

Chapter 2

Number Bonds

Chapter Overview

Let's Remember

Lesson 1: Telling Number Stories

Note for Teachers

In this chapter, students are introduced to number bonds. A number bond is a pictorial representation of the relationship between a whole and its parts. It shows how numbers can be composed and decomposed. An understanding of number bonds helps students develop their number sense by showing them the relationship between numbers. It is also an important foundation for understanding addition and subtraction in subsequent chapters. Students will be able to use number bonds as an addition and subtraction tool; if both parts are known, we can put the parts together (add) to find the whole. If the whole and one part are known, we can take away (subtract) the part we know from the whole to find the unknown part. Number bonds also help students to have a deeper understanding of fact families later on. They can piece the relationship between the addition and subtraction sentences in a fact family.

Recall Prior Knowledge

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From PR1ME Mathematics Interactive Edition:

Let's Remember (CB p. 22)

Assign the tasks to students as classwork to identify gaps in students' understanding. Use the objectives and chapter references given for each task in the corresponding lesson notes to address remediation needs.

Distribute a copy of Let's Remember Worksheet (WS2.1) to each student. Have students attempt the worksheet to help them recall these previously acquired related knowledge:

- Count and write a number within 10 (CWB 1A Chapter 1)
- Compare two numbers within 10 (CWB 1A Chapter 1)

For answers, go to CW Manual p. 118.

Lesson 1: Telling Number Stories

Duration: 8 h 45 min

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From PR1ME Mathematics Interactive Edition:

Let's Learn (CB pp. 23–24)

Go through the teaching example with students for concept development. Use the detailed lesson plan given in the corresponding lesson notes to carry out the teaching.

Learn

Making 5 (CWB p. 12)

Learning Outcomes:

- Make a number story to illustrate a number bond for 5
- Break a set of 5 objects into two parts in different ways
- Write a number bond for 5

Materials:

- 1 copy of Think About It Worksheet (WS2.2) per student
- Connecting cubes

Vocabulary:

- number bond

Stage: Concrete Experience

Begin by using connecting cubes to demonstrate that different numbers can form 5. Besides showing students the relationship between numbers, this activity implicitly introduces them to the concept that two smaller numbers can be added to make a greater number. By having students manipulate the connecting cubes, they have a hands-on experience at discovering different ways to break a set of 5 objects. This will enable them to interpret the number bond later on. Also, exploring various ways to break the rod of 5 connecting cubes enables students to be able to come up with different number bonds for 5. This process will be repeated for the rest of the numbers from 6 to 10, helping students to recognize all possible pairs of numbers that make up a whole from 6 to 10.

- Distribute a rod of 5 connecting cubes to students and have them follow each step of your demonstration.
- Have students state the number of connecting cubes. They should be able to tell that there are 5 cubes.
- Then, have students break the rod of 5 cubes into 2 smaller rods (3 cubes and 2 cubes). Highlight to them that 5 is made of 2 and 3.
- Have students combine the connecting cubes again to form a rod of 5 cubes. Ask them to break the rod in another way. Guide them to see that it can also be broken into 4 cubes and 1 cube respectively.

Stage: Pictorial Representation

Follow up by relating the connecting cubes activity to the picture of the children on CWB p. 12. The row of 5 children is made of two distinct parts — 3 girls and 2 boys. Students will be able to draw the similarities between this and the connecting cubes activity. This presentation also parallels the concept of parts and whole in a number bond. It aids the transition from pictorial representation to abstract representation later on.

- Refer students to the picture of the children on CWB p. 12. Have them state the number of children and write the first sentence of the number story on the board as shown on the page. Relate it back to the rod of 5 cubes. Tell students that the 5 children represent the whole.
- Next, have students state the number of girls and the number of boys in the group of children. Write this part of the number story on the board as shown on the page. Relate it back to breaking the rod into 3 cubes and 2 cubes. Tell students that we can break the whole into two parts — 3 girls and 2 boys.
- Direct students to the completed number story and highlight to them that we can present the picture this way.

