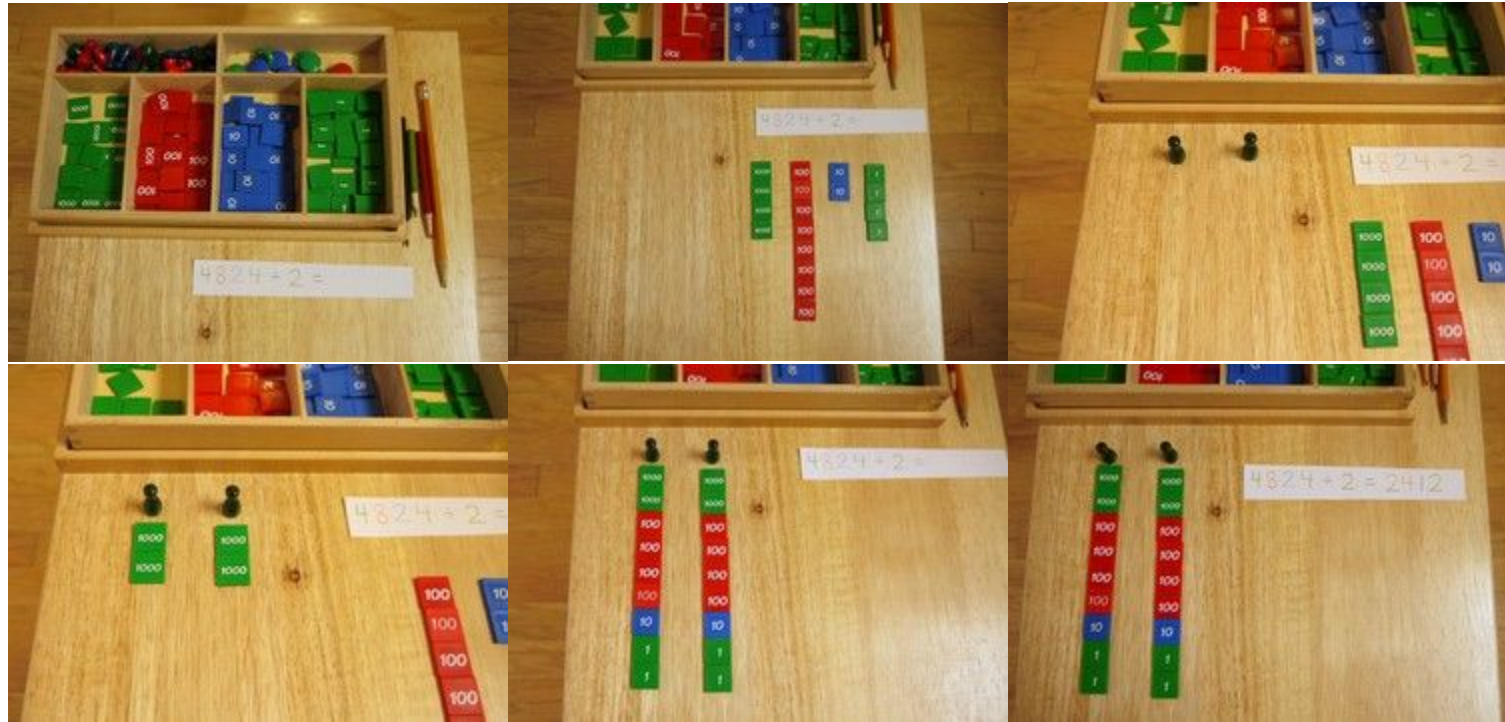
Lesson objective: Students will be able to multiply 1 digit by 2-4 digit numbers using concepts of place value and regrouping



