Topic A

Compositions and Decompositions of 2, 3, 4, and 5

K.OA.1, K.OA.3, K.OA.5

Focus Standard:

K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. (Drawings need not show details, but should show the mathematics in the problem.)

K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).

K.OA.5 Fluently add and subtract within 5.

Instructional Days: 6

Coherence -Links from: GPK–M5 Numerals to 5, Addition and Subtraction Stories, Counting to 20

-Links to: G1–M1 Sums and Differences to 10

In Module 1, students found embedded numbers and experienced decomposition by finding hidden partners. Topic A formally teaches composition and decomposition using number bonds as students explore the relationships between numbers to set the foundation for addition and subtraction.

In the first two lessons, students play with composition (3 and 2 make 5) by talking about the number of birds, fingers, and cubes together and decomposition (5 is 3 and 2) by finding embedded numbers in a group. They learn to record the relationships between quantities by drawing pictures in the number bond model.

In Lesson 3, students explore composing number pairs and record their findings using drawings and numerals in the number bond model.

Lesson 4 then has students consider decomposition as a whole separated into number pairs and record their findings using drawings and numerals in the number bond model.
Lesson 5 allows students to use the number bond model as a tool to help them model composition and decomposition. The end goal of this topic is for students to be flexible with the number bond model oriented in various ways and be able to understand the part–part–whole components. By the end of the module, they will understand the number bond’s relationship to the accompanying expression or equation.

Lesson 5: 5 = ____ + ____  
3 + 2 = ____  
2 + 3 = ____  
5 − 3 = ____

The final lesson of the topic gives students opportunities to move from abstract to concrete by acting out and creating stories based on a given number bond. Throughout Topic A, a fluid movement between composition and decomposition provides a firm foundation for understanding the relationship between addition and subtraction.

### A Teaching Sequence Towards Mastery of Compositions and Decompositions of 2, 3, 4, and 5

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<th>Objective</th>
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| 1.        | Model composition and decomposition of numbers to 5 using actions, objects, and drawings.  
            (Lesson 1) |
| 2.        | Model composition and decomposition of numbers to 5 using fingers and linking cube sticks.  
            (Lesson 2) |
| 3.        | Represent composition story situations with drawings using numeric number bonds.  
            (Lesson 3) |
| 4.        | Represent decomposition story situations with drawings using numeric number bonds.  
            (Lesson 4) |
| 5.        | Represent composition and decomposition of numbers to 5 using pictorial and numeric number bonds.  
            (Lesson 5) |
| 6.        | Represent number bonds with composition and decomposition story situations.  
            (Lesson 6) |
Lesson 1

Objective: Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (5 minutes)
- Concept Development (25 minutes)
- Student Debrief (8 minutes)
- Total Time (50 minutes)

Fluency Practice (12 minutes)

- 5-Frames: Counting Dots and Spaces K.OA.5 (3 minutes)
- Making 3, 4, and 5 Finger Combinations K.OA.3 (4 minutes)
- Make 5 Matching Game K.OA.5 (5 minutes)

Note: The following fluency activities review hidden partners of 3–5. This will help students recall familiar relationships between numbers 1–5, preparing them to explore those relationships using the number bond model.

5-Frames: Counting Dots and Spaces (3 minutes)

Materials: (T) Large 5-frame cards (Fluency Template A)

T: Raise your hand when you have counted the dots, then wait for the snap to say the number. How many dots? (Show 4 dot card. Wait until all hands are raised, and then give the signal.)

S: 4.

T: How many empty spaces? (Wait until all hands are raised, and then give the signal.)

S: 1.

Continue to show cards, exploring all of the decompositions of 5.

Making 3, 4, and 5 Finger Combinations (4 minutes)

T: I’ll show you some fingers. I want to make 3. Show me what is needed to make 3. (Show 2 fingers.)
Lesson 1

Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

Date: 11/12/13

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A NOTE ON MULTIPLE MEANS OF ENGAGEMENT:

For students with processing or memory issues, place cards face up to play the game. Students can match partners of 5 without the added memory requirement.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Scaffold the Application Problem for your below level students by giving them linking cubes to use in solving the problem. Once students are comfortable solving problems with manipulatives, you can transition them to the pictorial strategy of drawing a representation of the problem.

S: (Show 1 finger.)
T: Raise your hand when you can say the number sentence. Start with my number.
S: 2 and 1 make 3.

Continue with number pairs for 3, 4, and 5. Once students understand the game, let them play with a partner, rapidly and energetically.