Stage: Abstract Representation

Lastly, present the number bond to show the breaking of a number into two parts. Having gone through the previous stages, students will be able to identify the parts and whole of a number bond. They will have a better understanding of the relationship between numbers. This aids them in interpreting the number bond, especially the writing of the whole and the parts. They can see that since the whole is broken into two parts, it is the circle that is connected to both other parts. Having explored the different possibilities of making 5 during the connecting cubes activity, students will also be able to identify other ways of making 5. This is important as later on, they will be expected to find a part of a number bond, given the whole and the other part. Having a strong knowledge of the pairs of numbers that form a whole will enable them to find the missing part.

- Draw a number bond frame labeled with 'whole' and 'part' on the board. First, guide students to write the whole '5' in the circle labeled 'whole'. Relate it back to the number story on the page. Point out that the whole must always be in the circle that is connected to the other two circles.
- Then, guide students break the whole into two parts, '3' and '2'. Relate it back to the pictorial representation on the page. Write the parts '3' and '2' in the two circles labeled 'part'.
- Point to the completed number bond and reiterate that that 3 and 2 make 5.

- Highlight that the two parts of a number bond can be swapped with each other to get the same whole.
- Explain to students that we can tell different number stories for a picture. Guide them to see that the two parts of the whole can also be grouped this way: the children who are wearing hats and the children who are not. Guide students to write the number bond based on that number story. Conclude that 4 and 1 also make 5.

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From PRIME Mathematics Interactive Edition:

Let's Do (CB p. 24)

Assign the tasks to students as classwork for formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

Think About It

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From PRIME Mathematics Interactive Edition:

Think About It (CB p. 24)

Assign the task to students as classwork. Have them complete the task in groups. Facilitate discussions using the corresponding lesson notes.

Have students get into groups. Distribute a copy of Think About It Worksheet (WS2.2) to each group. Have them discuss the question presented. Ask a student from each group to present their answers before proceeding with the questions below.

- What is the difference between the number bonds drawn by Sam and Yen? (The whole is different/numbers representing the parts and whole are in different positions in the number bonds)
- What number is the whole? (5)
- What numbers should be in the circles connected to the whole? (2 and 3)
- Why? (Numbers in the circles connected to the whole represent the parts. '2' and '3' represent the parts.)

Conclude that Sam's number bond is correct. Prompt students to understand that Yen's number bond is wrong because 3 and 5 do not make 2. So, Yen is wrong. Provide more examples using smaller numbers as the whole to students who say that both Sam and Yen are correct to help these students understand the concept of number bonds better.

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From PRIME Mathematics Interactive Edition:

Let's Learn (CB p. 25)

Go through the teaching example with students for concept development. Use the detailed lesson plan given in the corresponding lesson notes to carry out the teaching.

Learn

Making 6 (CWB p. 13)

Learning Outcomes:

- Make a number story to illustrate a number bond for 6
- Break a set of 6 objects into two parts in different ways
- Write a number bond for 6

Materials:

- Connecting cubes

Stage: Concrete Experience

Follow the same teaching procedure as the example on CWB p. 12. Begin by using connecting cubes to demonstrate the breaking of 6 into 4 and 2. This allows students to have a concrete experience of breaking a rod of 6 cubes into two parts. Repeating this connecting cubes activity across numbers 5 to 10 forms a solid foundation for the understanding of the relationship between numbers. It also builds students' ability to recall pairs of numbers that make up another number quickly. This develops their ability to perform mental math problems effectively in subsequent chapters.

- Distribute a rod of 6 connecting cubes to students and have them follow each step of your demonstration.
- Have students state the number of connecting cubes. They should be able to tell that there are 6 cubes.
- Then, have students break the rod of 6 cubes into 2 smaller rods (4 cubes and 2 cubes). Highlight to them that 6 is made of 4 and 2.
- Have students combine the connecting cubes again to form a rod of 6 cubes. Ask them to break the rod in other ways. Guide them to see that it can also be broken into 5 cubes and 1 cube, or 2 rods of 3 cubes each respectively.