Example

245 x 4

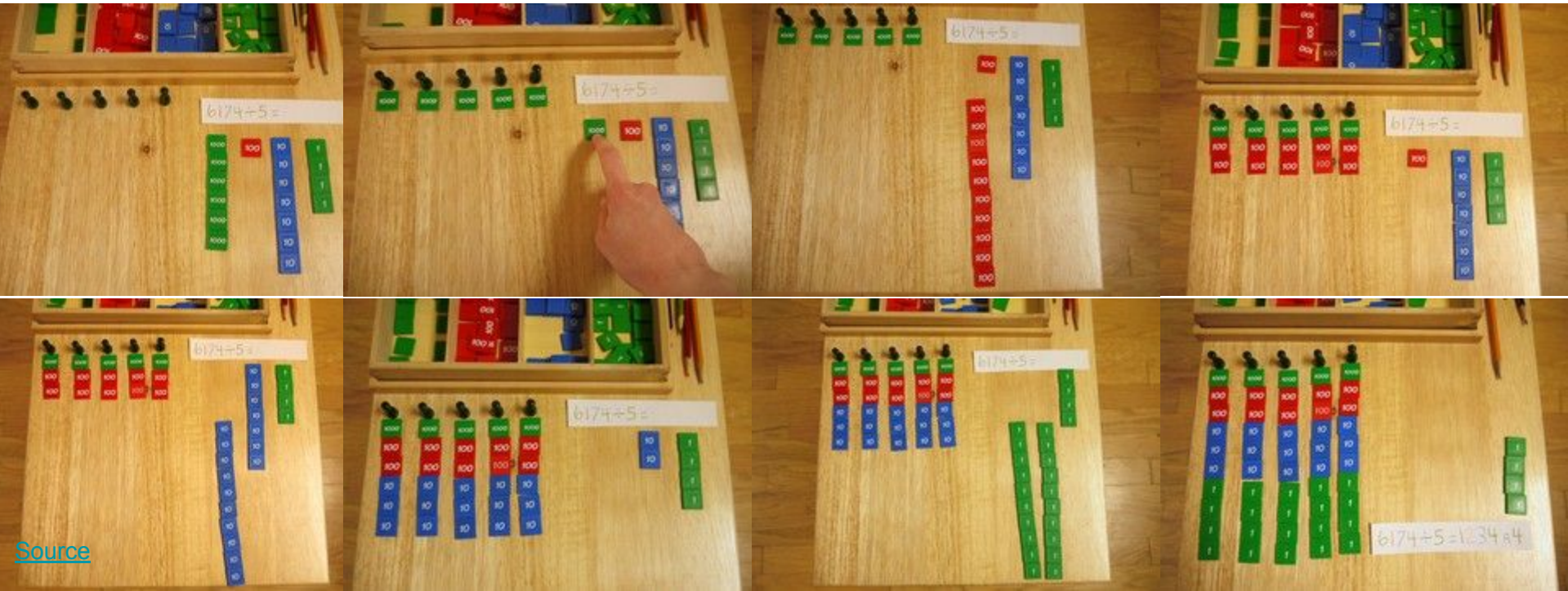
Learning objective: Students will be able to divide 2-3 digit by 1 digit numbers using concept of place value



Example

$$936 \div 3$$

Learning objective: Students will be able to divide 2-3 digit by 1 digit numbers using concept of place value and regrouping



Example

$$572 \div 2$$

Learning objective: Students will be able to identify multiples of numbers 1-12

Materials

Bead bars

DIY [\(Printable\)](#)

DIY

Times tables [\(Printable\)](#)



"Strings with Wings"
(Marilyn Zecher)

