3.OA Making a ten

Below is a table showing all the ways to add the numbers from 1 to 9.

a. Each sum which is larger than 10 can be found by first making a 10. For example, to find 8 + 5, we can write

$$
\begin{aligned}
8 + 5 &= 8 + (2 + 3) \\
&= (8 + 2) + 3 \\
&= 10 + 3 \\
&= 13.
\end{aligned}
$$

Explain why this reasoning works and apply this method to find 7 + 8. How can you visualize these equations using the table?

b. Adding 9 to another single digit number can also be done by first making a 10. For example

$$
\begin{aligned}
3 + 9 &= 3 + (10 - 1) \\
&= (3 + 10) - 1 \\
&= 13 - 1 \\
&= 12.
\end{aligned}
$$

Explain why this reasoning works and apply this method to find 7+9. How can you visualize these equations using the table?

+	1	2	3	4	5	6	7	8	9
1	2	3	4	5	6	7	8	9	10
2	3	4	5	6	7	8	9	10	11
3	4	5	6	7	8	9	10	11	12
4	5	6	7	8	9	10	11	12	13
5	6	7	8	9	10	11	12	13	14
6	7	8	9	10	11	12	13	14	15
7	8	9	10	11	12	13	14	15	16
8	9	10	11	12	13	14	15	16	17
9	10	11	12	13	14	15	16	17	18

Commentary:
Students are expected to be fluent with addition and subtraction within 20 i second grade (see 2.OA.2). This task builds on that knowledge by asking them to study more carefully the make-a-ten strategy that they should already know and use intuitively. In this strategy, knowledge of which sums make a ten, together with some of the properties of addition and subtraction, are used to evaluate sums which are larger than 10. The 10's in the table are shaded because they are essential to the technique.

The second part of the task focuses on adding 9's which can also be accomplished by adding a 10 and then subtracting 1. The teacher may wish to indicated to students for part (b) that showing how to add 9 by first making a ten with the addition table requires an extra column on the table. Alternatively, students can just add one box, with the number 17, to show the sum 7+10.

This task is intended for instruction purposes as it takes time to identify the patterns involved and understand the steps in the procedures.

Solution: 1

a. The first equation comes from writing 5 as 2+3. The reason for this is that in the next step we will group the 2 together with the 8 to make a 10. This second step uses the associative property of addition. In the third step, we add 10 + 3 to find the answer of 13.

In terms of the addition table, we can visualize adding 5 to 8 by starting at the 8 in the column of addends and moving over 5 spaces to the right. Notice that after two steps, we reach 10. Then three more steps puts us at 13. This is shown in the picture below:

+	1	2	3	4	5	6	7	8	9
1	2	3	4	5	6	7	8	9	10
2	3	4	5	6	7	8	9	10	11
3	4	5	6	7	8	9	10	11	12
4	5	6	7	8	9	10	11	12	13
5	6	7	8	9	10	11	12	13	14
6	7	8	9	10	11	12	13	14	15
7	8	9	10	11	12	13	14	15	16
8	9	10	11	12	13	14	15	16	17
9	10	11	12	13	14	15	16	17	18

Applying this method to calculate 7+8 we find

$$7+8 = 7+(3+5)$$
$$= (7+3)+5$$
$$= 10+5$$
$$= 15.$$

b. This method is similar to the making a ten method in part (b). In this case, however, a ten is made by rewriting 9 as 10 - 1. Then the 3 and 10 are grouped together first before performing the subtraction in the final step. This is shown in the picture below:

+	1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10	11
2	3	4	5	6	7	8	9	10	11	12
3	4	5	6	7	8	9	10	11	12	13
4	5	6	7	8	9	10	11	12	13	14
5	6	7	8	9	10	11	12	13	14	15
6	7	8	9	10	11	12	13	14	15	16
7	8	9	10	11	12	13	14	15	16	17
8	9	10	11	12	13	14	15	16	17	18
9	10	11	12	13	14	15	16	17	18	19

Applying this method to find 7+9 gives

$$
\begin{aligned}
7 + 9 &= 7 + (10 - 1) \\
&= (7 + 10) - 1 \\
&= 17 - 1 \\
&= 16.
\end{aligned}
$$

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