Stage: Pictorial Representation

Follow up by relating the connecting cubes activity to the picture of the keys on CWB p. 13. Students will become more proficient at constructing number stories as by this stage, they should be able to identify the parts and whole of a picture. The picture shows the two parts clearly: the keys that are on the keychain and the loose keys.

- Refer students to the picture of the keys on CWB p. 13. Have them state the number of keys and write the first sentence of the number story on the board as shown on the page. Relate it back to the rod of 6 cubes. Students should know that the 6 keys represent the whole.
- Next, guide students to identify the two parts that form the whole. Students should be able to see that the two parts are the 4 keys that are on the keychain and the 2 loose keys. Write this part of the number story on the

board as shown on the page. Relate it back to breaking the 6 cubes into two parts, 4 and 2.

- Direct students to the completed number story on the board.

Stage: Abstract Representation

Lastly, present the number bond to show the breaking of a number into two parts. Having gone through the previous stages, students will be able to identify the parts and whole of a number bond. Having explored the different possibilities of making 6 during the connecting cubes activity, students will also be able to identify other ways of making 6.

- Draw an empty number bond frame on the board. Guide a student to label the number bond frame with 'whole' and 'part'. Then, have the student write the whole '6' in the circle labeled 'whole'. Relate it back to the number story on the page. Reiterate that the whole must always be in the circle that is connected to the other two circles.
- Next, guide another student to write the parts based on the number story. Lead the student to identify 4 and 2 as the two parts.
- Point to the completed number bond and reiterate that 4 and 2 make 6.
- Explain to students that the two parts of a number bond can be swapped with each other to get the same whole.
- Have students write other number bonds for 6. Guide students to write other number bonds for 6 by first getting them to tell other number stories with 6 as the whole. Write some helping words on the board to guide students.

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From PR1ME Mathematics Interactive Edition:

Let's Do (CB p. 25)

Assign the tasks to students as classwork for formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

Exercise 1 (PB p. 15)

Assign the tasks to students as classwork for further formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

From PR1ME Mathematics Coursework Book:

Coursework Book Practice 1 (CWB pp. 13–14)

Assign all tasks to students as homework. Use the following notes to identify the skills needed for each task and address remediation needs.

Practice 1 (CWB pp. 13–14)

Class practice (For Print-based Program):

Task 1 requires students to write a number bond for 5. Pictorial guidance is provided for them and they are prompted to count the number of objects in each set to find the parts.

Remediation

Task 1(a): Reteach breaking a set of 5 objects into two parts using a number bond. Then, go through Task 1(a). Have students use a number story to help them complete the number bond. First, guide them to see the number of balls and point out that they represent the whole. Then highlight to them that the footballs are one part, and the basketball is the other part. Have them see that they should complete the number bond with 4 and 1 respectively.

Task 1(b): Reteach breaking a set of 6 objects into two parts using a number bond. Then, go through Task 1(b). Have students use a number story to help them complete the number bond. First, guide them to see the number of birds and point out that they represent the whole. Then highlight to them that the canaries are one part, and the parrots are the other part. Have them see that they should complete the number bond with 3 and 3 respectively.

Teaching tips

Task 1

- When reteaching, follow the same procedure as the example in Learn (CWB pp. 12–13). Use connecting cubes to introduce the concept of breaking a whole into two parts. Then, continue illustrating the process using a number bond.
- Highlight that the whole must always be in the circle that is connected to the other two circles.

Independent practice (For Print-based Program):

Task 2 requires students to match pairs of numbers that make 5. This helps students to commit the different number bonds for 5 to memory. Highlight to students that when a whole is broken into 0 and another part, the other part will be the whole.

Task 3 requires students to match pairs of numbers that make 6. This helps students to commit the different number bonds for 6 to memory.

For answers, go to CW Manual p. 118.

❖ Blended Learning Program ❖

From PRIME Mathematics Interactive Edition:

Let's Learn (CB p. 26)

Go through the teaching example with students for concept development. Use the detailed lesson plan given in the corresponding lesson notes to carry out the teaching.