Make 5 Matching Game (5 minutes)

Materials: (S) Fluency Template B cards with quantities of 0, 1, 2, 3, 4, 5 (use only dots, dice, and fingers) per pair

1. Shuffle and place the cards face down in two equal rows.
2. Partner A turns over two cards.
3. If the total of the numbers on both cards is 5, then she collects both cards. If not, then Partner A turns them back over in their original place facedown.
4. Repeat for Partner B.

Variation: Provide each partner with a stick of 5 cubes to help them determine the missing part. For example, a student turns over 4, then breaks off 4 cubes, revealing 1 as the missing part, that way he knows to look for the card with the number 1.

Application Problem (5 minutes)

Julia went to the beach and found 3 seashells. Her sister Megan found 2 seashells. Draw the seashells the girls found. How many did they find in all?

Talk to your partner about how you know!

Note: This problem anticipates the composition of numbers to 5 in today’s lesson.

Concept Development (25 minutes)

Materials: (T) 3 hula hoops, colorful masking tape, template graphic of birds  (S) Number bond template and 5 cubes

Before the lesson begins, prepare a large number bond template on the classroom floor using hula hoops and tape, and place the template graphic of birds on the board.

T: We are going to play a game today! Student A, please come and stand in this hula hoop. (Direct the student to stand in one part of the “number bond.”) Students B and C, please come stand in this
Lesson 1

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Lesson 1

Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

Date: 11/12/13

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A NOTE ON MULTIPLE MEANS OF REPRESENTATION:

After you have introduced number bonds to the class, create a visual of a number bond and put it on your math word wall. Be sure that your visual shows number bonds in all orientations. The visual will help your English language learners remember what the term means and enable them to use it in partner talks.

T: Let’s pretend the students are all going to a party. Please walk along the tape paths to get to the party. Don’t fall off the path! What do you notice now?
S: Now all three of them are in one hoop!
T: So we started with one student in one hoop and two in the other. Now we have all three students in one hoop! Let me put that in my picture. (Complete the pictorial number bond on the board.) 1 student and 2 students together makes...
S: 3 students!

Repeat game three times with other students and combinations for 3, 4 and 5, recording the results in the pictorial number bond on the board each time.

T: Look at the picture of the birds on the board. What do you notice?
S: I see some geese. There are chickens, too.
T: How many birds are there?
S: 5.
T: How many geese? (3) How many hens? (2) So we have five birds. There are 3 geese and 2 hens. Repeat after me: 3 and 2 make 5. (Write the number sentence on the board.)
S: 3 and 2 make 5.
T: I can show that in a hoop picture like we did before! We call this sort of picture a number bond. It takes a long time to draw ducks and hens, so I will just draw squares instead.

T: In my picture, I have 3 pretend geese and 2 pretend hens. I have 5 pretend birds in all. Look at my picture to see how this is like what we did with our students in the hoops. (Demonstrate and guide students to see that 3 and 2 make 5 in the number bond.)

T: In both stories two groups were put together. One is about students going to a party, and one is about geese and chickens, but the number bond is the same!

T: Turn and talk to your partner. Partner A, tell a put together story about apples and bananas that...
matches the same number bond. (Wait for Partner A to share.) Now, Partner B, tell a put together story about monkeys and lizards to match the number bond.

Listen as the students share their composition stories with each other, and give new ideas if they need more practice.

T: Great job putting bananas and apples together, putting the monkeys and lizards together. Now let’s start with all the birds and put them into two groups. Look at the picture of the 5 birds. What would you tell me?

S: There are two different kinds of birds. There are 5 birds in the picture, 3 are geese and 2 are hens!

T: Yes, I could take my 5 birds and show that we have 3 geese and 2 hens. The number bond shows that, too, but I am going to switch it around! (Demonstrate with the bond on the board, this time putting the total on the top.)

T: Let’s tell take apart stories to match the number bond, too. Turn and talk to your partner. Partner A, tell a take apart story about 5 animals in two groups: snakes and turtles. (Wait for Partner A to share.) Partner B, tell a take apart story about 5 balls in two groups: basketballs and tennis balls.

T: We’re going to practice this some more in our Problem Set. You will get a chance to draw some put together and take apart number bond pictures yourself.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes.

Student Debrief (8 minutes)

Lesson Objective: Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.
You may choose to use any combination of the questions below to lead the discussion.

- What new type of drawing did we use today? (Number bond.)
- In the Problem Set, which story was about putting together and which story was about taking apart?
- Did you notice that the number bond was different for the butterflies and cats? Why do you think I drew the number bond differently?
- Look at the butterflies on your Problem Set. Why did we draw all the butterflies in the bottom circle?
- We drew circles in the last number bond on our Problem Set. What do the three circles represent?
- What do the two circles you drew represent? How does drawing little circles instead of cats help us in math?
- What happened when we played the games with the hula hoops?
- How did you know what we should write in each of the hoops in our number bonds?
- Did our number bond look different when we worked backwards, starting with the whole group of birds?
Draw the light butterflies in the number bond. Then draw the dark butterflies. Show what happens when you put the butterflies together.
Lesson 1
Problem Set

Name ________________________________  Date ___________

How many ? □  How many ? □

Draw to show how to take apart the group of cats to show 2 groups, the ones sleeping and the ones awake.