1 X 1 =	2 X 1 =	3 X 1 =	4 X 1 =	5 X 1 =	6 X 1 =
1 X 2 =	2 X 2 =	3 X 2 =	4 X 2 =	5 X 2 =	6 X 2 =
1 X 3 =	2 X 3 =	3 X 3 =	4 X 3 =	5 X 3 =	6 X 3 =
1 X 4 =	2 X 4 =	3 X 4 =	4 X 4 =	5 X 4 =	6 X 4 =
1 X 5 =	2 X 5 =	3 X 5 =	4 X 5 =	5 X 5 =	6 X 5 =
1 X 6 =	2 X 6 =	3 X 6 =	4 X 6 =	5 X 6 =	6 X 6 =
1 X 7 =	2 X 7 =	3 X 7 =	4 X 7 =	5 X 7 =	6 X 7 =
1 X 8 =	2 X 8 =	3 X 8 =	4 X 8 =	5 X 8 =	6 X 8 =
1 X 9 =	2 X 9 =	3 X 9 =	4 X 9 =	5 X 9 =	6 X 9 =
1 X 10 =	2 X 10 =	3 X 10 =	4 X 10 =	5 X 10 =	6 X 10 =
1 X 11 =	2 X 11 =	3 X 11 =	4 X 11 =	5 X 11 =	6 X 11 =
1 X 12 =	2 X 12 =	3 X 12 =	4 X 12 =	5 X 12 =	6 X 12 =
7 X 1 =	8 X 1 =	9 X 1 =	10 X 1 =	11 X 1 =	12 X 1 =
7 X 2 =	8 X 2 =	9 X 2 =	10 X 2 =	11 X 2 =	12 X 2 =
7 X 3 =	8 X 3 =	9 X 3 =	10 X 3 =	11 X 3 =	12 X 3 =
7 X 4 =	8 X 4 =	9 X 4 =	10 X 4 =	11 X 4 =	12 X 4 =
7 X 5 =	8 X 5 =	9 X 5 =	10 X 5 =	11 X 5 =	12 X 5 =
7 X 6 =	8 X 6 =	9 X 6 =	10 X 6 =	11 X 6 =	12 X 6 =
7 X 7 =	8 X 7 =	9 X 7 =	10 X 7 =	11 X 7 =	12 X 7 =
7 X 8 =	8 X 8 =	9 X 8 =	10 X 8 =	11 X 8 =	12 X 8 =
7 X 9 =	8 X 9 =	9 X 9 =	10 X 9 =	11 X 9 =	12 X 9 =
7 X 10 =	8 X 10 =	9 X 10 =	10 X 10 =	11 X 10 =	12 X 10 =
7 X 11 =	8 X 11 =	9 X 11 =	10 X 11 =	11 X 11 =	12 X 11 =
7 X 12 =	8 X 12 =	9 X 12 =	10 X 12 =	11 X 12 =	12 X 12 =

Learning objective: Students will be able to identify multiples of numbers 1-12

Materials (continued)

100 Chart ([Printable](#))

Multiples of Numbers									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Learning objective: Students will be able to identify multiples of numbers 1-12



1 X 1 =	2 X 1 =	3 X 1 =	4 X 1 =	5 X 1 =	6 X 1 =
1 X 2 =	2 X 2 =	3 X 2 =	4 X 2 =	5 X 2 =	6 X 2 =
1 X 3 =	2 X 3 =	3 X 3 =	4 X 3 =	5 X 3 =	6 X 3 =
1 X 4 =	2 X 4 =	3 X 4 =	4 X 4 =	5 X 4 =	6 X 4 =
1 X 5 =	2 X 5 =	3 X 5 =	4 X 5 =	5 X 5 =	6 X 5 =
1 X 6 =	2 X 6 =	3 X 6 =	4 X 6 =	5 X 6 =	6 X 6 =
1 X 7 =	2 X 7 =	3 X 7 =	4 X 7 =	5 X 7 =	6 X 7 =
1 X 8 =	2 X 8 =	3 X 8 =	4 X 8 =	5 X 8 =	6 X 8 =
1 X 9 =	2 X 9 =	3 X 9 =	4 X 9 =	5 X 9 =	6 X 9 =
1 X 10 =	2 X 10 =	3 X 10 =	4 X 10 =	5 X 10 =	6 X 10 =
1 X 11 =	2 X 11 =	3 X 11 =	4 X 11 =	5 X 11 =	6 X 11 =
1 X 12 =	2 X 12 =	3 X 12 =	4 X 12 =	5 X 12 =	6 X 12 =
7 X 1 =	8 X 1 =	9 X 1 =	10 X 1 =	11 X 1 =	12 X 1 =
7 X 2 =	8 X 2 =	9 X 2 =	10 X 2 =	11 X 2 =	12 X 2 =
7 X 3 =	8 X 3 =	9 X 3 =	10 X 3 =	11 X 3 =	12 X 3 =
7 X 4 =	8 X 4 =	9 X 4 =	10 X 4 =	11 X 4 =	12 X 4 =
7 X 5 =	8 X 5 =	9 X 5 =	10 X 5 =	11 X 5 =	12 X 5 =
7 X 6 =	8 X 6 =	9 X 6 =	10 X 6 =	11 X 6 =	12 X 6 =
7 X 7 =	8 X 7 =	9 X 7 =	10 X 7 =	11 X 7 =	12 X 7 =
7 X 8 =	8 X 8 =	9 X 8 =	10 X 8 =	11 X 8 =	12 X 8 =
7 X 9 =	8 X 9 =	9 X 9 =	10 X 9 =	11 X 9 =	12 X 9 =
7 X 10 =	8 X 10 =	9 X 10 =	10 X 10 =	11 X 10 =	12 X 10 =
7 X 11 =	8 X 11 =	9 X 11 =	10 X 11 =	11 X 11 =	12 X 11 =
7 X 12 =	8 X 12 =	9 X 12 =	10 X 12 =	11 X 12 =	12 X 12 =