Learn

Making 7 (CWB p. 15)

Learning Outcomes:

- Make a number story to illustrate a number bond for 7
- Break a set of 7 objects into two parts in different ways
- Write a number bond for 7

Materials:

- Connecting cubes

Stage: Concrete Experience

Follow the same teaching procedure as the example on CWB p. 12. Begin by using connecting cubes to demonstrate the breaking of 7 into two parts. Besides bridging the concrete and pictorial stage, this also allows students to explore different ways of making 7.

- Distribute a rod of 7 connecting cubes to students and have them follow each step of your demonstration.
- Have students state the number of connecting cubes. They should be able to tell that there are 7 cubes.
- Then, have students break the rod of 7 cubes into 2 smaller rods (4 cubes and 3 cubes). Highlight to them that 7 is made of 4 and 3.
- Have students combine the connecting cubes again to form a rod of 7 cubes. Ask them to break the rod in other ways. Have some students show that it can also be broken into 6 cubes and 1 cube, or 5 cubes and 2 cubes respectively.

Stage: Pictorial Representation

Follow up by relating the connecting cubes activity to the picture of the flowers on CWB p. 15. This helps students to transit from concrete experience to pictorial representation.

- Refer students to the picture of the flowers on CWB p. 15. Have them state the number of flowers and write the first sentence of the number story on the board as shown on the page. Relate it back to the rod of 7 cubes. Students should know that the 7 flowers represent the whole.
- Next, have students identify the two parts that form the whole. Students should be able to see that the two parts are the 4 pink flowers and the 3 yellow flowers. Write this part of the number story on the board as shown on the page. Relate it back to breaking the 7 cubes into two parts, 4 and 3.
- Direct students to the completed number story on the board.

Stage: Abstract Representation

Lastly, present the number bond to show the breaking of a number into two parts. Having gone through the previous stages, students will be able to identify the parts and whole of a number bond. Having explored

the different possibilities of making 7 during the connecting cubes activity, students will also be able to identify other ways of making 7.

- Guide a student to draw a number bond frame labeled with 'whole' and 'part' on the board. Then, have the student write the whole '7' in the circle labeled 'whole'.
- Relate it back to the number story on the page. Reiterate that the whole must always be in the circle that is connected to the other two circles.
- Next, get another student to write the parts based on the number story. The student should be able to identify 4 and 3 as the two parts.
- Conclude that 4 and 3 make 7.
- Have students write other number stories with 7 as the whole and draw the corresponding number bonds for their stories. Write some helping words on the board to guide students. Have students present their number stories and the corresponding number bonds.

❖ Blended Learning Program ❖

From PRIME Mathematics Interactive Edition:

Let's Do (CB p. 26)

Assign the tasks to students as classwork for formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

Exercise 2 (PB p. 16)

Assign the tasks to students as classwork for further formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

From PRIME Mathematics Coursework Book:

Coursework Book Practice 2 (CWB pp. 15–16)

Assign all tasks to students as homework. Use the following notes to identify the skills needed for each task and address remediation needs.

Practice 2 (CWB pp. 15–16)

Class practice (For Print-based Program):

Task 1 requires students to write number bonds for 7. Pictorial guidance is provided for them.

Remediation

Task 1(a): Reteach breaking a set of 7 objects into two parts using a number bond. Then, go through Task 1(a). Point out that the 7 airplanes represent the whole. Guide students to identify the blue airplanes and yellow airplanes as the two parts that make up the whole. Have them see that they should complete the number bond with 2 and 5.

Task 1(b): Reteach breaking a set of 7 objects into two parts using a number bond. Then, go through Task 1(b). Point out that the 7 flowers represent the whole. Guide students to identify the white flowers and red flowers as the two parts that make up the whole. Have them see that they should complete the number bond with 1 and 6.

Teaching tips

Task 1

- When reteaching, follow the same procedure as the example in Learn (CWB p. 15). Use connecting cubes to introduce the concept of breaking a set of objects into two parts. Then, continue illustrating the process using a number bond.

