Grade 1: Meaning of Addition

1.N.9	
Demonstrate an understanding of addition of numbers with answers to 20 and their corresponding subtraction facts, concretely, pictorially and symbolically by: • using familiar and mathematical language to describe additive and subtractive actions from their experience • creating and solving problems in context that involve addition and subtraction • modelling addition and subtraction using a variety of concrete and visual representations, and recording the process symbolically.	1. Act out a given story problem presented orally or through shared reading. ONLY ADDITION 2. Indicate if the scenario in a given story problem represents additive or subtractive action. ONLY ADDITION 3. Represent the numbers and actions presented in a given story problem by using manipulatives, and record them using sketches and/or number sentences. ONLY ADDITION 4. Create a story problem for addition that connects to student experience and simulate the action with counters. 5. Create a story problem for subtraction that connects to student experience and simulate the action with counters. NOT INCLUDED 6. Create a word problem for a given number sentence. ONLY ADDITION 7. Represent a given story problem pictorially or symbolically to show the additive or subtractive action and solve the problem. ONLY ADDITION

Clarification of the outcome:

- ✦ The meaning of addition involves a combining action. The meaning can also concern a part/whole situation. Understanding both of these aspects of addition is important for problem solving (requires a decision about what operation(s) to use).
- ✦ The subtraction component of the outcome is not developed here. While addition and subtraction are related in an inverse way, the distinction in their meanings requires separate development in order to ensure better student understanding.
- ✦ For a more in-depth discussion of issues related about the development of arithmetic meanings and arithmetic skills, refer to Routine and non-routine problem solving and to Sequencing meaning, routine problem solving, and arithmetic

Required close-to-at-hand prior knowledge:

- ✤ Real counting to at least 10.
- ✤ Numeral recognition to at least 10.

SET SCENE stage

The problem task to present to students:

Read a children's story that involves putting together and counting up what is there. For example, the story '***10 for Dinner***' by Jo Ellen Bogart (Scholastic, 1989) could be read interactively with the students. Another possibility is for you to create and then perform a short puppet show that involves putting together and counting up what is there.

In either case, students should count and describe what is happening in the story or show. Do not involve mathematical symbols (e. g. '+') yet. The SET SCENE activity should be a time for oral counts and oral descriptions of 'put together' actions.

Comments:

It is likely that students will already have put stuff together in some way as a part of what they do daily. For example, they may have put candies together and counted them. In any case, at least one SET SCENE activity should be used before formally developing the meaning of addition. The mathematical focus of the activity should involve putting objects together and counting what is there. You could also include a part/whole situation (E.G.: In the box there are 6 white crayons and 2 blue crayons. Altogether there are 8 crayons.)

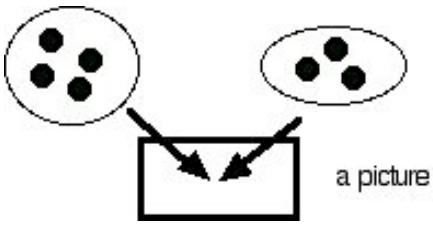
DEVELOP stage

The following points are important for developing a good understanding of the meaning of addition as 'put together' and 'part/whole'.

- To begin with, it is preferable that the **same** objects be 'put together' as addition requires that in some manner. Later, as students become proficient with this aspect of addition, the part/whole aspect should be developed. This aspect involves differing objects such as red buttons and blue stones in a container (the different coloured objects are the parts and their combined count is the whole).
- The total, at first, should be restricted to a maximum of 9 to help ensure a clear focus on the meaning of addition. Progress to a total of 20 as appropriate.
- There is a small issue related to language. It is not advisable to refer to number sentences such as '3 + 5 = 8' as "3 plus 5 is 8". It is better to say "3 add 5 is 8", or "3 add 5 equals 8, or "3 and 5 is/equals 8". The reason is that students are beginning to be aware of temperature where 'plus' denotes a temperature above zero (and more generally, indicates a position on a number line). Using the word 'plus' to mean 'add', can create confusion for students now and in later years when they learn about integers.
- For the moment, '=' should be understood as indicating an action of counting up everything that you have. This is the active sense of '='. It is a one-way arrow from left to right. The 'another name for' sense of '=' (the stuff on the left is another way to say the stuff on the right and vice versa) is appropriate when learning to do arithmetic (and in later grades, algebra).

Activity 1: Revisits SET SCENE and addresses achievement indicators 1, 2, and 3.

- ✦ **[We are assuming that a story reading was the SET SCENE activity.]** Revisit a part of the story where there is a 'put together' action taking place. Reread that part.
- ✦ Ask students to tell you what is happening. As they do that, draw a picture showing the 'put together' action (see diagram) and then write the number sentence for the action (e. g. on the white board). Read the number sentence in a way that retells what students were saying. Discuss what '+' means and what '=' means.



- ✦ Ask students for examples where they have put things together and then counted how many they have. As each example is provided, draw a picture showing the 'put together' action and then write the number sentence for the action. Then read the number sentence in an addition way that retells what student was saying (e. g. 3 candies add 5 candies is 8 candies). Discuss why order matters (e.g. 4 + 3 means starting with 4 while 3 + 4 means starting with 3).

