

# FACILITATING STUDENTS' CONTEXTUALISATION IN ADDITION AND SUBTRACTION

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## RATIONALE

Teachers usually find that P1 NCS students in CMI classrooms face the following difficulties:

- most of them have not experienced any kindergarten education in HK;
- they rarely have any chance to use Chinese as their daily activities are confined to their NCS homes; and
- they have to learn not only mathematics, but also Chinese, in mathematics lessons.

These difficulties are likely to bring about a loss in interest and confidence in mathematics in their future learning. In order to help them retain such interest and confidence, teachers are eager to provide them with more accommodating environments, as shown in the following targets and strategies.

## LEARNING TARGETS

NCS students are expected to be able to

1. make sense of addition and subtraction of integers (0 – 18) through daily life language and context;
2. present their ideas of an arithmetic expression by drawing pictures or telling daily life stories;
3. express their understanding of a word problem through the pictures they draw; and further
4. write out the corresponding arithmetic expressions.

# LEARNING AND TEACHING STRATEGIES

Traditional word problems, camouflaged as stories or games, are introduced in an earlier stage to facilitate students' construction of mathematical facts, development of skills and consolidation of concepts in their own words and ideas.

Let students present their thinking via creating stories or drawing pictorials like counting circles, dots, crosses or bars.

Learning is set in daily life contexts such that students may learn in an unfamiliar language with less difficulties.

Lessons and exercises are designed along these strategies. Students experience, anew, expressing their own coherent thinking, first through simple Chinese, and then via drawing and storytelling. In such ways, they are no longer confined to listening passively or at most giving very short answers to the teacher's simplistic questions.

## THE LESSONS

The approaches could be adopted based on the classes' characteristics.

**In Class 1**, teacher writes an addition or subtraction expression (e.g.  $7 + 8$  or  $15 - 8$ ) on the board to ask students to create a short story about the arithmetic expression.

The teacher prepares these 14 cards, which may be named under three categories.



Toys



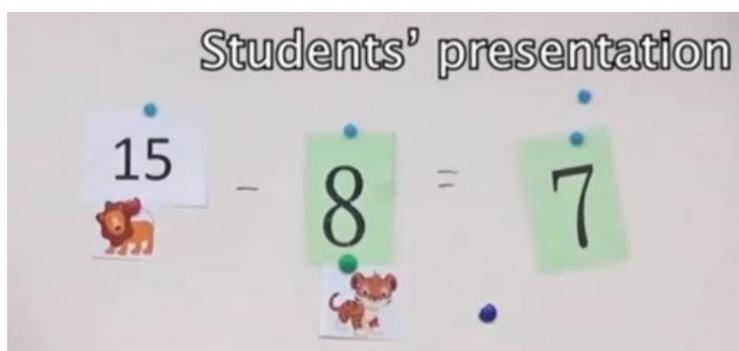
Animals



Food or drinks

Two cards from one of the categories are given to each group of 4 students. They are asked to use the pictures as characters of their stories. After a short discussion, two students from each group are invited to present their story.

For example, one group presented their story as below.

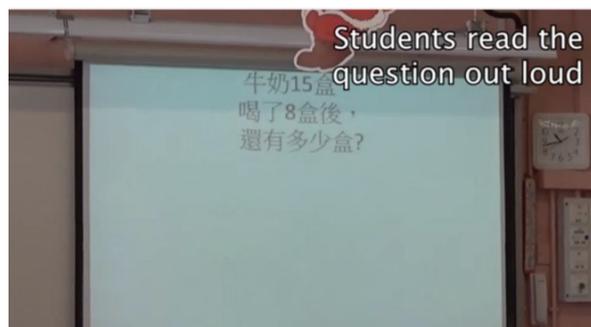


Two students presented their story about the subtraction as,

“有十五隻獅子，被人捉了八隻，剩下七隻。”

(There are fifteen lions. Eight of them are caught. There are seven left.)

In **Class II**, teacher relates the meaning of subtraction with a contextual problem:

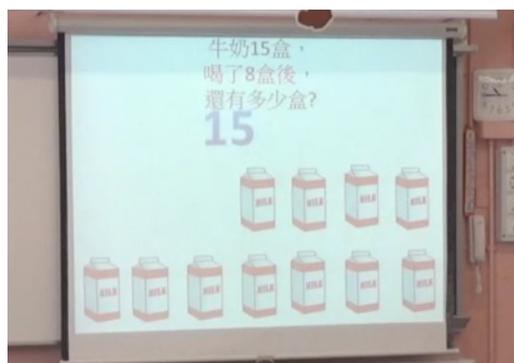
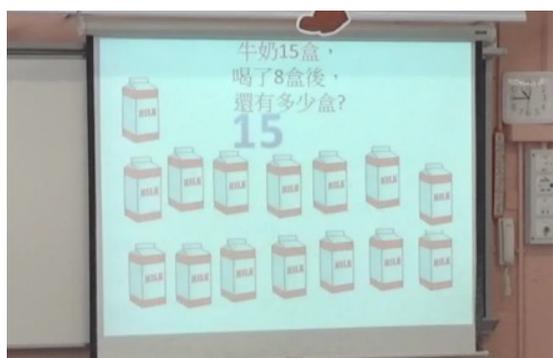


There are fifteen boxes of milk.