OOOOO

EngageNY

Lesson 1:  Model composition and decomposition of numbers to 5 using actions, objects, and drawings.
Date:  11/12/13

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Draw the blue fish in the first circle on top. Draw the orange fish in the next circle on top. Draw all the fish in the bottom circle.

Draw a square for each fish in the top circle. Draw a square for each goldfish in the bottom circle. In the last circle on the bottom, draw a cube for each spiny fish.

Name ___________________________ Date ________
Lesson 1: Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

Date: 11/12/13
Lesson 1:
Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

Date: 11/12/13

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Lesson 1:
Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

Date: 11/12/13
Cut along lines to create cards. Print on cardstock or laminate for repeated use.

Lesson 1 Fluency Template B

Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

Date: 11/12/13

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Lesson 1: Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

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Lesson 1:
Model composition and decomposition of numbers to 5 using actions, objects, and drawings.

Date: 11/12/13
Lesson 2

Objective: Model composition and decomposition of numbers to 5 using fingers and linking cube sticks.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (5 minutes)
- Concept Development (25 minutes)
- Student Debrief (8 minutes)

Total Time (50 minutes)

Fluency Practice (12 minutes)

- Draw Lines to Make a Bond of 3  \( \text{K.OA.1} \) (4 minutes)
- Hidden Numbers \( \text{K.OA.3} \) (4 minutes)
- Say Ten Push-Ups \( \text{K.NBT.1} \) (4 minutes)

Draw Lines to Make a Bond of 3 (4 minutes)

Materials: (S) 3 beans, Fluency Template A inserted into personal white board per student

Note: This fluency activity reinforces the part–total relationship represented by the number bond. It helps students understand that the lines of the number bond should connect the two parts with the total and that the orientation of the parts and total do not affect the numerical relationship.

T: Take out 3 beans. Point to the first number bond. Put 2 beans on top of the 2 dots and 1 bean on top of the 1 dot.
S: (Place beans on top of the number bond.)

T: Our job is to make 3. Slide your beans along the lines to make 3.
S: (Move the beans to the 3 dots on the number bond.)
T: Now slide your beans back to take apart 3.
S: (Move the beans to the 2 and 1 dots.)
T: Let’s slide the beans again, and this time, tell how to make 3, like this 2 and 1 make 3.
S: 2 and 1 make 3 (move the beans to the 3 dots).
Lesson 2: Model composition and decomposition of numbers to 5 using fingers and linking cube sticks.

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Lesson 2

T: Take them apart again.
S: (Move the beans to the 2 and 1 dots.)
T: This time we’ll flip it: 1 and 2 make 3.
S: 1 and 2 make 3 (move the beans to the 3 dots).
T: Great. Now leave your beans there. Draw (or trace) the lines to show how to make 3.

Continue guiding students through the process as necessary, and then allow them to complete the remainder of the template independently. Circulate to ensure that they are saying the compositions aloud.

As a variation, have students state the decomposition (i.e., 3 is 2 and 1, 3 is 1 and 2).

Hidden Numbers (5 as the Whole) (4 minutes)

Materials: (S) Fluency Template B inserted into personal white boards

Note: Finding embedded numbers anticipates the work of this module by developing part–whole thinking.

T: Touch and count the fish on your mat. Raise your hand when you know how many (wait for all hands to go up, and then give the signal). Ready?
S: 10.
T: 10 what?
S: 10 fish!
T: Put X’s on 5 of the fish. Pretend they swam away!
S: (Cross out 5 fish.)
T: How many fish are left?
S: 5 fish.
T: Circle a group of 4 of the fish who didn’t swim away. Pretend they swam away, too.
T: How many fish are left now?
S: 1 fish.
T: Let’s circle that 1 fish. How many did you circle all together?
S: 5.

Repeat the process. This time, have 5 fish swim away again but circle 3 fish, then another 2 fish and ask how many are circled. Repeat with other combinations equal to 5. Continue this procedure looking for hidden numbers within groups of 3, 4, and 5. Pause occasionally to allow students to explain efficient ways of locating the groups.

Say Ten Push-Ups (4 minutes)

Note: This activity reviews students’ understanding of numbers to 10 for the work of this module and extends to teen numbers in anticipation of Module 5.

