

筑波大学
 University of Tsukuba

Free Program for SEAMEO School Network
 from the University of Tsukuba, Affiliate Member of SEAMEO
**Teaching Mathematics to Develop Mathematical Thinking as Higher Order Thinking:
 How do you teach? Why?**

Lesson 16: What is Multiplication Table

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Adopting a 21st Century Curriculum



Revitalizing Teacher Education

Mathematical Values, Attitudes and Habits for Human Character

Mathematical Values: Generality and Expandability Reasonableness and Harmony Usefulness and Efficient Simpler and Easier Beautifulness	Mathematical Attitude attempting to: See and think mathematically Pose question and develop explanation such as why and when Generalize and extend Appreciate others' idea and change representation to conceptualize	Habits of mind for Citizen to live: Reasonably and critically with respecting and appreciating others Autonomously Creatively and innovatively in harmony Judiciously using tools such as ICT Empowerly in imagining the future through lifelong learning
Mathematical Thinking and Processes		
Mathematical Ideas for: Set, Unit, Compare, Operate, Algorithm, Fundamental principle, and Varied representation such as table, diagram, expressions, graph and translations.	Mathematical Thinking: Generalization and Specialization Extension and Integration Inductive, Analogical and Deductive reasoning Abstracting, Concretizing and Embodiment Objectifying by representing and symbolizing Relational and Functional thinking Thinking forward and backward	Mathematical Activities for: Problem Solving Exploration and Inquiry Mathematical Modeling Conjecturing, Justifying and Proving Conceptualization Proceduralization Representation and Sharing
Content		
• Numbers & Operations • Quantity & Measurement	• Extension of Number and	• Number & Algebra

We are seeking the 1P textbook by using terminology to explain to students with every content of learning and sequence of content for knowing the way to develop children who learn and think by and for themselves through the preparation of future learning.

Curriculum Standards: SEABES-CCRLS (by SEAMEO-RECSAM (Mango, Ahmad, Isoda, 2017))

Appreciation

Reflection

Acquisition

HOTS is Math. T. Those terminology distinguish tasks and explain task sequence for the preparation of future learning.

MATHEMATICAL THINKING
 Review

Review Using what you already knew on the past 15 lessons!


TOPIC 1: INTRODUCTION	L1: Introductory discussion to develop mathematical thinking		
TOPIC 2: NUMBERS	L2: How to introduce number	L3: What is number	
TOPIC 3: ADDITION AND SUBTRACTION	L4: How to introduce addition	L5: What is addition	
TOPIC 4: EXTEND NUMBER WITH ADDITION AND SUBTRACTION USING COLUMN FORM	L6: How to introduce subtraction	L7: What is subtraction	
TOPIC 5: MULTIPLICATION	L8: How to extend number to more than 10	L9: How to extend addition	L10: How to extend subtraction
	L11: How to extend number to more than 100	L12: How to introduce column addition and subtraction	L13: How to extend column addition and subtraction
	L14: How to introduce multiplication	L15: How to develop multiplication table	
	L16: What is the multiplication table	L17: How to introduce column multiplication	

Participants need to consider what's NEW.

Participants of this program are able to imagine the ways of learning from the past process of learning.

Why there are four chapters? Why this order?

These Multiplication Chapters are a best chapter for knowing how Japanese try to develop students who learn mathematics for themselves based on what they learned.



Review 2nd grade: Thinking about Calculations, Vertical Addition, Tables and Graphs, Numbers up to 1000, Various Shapes, Telling Time, Action and Subtraction, Length(?)

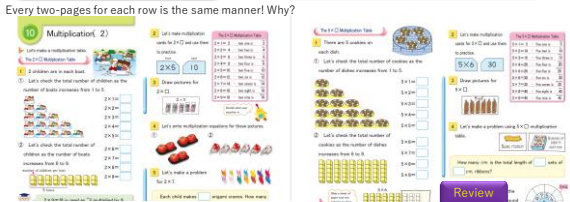
Review 3rd grade: Thinking about Calculations, Action and Subtraction, Length(?)

Review 4th grade: Numbers Larger than 1000, Action and Subtraction, Length(?)

See the situation for multiplication
 Multiplicative Situation A, B, C, ...
 Pictures & Diagrams
 by using dishes & boxes

Properties of Rows
 Rows of Multiplication are binary operations.
 Repeated addition
 Tape Diagram & Times
 Proceduralization
 A Set of Group x a number of set


Every two-pages for each row is the same manner! Why?



For Learning the ways to extend the multiplication rows

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Review 2nd grade: Thinking about Calculations, Vertical Addition, Tables and Graphs, Numbers up to 1000, Various Shapes, Telling Time, Action and Subtraction, Length(?)

Review 3rd grade: Thinking about Calculations, Action and Subtraction, Length(?)

Review 4th grade: Numbers Larger than 1000, Action and Subtraction, Length(?)

Grade 1 to 6 for preparation of future learning

Task 1: Learning the ways of problem posing

3. Make cards from 0 to 100 and line them up.

① Look for the numbers with 7 in ones place.

0	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									
50									59
60									
70									
80									89
90								96	98
100									

② Look for the numbers with 8 in tens place.

What are the numbers in the 50's case below?

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									

Task 2

Let's pose questions!

Multiplication Table

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

Up to Junior High School: Could you pose the questions for algebra?

Extended Calendar

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

Odd Number Table

1	3	5	7	9	11	13	15	17	19
21	23	25	27	29	31	33	35	37	39
41	43	45	47	49	51	53	55	57	59
61	63	65	67	69	71	73	75	77	79
81	83	85	87	89	91	93	95	97	99
101	103	105	107	109	111	113	115	117	119
121	123	125	127	129	131	133	135	137	139
141	143	145	147	149	151	153	155	157	159
161	163	165	167	169	171	173	175	177	179
181	183	185	187	189	191	193	195	197	199

Algebra arrows us general reasoning

See you next class!

Fig. 1.1 Simplified extension and integration process of multiplication (*mul.*) in the task sequence detailed in the textbooks, which is explained by conceptual and procedural knowledge (Isoda, 2009)

References

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- Mathematical Challenges for Elementary Students at the Upper Elementary Level
- Mathematical Challenges for Elementary Students at the Lower Secondary Level
- Teaching Multiplication with Lesson Study
- Real dragons mathematics challenge
- Competition mathematics challenge

Gakko Iosho: Study with your friends: Mathematics for Elementary School Series

คณิตศาสตร์

2010 Edition

さんすう

2005 Edition

Isoda, M., Tall, D. (2019). Junior High School Mathematics Textbook, Gakko Toshu

- Primary School Textbook 2001 Ourreform 2005 Japanese Edition 2005 English Edition
- 2010 Thai Ed.
- 2012 Mexico Ed. 2019 Chile Pro. Ed.
- 2011 Coreform 2011 America Edition 2011 English Edition
- 2019 Papua N.G. Ed. 2020 Indonesian Ed. 2020 Chile Ed.
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