**Students’ reference**

**Teaching methodology for Numbers: the concept of numbers**

1. **Acquiring the number concept and semi-concrete objects**

**2**



**Concrete objects**

**Number**

In the very beginning of primary mathematics, students are expected to acquire the concept of numbers. For this process, students must understand that the number of objects is represented by number. For example, as in the first figure, the number of apples, cats and flowers is all represented the number `2’ regardless of types, colours or sizes, etc.

However, this concept is abstract and difficult for some children. In the new primary G1 textbook, semi-concrete objects like blocks are used as medium between concrete objects and numbers to help students to acquire the concept of numbers as shown in the second figure. In this process, they replace concrete objects such as apples, cats and flowers by semi-concrete objects. In this way, they can understand that all three kinds of objects are represented by two blocks, and this understanding will help students to acquire the number concept of `2’.

**2**



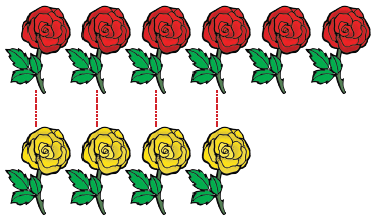
**Concrete objects**

**semi-concrete objects**

**number**

1. **From comparing the numbers of objects to comparing the numbers**

The question “Which is bigger, 6 or 4?” must be abstract. Students compare the numbers of red and yellow flowers by one-to-one correspondence as shown in the figure. Therefore, it is better for students to learn comparing the numbers of objects before comparing numbers.



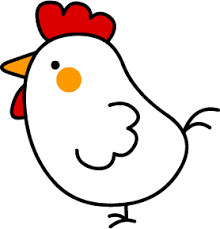
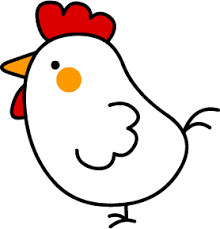
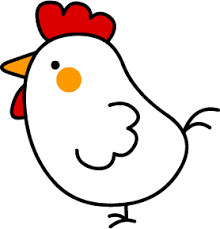
**Comparing 6 and 4**

Also they learn comparing the numbers of flowers by replacing by semi-concrete objects. Then, finally, they learn that the number 6 is bigger than 4.

1. **Addition with semi-concrete objects within 10**

There are many situations where we can apply addition in our daily life. In Grade 1, two types of addition are introduced, namely, `putting together’ and `increasing’ type additions. Those additions are introduced using situations which are familiar to Grade 1 students. The details are as follows.

**`Putting together’ type addition**



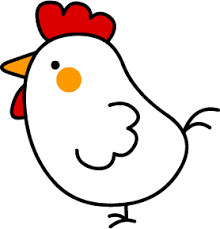
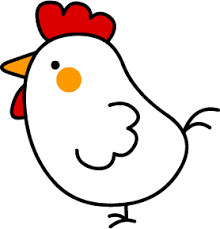
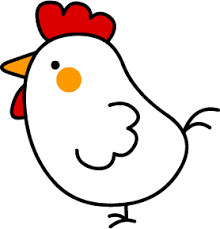
(e.g.)

There are 2 chickens and 1 chicken. How many chickens are there by putting together?

2 + 1

In this type of addition, two groups of objects existed in the first place, and the two groups are put together. In Grade 1 textbook, this action of `putting together’ is expressed with two arrows just like the figure on the above. Also, it is important for students to actually move concrete objects and semi-concrete objects to show `putting together’.

**`Increasing’ type addition**



2 + 1

(e.g.)

There were 2 chickens at first. Then, 1 chicken joined later. How many chickens are there after increasing?

In this type of additions, one group existed at first, and another group joins later. In Grade 1 textbook, we express this `increasing’ situation with one arrow pointing towards the first group. In this case, too, it is important for students to actually move concrete objects and semi-concrete objects to show `increasing’.

The above two situations might look quite different for Grade 1 students. They have to understand that the same addition 2 + 1 = 3 can be applied in both of the cases.

1. **Making a group of 10**

10

and

3

**13**

thirteen

After students learn numbers up to 10, they learn numbers up to 20 using concrete and semi-concrete objects. Here, students learn numbers from 11 to 20 based on the idea of `making a group of 10’. This idea of `making a group of 10’ is central in Grade 1 mathematics and this idea will be also used for bigger numbers, addition and subtraction in later units in Grade 1 textbook.

This approach of using `making a group of 10’ idea is very natural since this idea is in line with Myanmar language unlike English and many other languages. For this reason, `making a group of 10’ idea is applied throughout Grade 1 textbook. Also, this approach will help students to move smoothly to learn the concept of place values later.

1. **Addition with semi-concrete objects up to 19**

We classify addition up to 19 into two categories. One is `addition without regrouping’ and the other is `addition with regrouping’. More details are as follows.

**Addition without Regrouping**

(e.g.) 10 + 3, 14 + 2, 6 + 11

This type of addition has a group of 10 in one of the two numbers in the addition. Therefore, we can keep the group of 10 unchanged, and do addition with the other part. For example, when we do 14 + 2, we can keep the group of 10 unchanged, and just do 4 + 2 to obtain the answer 16 as shown in the figure. Since this type is likely to be easier for students, we should teach it before the other type.

14 + 2 = 16

**14**

**2**

**10**

**16**

**Addition with Regrouping**

(e.g.) 9 + 3, 8 + 5, 4 + 9

In this type of addition, both numbers don’t have a group of 10 at first. Therefore, the key idea of calculation should be to make a group of 10. For example, in the case of the addition 9 + 3, the key part is to make a group of 10 as shown in the figure on the left. This type of addition seems to be more difficult than addition without regrouping for children, since they have to make a group of 10 by themselves by employing the idea of composition and decomposition of numbers up to 10.

9 + 3 = 12

**9**

**3**

**10**

1. **Subtraction with semi-concrete objects up to 19**

We classify subtraction up to 19 into two categories. One is `subtraction without regrouping’ and the other is `subtraction with regrouping’. More details are as follows.

**Subtraction without Regrouping**

**17**

**13**

**10**

**7**

**10**

**3**

(e.g.) 17 − 4, 15 − 3, 12 − 2

In this type of subtraction, we can keep a group of 10 unchanged and do subtraction only in the rest of the part. For example, when we do 17 − 4, we can keep the group of 10 unchanged, and just do 7 − 4 in the rest of part to obtain the answer 13 as shown in the figure. Since this type is likely to be easier for students, we should teach it before the other type.

17 - 4 = 13

**Subtraction with Regrouping**

(e.g.) 13 − 9, 14 − 8, 12 − 4

**10**

**3**

**4**

**10 − 9**

**3**

In this type of subtraction, we cannot keep a group of 10 unchanged, and must do subtraction from the group of 10. For example, in the case of the subtraction 13 − 9, we cannot subtract 9 from 3. Therefore, we need do subtraction with 10 like 10 − 9 as shown in the figure. This type of subtraction seems to be more difficult than subtraction without regrouping for children since they have to take more than one step to find the answer unlike subtraction without regrouping.

13 - 9 = 4