Activity 2: Addresses achievement indicators 1, 2, and 3.

- ✦ Revisit another 'put together' part of the story. Use objects to demonstrate put together actions. As you demonstrate each 'put together' action, ask individual students to count objects and to tell you what number sentence you need to write that tells the story of the action. Discuss why order matters (e.g. 5 + 2 means having 2 and getting 5, while 5 + 2 means having 5 and getting 2).
- ✦ Provide students with objects. Write an addition number sentence on the white board and ask students to act it out, using objects. Repeat about three times. Ensure that what students do reflects each number sentence. Discuss why order matters.
- ✦ Bring out a cup of popcorn and put it together with a cup of water. Ask students if it makes sense to write '1 + 1' = 2' for the situation. Discuss why the answer is not 2 soggy cups of popcorn. You want to ensure that students realize that addition involves counting up individual things.

NOTE:

- ☐ You might want to read another children's story that concerns addition. One possibility, Nomowapa and the dam, can be found at this website. As you read the story, have students translate 'put together' actions or situations into number sentences.

- ☐ By this point you want students to understand that order matters when combining. Here are examples of this.

I have 2 candies. Then mom gives me 3 candies. Now I have 5 candies.

This story is represented by the number sentence: 2 + 3 = 5 (I started with 2, then I got 3).

I have 3 candies. Then mom gives me 2 candies. Now I have 5 candies.

This story is represented by the number sentence: 3 + 2 = 5 (I started with 3, then I got 2).

Activity 3: Addresses achievement indicators 1, 2, 3, 4, and practice.

- Tell an oral story problem that involves addition. For example, "*My dog ate 2 cookies. Then he ate 3 cookies. How many cookies are in his tummy?*" Write the number sentence that represents the mystery in the story (how many cookies). In the case of the dog story, write as shown here: Continue by asking students to figure out what number goes in the box by using manipulatives (fingers are manipulatives).

$$2 + 3 = \square$$

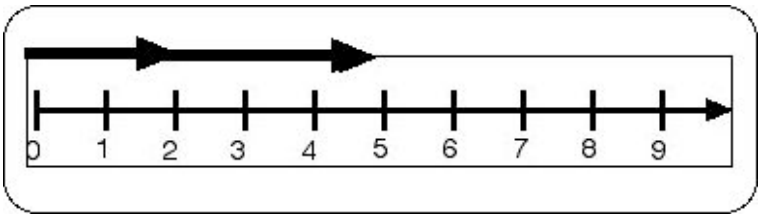
- Tell about four more addition story problems. Involve totals to 20 as appropriate. This time have students write the number sentence that represents what is happening in the story and then figure out the answer in whatever way they want. Restrict the stories to the 'a + b = ?' type. The 'a + ? = c' and the '? + b = c' types of stories are part of the development of simple problem solving that occurs in a later lesson.

Activity 4: Addresses achievement indicators 1, 2, 3, 6, and practice.

- Provide students with a number sentence such as 2 + 5 = ? (only 'a + b = ?' type). Ask students to make up a story problem for the number sentence and then use counters/ fingers to obtain an answer to '?'. Repeat about five times. Involve totals to 20 as appropriate.
- Have students take turns telling addition story problems, with the other students writing the number sentences and then figuring out the answers (only for the 'a + b = ?' type).

Activity 5: Addresses achievement indicators 2, 3, and 7.

- Tell a simple 'put together' story. Ask students to provide the number sentence for it (e.g.: 2 + 3 = 5).
- Make a number line on the floor, marked from 0 to 20. Ask a student to show how the number line can be used to show the number sentence they provided. Expect someone to start at zero on the number line, take 2 steps and then take 3 steps to reach 5 (see below). Or expect someone to start at 2 on the number line and then take 3 steps to reach 5. Either approach is acceptable. If no student can do this at first, relate the number line to hopscotch and ask again. If this fails, then demonstrate the action on the number line. Discuss why order matters (2 + 3 means start at 2, step 3 while 3 + 2 means start at 3, step 2).



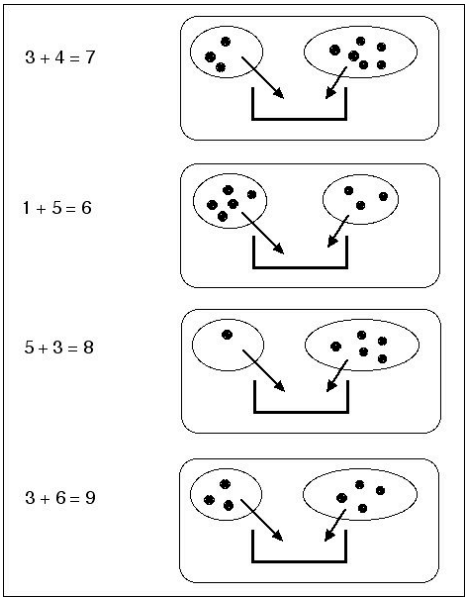
- Repeat about four times.