After eight of them are drunk, how many boxes left?



She illustrates the words in the problem with pictures and animations.



Students counted backward loudly while the boxes were disappearing one by one. They had learnt to do subtraction this way before.

# ASSESSMENT TOOLS

Formative exercises are designed, from the very beginning, to check and consolidate students' understanding.

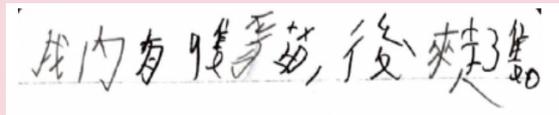
## Exercise 1:

Ask students to think of a daily life situation that may be behind a mathematics expression.

### STUDENTS WORK

1. 試畫圖或用文字說出一個用數式  $9 - 3 = 6$  去計算的故事。

Student A's writing:

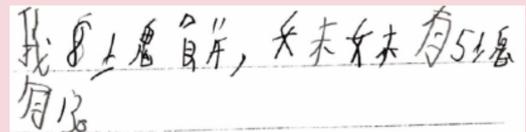


Student B's drawing:

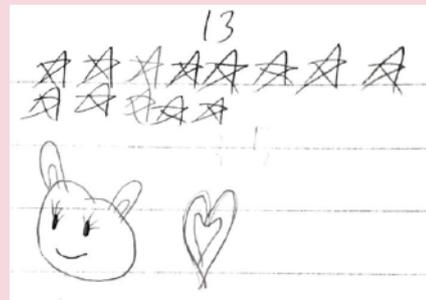


2. 試畫圖或用文字說出計算  $8 + 5$  的方法。

Student A's writing:



Student C's drawing:



## Exercise 2:

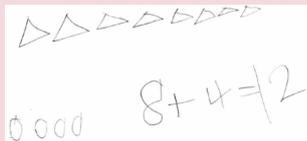
Ask students to show what they have read in a word problem.

### STUDENTS WORK

試畫出下列問題的意思。(Draw what you think the word problem is asking.)

1. 思思寫了8個詞語後，再寫多4個，她共寫了詞語多少個？

Student D's drawing:



Student E's drawing:

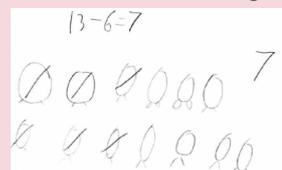


2. 農場裡原有13隻鴨子，其中6隻游走了，還餘鴨子多少隻？

Student F's writing:



Student G's drawing:



### Exercise 3:

Let students develop their own algorithm in solving a problem.

Students can be encouraged to give answers by drawing, telling, writing arithmetic expression or exploring with apps e.g. TouchCounts and etc.

This exercise could be even more fruitful if it is assigned as group work, and lesson time is allocated for students to present, explain and discuss their algorithms.

- A. Miss Chan has 4 bags of candies, each containing 4, 6, 8 and 10 pieces as shown below.



She wants to re-arrange the candies in the 4 bags so that each has the same number. How would you help her do it?

- B. Mr. Wong has 30 candies and 7 boxes. He wants to use at least 3 of them to contain an equal number of candies as prizes in a game.
- How can you help him put all the candies into the boxes?
  - How can you help him put most of the candies into the boxes, with the least number left unused?
- C. Let students design their own problems similar to A and B above for classmates to solve. Other than varying the numbers of candies, bags and boxes, they may be encouraged to come up with quite different contexts, requirements and questions.

Some of the proposed problems may be ambiguous, unsolvable and blended with incomplete or irrelevant data, while some others may involve procedures that will only be introduced one year or more later in the formal curriculum. These “wrong turns” deserve to be welcomed because

- ambiguous problems can be clarified collectively, bringing nuanced mathematical sense for all,
- they facilitate rich dialogue,
- problems “too soon for their level” can provide precious motivation for self-directed learning ahead and
- students are often capable of devising ingenious algorithms to solve problems “beyond their reach”.

More about TouchCounts

The following two videos from TouchCounts 1.0 are highly recommended. They are inspiring for both teachers and students.

- Number compositions, <https://www.youtube.com/watch?v=oJxdNJIHBNk&app=desktop> and
- Fair share, <https://www.youtube.com/watch?v=eQSPfGhbhvg>.