www.worksheetfun.com

Learning objective: Students will be able to identify patterns of multiples of numbers 1-12

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
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Multiples of Numbers

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71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
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41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
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91	92	93	94	95	96	97	98	99	100

Learning objective: Students will be able to identify patterns of multiples of numbers 1-12

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
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91	92	93	94	95	96	97	98	99	100

Multiples of Numbers

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31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
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31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Learning objective: Students will be able to identify patterns of multiples of numbers 1-12

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Learning objective: Students will be able to explain the meaning of a prime number and identify prime numbers between 1-100

Sieve of Eratosthenes

Multiples of Numbers

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Example

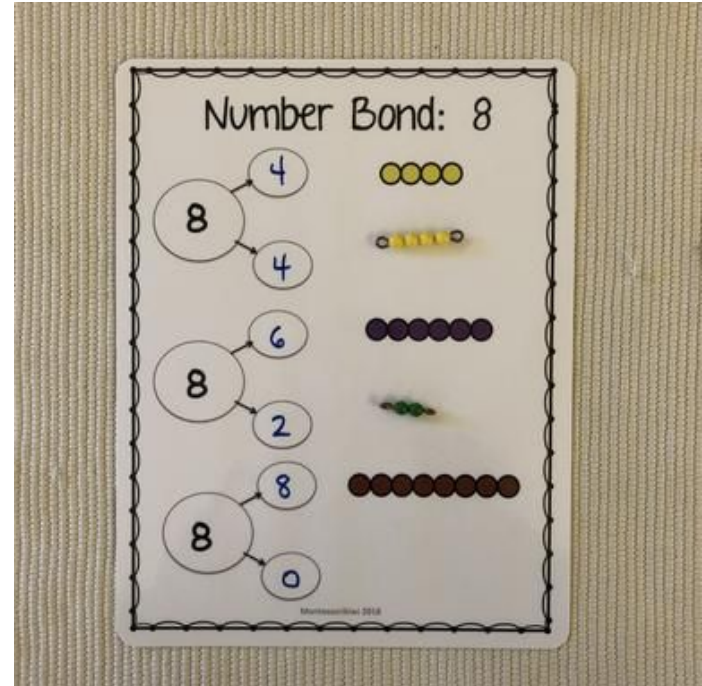
Learning objective: Students will be able to identify common multiples of numbers 1-12

Multiples of Numbers									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Learning objective: Students will be able to identify number bonds of numbers 1-10

Sums of 10

  _____ $1 + \underline{\quad} = 10$	  _____ $3 + \underline{\quad} = 10$
  _____ $2 + \underline{\quad} = 10$	  _____ $4 + \underline{\quad} = 10$



Resources

[Shop DOE](#) website

- Popsicle sticks, Creativity Street Wood Economy Non-Toxic Craft Stick, 4-1/2 X 3/8 X 1/2 in, Natural, Pack of 1000, Item Number: 312200684
- Gold beads, Creativity Street Pony Beads, Gold, Silver, and Copper, 6mm x 9mm, Set of 500, Item Number: 319534294
- Elastic cord, Sulyn Thick Sparkle Elastic Cord, 18 Yards, Item Number: 317318217
- Pony beads, Sulyn Pony Beads, Set of 2300, Item Number: 317333631

Questions

Thank you and contact information

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Feedback

Rena Gelb Post Session Survey



<https://forms.office.com/r/7LdgayKP0r>