NOTE:

The 'put together' aspect should have been sufficiently developed to this point. You should assess your teaching before developing the part/whole aspect of addition.

Activity 6: Assessment of teaching ('put together' aspect only)

- Give students a small worksheet (see sample) where they match a number sentence to the corresponding picture of a 'put together' action. Restrict the total to 9 or less.



Activity 7: Addresses achievement indicators 2, 3, 4, and 7.

- Make a team of students with boys and girls on it. Select 3 girls and 4 boys and locate them together in a distinct area of the room (e.g. around a table). Ask students how many students are on the team. Ask how many are boys and how many are girls. Ask for a number sentence. Expect 3 + 4 = 7 or 4 + 3 = 7. [Assist as needed.] Discuss that the whole team is made up of two parts: girls and boys. Discuss why the order of adding does not matter (either part can be first).
- Show students an actual container with 6 red crayons and 3 blue crayons in it. Ask for a number sentence. Expect 6 + 3 = 9 or 3 + 6 = 9. Discuss that the container has two parts in it: red crayons and blue crayons. Discuss why the order of adding does not matter (either part can be first).
- Show students a picture of a drawing of 5 stars and 2 hearts (see example). Ask for a number sentence. Expect 5 + 2 = 7 or 2 + 5 = 7. Discuss that the drawing has two parts in it: stars and moons. Discuss why the order of adding does not matter.

- Ask students to describe other situations made up of two parts. Ask for number sentences as appropriate.

Activity 8: Addresses achievement indicators 1, 2, 3, 4, 6, and 7, and practice.

- ✦ Tell an addition story problem ('put together' aspect and a + b = ? form) connected to student experiences. Ask students to draw a picture for it, provide a number sentence for it, and use manipulatives to figure out the answer. Discuss results.
- ✦ Tell an addition story problem ('part/whole' aspect and a + b = ? form) connected to student experiences. Ask students to draw a picture for it, provide a number sentence for it, and use manipulatives to figure out the answer. Discuss results.
- ✦ Present an addition number sentence (e.g. 5 + 6 = 11) and ask students to draw a 'put together' picture for it and make up a'put together' story for it. Discuss results.
- ✦ Present an addition number sentence (e.g. 5 + 6 = 11) and ask students to draw a 'part/whole' picture for it and make up a'part/whole' story for it. Discuss results.

Activity 9: Assessment of teaching ('put together' and 'part/whole' aspects)

- ✦ Ask students to draw a picture of 2 + 5 = 7 in two ways: (1) way 1 shows action and (2) way 2 shows part/whole.

If all is well with the assessment of teaching, engage students in PRACTICE (the conclusion to the lesson plan).

An example of a well-designed worksheet follows.

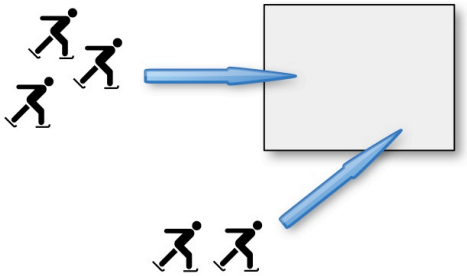
More questions of each type are needed for a well-designed worksheet.

The MAINTAIN stage follows the sample worksheets.

Question 1.

Write the number sentence for each picture:

a)



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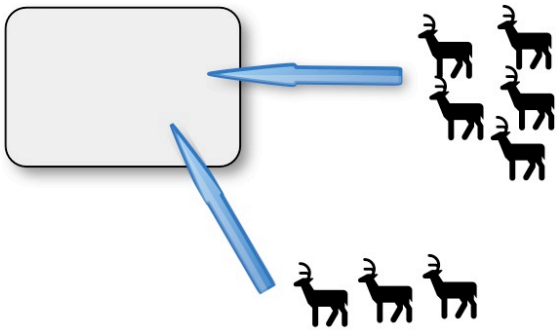
b)



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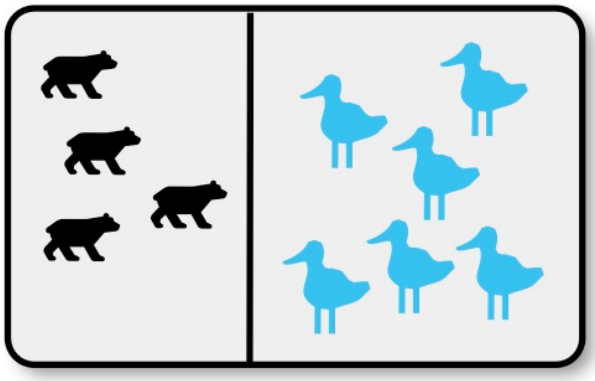
c)



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Question 2.

a) Draw an action picture for 6 + 3 = 9

a) Draw a part/whole picture for 5 + 2 = 7

MAINTAIN stage

Mini-task example

Present an addition number sentence (e.g.: 4 + 5 = 9) at calendar time and ask students to make up an oral story for it.

Rich-task example (integrates art, LA, and addition and subtraction)

Have groups of students make a book that is a collection of addition and subtraction stories that are expressed in picture and/or word form. The groups share each others books and solve the problems.