

 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 18: How to introduce division
 Isoda, Masami. Prof., Faculty of Human Sciences
 Director of CRICED, The University of Tsukuba, Japan
 With collaborations of
 Nguyen Chi Thanh, Aida Yap and Teh Kim Hong

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, Conceptualizing 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 and Proceduralization Representation and Sharing
Content		
• Numbers & Operations • Quantity & Measurement	• Extension of Number and Measurement	• Number & Algebra

We are seeking the IP textbook by using terminology to explain to distinguish 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))

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 17 lessons!

TOPIC 1: INTRODUCTION	L1: Introductory discussion to develop mathematical thinking	
TOPIC 2: NUMBERS	L2: How to introduce number	L3: What is a number?
TOPIC 3: ADDITION AND SUBTRACTION	L4: How to introduce addition	L5: What is addition?
TOPIC 3: ADDITION AND SUBTRACTION	L6: How to introduce subtraction	L7: What is subtraction?
TOPIC 4: EXTEND NUMBER TO 100 WITH ADDITION AND SUBTRACTION USING COLUMN FORM	L8: How to extend number to more than 10	L9: How to extend addition
	L11: How to extend number to more than 100	L12: How to introduce column addition
		L13: How to introduce column subtraction
TOPIC 5: MULTIPLICATION	L14: How to introduce multiplication	L15: How to develop multiplication table
	L16: What is the multiplication table	L17: How to introduce column multiplication
TOPIC 6: DIVISION	L18: How to introduce division	L19: How to extend division with remainder
TOPIC 7: REFLECTIVE DISCUSSION	L20: Panel-Reflective discussion for summary	

Participants of this program are able to imagine the ways of learning from the past process of learning.
 Participants need to consider what is new.

What is division on situations?

On the situation:

Partitive Division
 12 candies distribute 4 children equally. How many candies each child will receive.
 $12 \div 4 = 3$, **Ans. 3 candies for each child**; $4 \times 3 = 12$ in English

Quotative Division
 There is 12 candies and each child receive 4 candies equally. How many children will receive it.
 $12 \div 4 = 3$, **Ans. 3 children**; $3 \times 4 = 12$ in English

Do you distinguish these two situations in your textbook?
 If you distinguish, which one do you teach at first and why?

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1) Which of the following can be expressed by the equation 4×2 ?

2) Total number of apples

3) Total number of apples

4) Total number of children

5) Total number of children

6) 4 children receive 3 pencils each. How many pencils are there in all?

7) There are 3 bags with 4 oranges in each one. How many oranges are there in all?

Do you remember?

See the situation for multiplication
 Multiplicative Comparison (A, B, C, Pictures & Diagrams, by using
 A Set of Group and a number of set
 Interpretation of Word
 Rows of Multiplication and
 Array Diagram & Tables
 Phrases
 Multiplicative Comparison
 Opposite
 Opposite
 Opposite

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How distribute equally? Questioning for partitive and quotative division

Ways of distribution for Partitive division: Repeated subtraction 1 by 1

Meaning of Division with Partitive division situation

1) Write equations for the following problems and get the number for each child by dividing blocks.

2) Divide 8 blocks equally among 3 children.

3) Change the numbers of blocks and children and do these problems again.

Calculations such as $12 \div 4 = 3$ and $9 \div 3 = 3$ are called "division."

The division calculations in 1) and 2) need to divide things among children so that each one receives the same number.

3) Divide 15 blocks equally among 5 children. How many blocks does each one receive?

$15 \div 5 = 3$

When 12 is divided among 4 children, each one Partitive division is written as $12 \div 4 = 3$ and read "12 divided by 4 equals 3."

Answer: 3 pieces

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