Independent practice (For Print-based Program):

Task 2 requires students to match pairs of numbers that make 7. This helps students to commit the different number bonds for 7 to memory.

For answers, go to CW Manual p. 118.

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From PRIME Mathematics Interactive Edition:

Let's Learn (CB p. 27)

Go through the teaching example with students for concept development. Use the detailed lesson plan given in the corresponding lesson notes to carry out the teaching.

Learn

Making 8 (CWB p. 16)

Learning Outcomes:

- Make a number story to illustrate a number bond for 8
- Break a set of 8 objects into two parts in different ways
- Write a number bond for 8

Materials:

- Connecting cubes

Stage: Concrete Experience

Follow the same teaching procedure as the example on CWB p. 12. Begin by using connecting cubes to demonstrate the breaking of 8 into two parts. Besides bridging the concrete and pictorial stage, this also allows students to explore different ways of making 8.

- Distribute a rod of 8 connecting cubes to students and have them follow each step of your demonstration.
- Have students count the number of connecting cubes. They should be able to tell that there are 8 cubes.

- Then, have students break the rod of 8 cubes into 2 smaller rods (6 cubes and 2 cubes). Highlight to them that 8 is made of 6 and 2.
- Have students combine the connecting cubes again to form a rod of 8 cubes. Ask them to break the rod in other ways. Have some students to show that it can also be broken into 7 cubes and 1 cube, 5 cubes and 3 cubes, or 2 rods of 4 cubes each respectively.

Stage: Pictorial Representation

Follow up by relating the connecting cubes activity to the picture of the airplanes on CWB p. 16. This helps students to transit from concrete experience to pictorial representation.

- Refer students to the picture of the airplanes on CWB p. 16. Have them state the number of airplanes and write the first sentence of the number story on the board as shown on the page. Relate it back to the rod of 8 cubes. Students should know that the 8 airplanes represent the whole.
- Next, have students identify the two parts that form the whole. Students should be able to see that the two parts are the 6 airplanes on the ground and the 2 airplanes that are flying. Write this part of the number story on the board as shown on the page. Relate it back to breaking the 8 cubes into two parts, 6 and 2.
- Direct students to the completed number story on the board.

Stage: Abstract Representation

Lastly, present the number bond to show the breaking of a number into two parts. Having gone through the previous stages, students will be able to identify the parts and whole of a number bond. Having explored the different possibilities of making 8 during the connecting cubes activity, students will also be able to identify other ways of making 8.

- Guide a student to draw a number bond frame labeled with 'whole' and 'part' on the board. Then, have the student write the whole in the correct circle. The student should know that 8 is the whole.
- Next, get another student to write the two parts of the whole based on the number story that was constructed earlier on. The student should be able to tell that the two parts are 6 and 2.
- Reiterate that 6 and 2 make 8.
- Have students write other number stories with 8 as the whole and draw the corresponding number bonds for their stories. Write some helping words on the board to guide students. Have students present their number stories and the corresponding number bonds.

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From PRIME Mathematics Interactive Edition:

Let's Do (CB p. 27)

Assign the tasks to students as classwork for formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

Exercise 3 (PB p. 17)

Assign the tasks to students as classwork for further formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

From PRIME Mathematics Coursework Book:

Coursework Book Practice 3 (CWB p. 17)

Assign all tasks to students as homework. Use the following notes to identify the skills needed for each task and address remediation needs.

Practice 3 (CWB p. 17)

Class practice (For Print-based Program):

Task 1 requires students to write number bonds for 8. Pictorial guidance is provided for them.

Remediation

Task 1(a): Reteach breaking a set of 8 objects into two parts using a number bond. Then, go through Task 1(a). Point out that the 8 oranges represent the whole. Lead students to identify the two plates as the two parts that make up the whole. Have them see that they should complete the number bond with 4 and 4.

Task 1(b): Reteach breaking a set of 8 objects into two parts using a number bond. Then, go through Task 1(b). Point out that the 8 pencils represent the whole. Lead students to identify the yellow pencils and red pencils as the two parts that make up the whole. Have them see that they should complete the number bond with 5 and 3.

Teaching tips

Task 1

- When reteaching, follow the same procedure as the example in Learn (CWB p. 16). Use connecting cubes to introduce the concept of breaking a set of objects into two parts. Then, continue illustrating the process using a number bond.

Independent practice (For Print-based Program):

Task 2 requires students to match pairs of numbers that make 8. This helps students to commit the different number bonds for 8 to memory.

For answers, go to CW Manual p. 118.

❖ Blended Learning Program ❖

From PRIME Mathematics Interactive Edition:

Let's Learn (CB p. 28)

Go through the teaching example with students for concept development. Use the detailed lesson plan given in the corresponding lesson notes to carry out the teaching.

Learn

Making 9 (CWB p. 18)

Learning Outcomes:

- Make a number story to illustrate a number bond for 9
- Break a set of 9 objects into two parts in different ways
- Write a number bond for 9

Materials:

- Connecting cubes

Stage: Concrete Experience

Follow the same teaching procedure as the example on CWB p. 12. Begin by using connecting cubes to demonstrate the breaking of 9 into two parts. Besides bridging the concrete and pictorial stage, this also allows students to explore different ways of making 9.

- Distribute a rod of 9 connecting cubes to students and have them follow each step of your demonstration.
- Have students count the number of connecting cubes. They should be able to tell that there are 9 cubes.
- Then, have students break the rod of 9 cubes into 2 smaller rods (4 cubes and 5 cubes). Highlight to them that 9 is made of 4 and 5.
- Have students combine the connecting cubes again to form a rod of 9 cubes. Ask them to break the rod in other ways. Have some students to show that it can also be broken into 8 cubes and 1 cube, 7 cubes and 2 cubes, or 6 cubes and 3 cubes respectively.

Stage: Pictorial Representation

Follow up by relating the connecting cubes activity to the picture of the chickens on CWB p. 18. This helps students to transit from concrete experience to pictorial representation.

- Refer students to the picture of the chickens on CWB p. 18. Have them state the number of birds and write the first sentence of the number story on the board as shown on the page. Relate it back to the rod of 9 cubes. Students should know that the 9 birds represent the whole.
- Next, have students identify the two parts that form the whole. Students should be able to see that the two parts are the 4 hens and 5 chicks respectively. Write this part of the number story on the board as shown on the page. Relate it

back to breaking the 9 cubes into two parts, 4 and 5.

- Direct students to the completed number story on the board.

Stage: Abstract Representation

Lastly, present the number bond to show the breaking of a number into two parts. Having gone through the previous stages, students will be able to identify the parts and whole of a number bond. Having explored the different possibilities of making 9 during the connecting cubes activity, students will also be able to identify other ways of making 9.

- Get a student to draw a number bond frame labeled with 'whole' and 'part' on the board. Then, have the student write the whole in the correct circle based on the number story constructed earlier on. The student should be able to identify 9 as the whole.
- Next, get another student to fill in the two parts of the number bond. The student should be able to tell that 4 and 5 are the two parts.
- Reiterate that 4 and 5 make 9.
- Have students find other ways to make 9. Also, get students to write other number stories with 9 as the whole and draw the corresponding number bonds for their stories. Write some helping words on the board to guide students. Have some students present their number stories and the corresponding number bonds.

❖ Blended Learning Program ❖

From PRIME Mathematics Interactive Edition:

Let's Do (CB p. 28)

Assign the tasks to students as classwork for formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

Exercise 4 (PB p. 18)

Assign the tasks to students as classwork for further formative assessment. Use the corresponding lesson notes to identify the objectives of each task and address remediation needs.

From PRIME Mathematics Coursework Book:

Coursework Book Practice 4 (CWB pp. 18–19)

Assign all tasks to students as homework. Use the following notes to identify the skills needed for each task and address remediation needs.

Practice 4 (CWB pp. 18–19)

Class practice (For Print-based Program):

Task 1 requires students to break a set of 9 objects into two parts in different ways, and then write the corresponding number bond.