T: We are going to do Say Ten Push-Ups. First, let’s get ready to push up by counting to 10 the Math
Scaffold the directions to the Application Problem for your English language learners by modeling what you want them to do. Slide the pennies together as you give the direction to slide the pennies together.

Way.

S: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. (Students should start counting with 1 on the left pinky and continue to 10 on the right pinky.)

T: Great! Now that we have 10, we can continue counting with ten (push out both hands as if doing a push-up exercise in the air, then pause with closed fists close to body), 1 (push out the left hand, pinky finger). Repeat please.

S: Ten (push out both hands as if doing a push-up exercise in the air, then pause with closed fists close to body), 1 (push out the left hand, pinky finger).

T: Keep going with me. Ten (repeating push-up), 2 (push out the left hand pinky and ring finger).

Continue to 20 (2 ten or 10 and 10).

Application Problem (5 minutes)

Materials: (S) Set of 5 pennies per student

Margaret and Caleb discovered that if they put their money together, they would have the 5 pennies they needed to buy some gum. Yum!

Put 5 pennies in the middle of your desk. Now slide some to one side of your desk to show how much money Margaret might have had. Put the other coins on the other side of the desk to show how much money Caleb might have had.

Check with your friend to see how he showed Margaret and Caleb’s coins. What do you notice?

Slide the coins together again to make sure you have enough for the gum. Now act out the story again. Could you divide the pennies in a different way?

Note: The practice in making different compositions for 5 serves as the anticipatory set for today’s lesson.

Concept Development (25 minutes)

Materials: (T) 3 hula hoops; colorful masking tape (S) Number bond template on cardstock in a sheet protector, linking cube 5-stick

Prepare a large number bond template on the classroom floor using the hula hoops and tape.

T: It’s time for another party game! Students A, B, C, and D, would you please come stand in our hula hoop? (Direct students to stand in the “whole” of the model.) What do you notice?

S: There are four students standing up! Two of the hoops are empty.
→ We have the paths on the floor.

T: The students have had a wonderful time at the party and now it is time to go home. Student A, please take this path to your hoop home. Students B, C, and D, take the other path to your hoop home. Don’t forget—stay on the path! What do you see now?

S: There are 3 in one hoop and 1 in the other! → There are still 4 students.

T: Let’s draw what happened on the board. We had 4 students, but we made our 4 into 3 and 1. (Demonstrate by creating the pictorial number bond on the board. Practice the decomposition and number bond recording several times with groups of 2, 3, 4, and 5 students until students seem confident and familiar with the material.)

T: (Hand out number bond templates in the personal white boards). Let’s play our party game some more using our linking cubes. Put your 5-stick in the place where the paths come together to show the students at the party. (Circulate to ensure accuracy.) Now let’s pretend it is time for the students to go home. Break your 5-stick into two pieces and send each piece home on one of the paths. Put them in your hoops. What do you have now?

S: I have a 1 and a 4 in my hoops! → I have a 2 and a 3. → I have 4 and 1.

T: We can make number bonds to show what you have! Tell me your stories. I will draw how many students were at the party and then what happened when they went home. (Demonstrate several student examples using linking cube sketches in the bonds.)

T: In the first picture, I can see that 5 students is the same as 1 student and 4 students. Could we show this with our fingers? Show me 1 on your left hand and 4 on your right hand. How many fingers are you showing me in all?

S: 5!

T: What do you see in the other number bonds? Could you show me each of these with your fingers, too? (Allow time for discussion.) Let’s practice more of this in our Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes.
Lesson Objective: Model composition and decomposition of numbers to 5 using fingers and linking cube sticks.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- What happened in our number bond when we decided to send the students home from the party?
- Did the whole number of students change when they went home in different groups?
- How did we make our stories into number bonds?
- What did you think about when you were deciding how to break apart your 5-stick?
- How did you show me the number bonds with your fingers?
Color the cube stick to match the rabbits. 4 cubes gray. 1 cube black.
Draw the cubes in the number bond.

Show the parts of the number bond on your fingers. Color the fingers you used.

rabbits and rabbit make rabbits.
Name ______________________________ Date ____________

In each cube stick, color some cubes blue and the rest of the cubes red. Draw the cubes you colored in the number bond. Show the hidden partners on your fingers to an adult. Color the fingers you showed.

[]  []  []  []  []  []

[Hand diagrams]

[Number bond]

Model composition and decomposition of numbers to 5 using fingers and linking cube sticks.

Date: 11/12/13
Lesson 2: Model composition and decomposition of numbers to 5 using fingers and linking cube sticks.

Date: 11/12/13
Lesson 2: Model composition and decomposition of numbers to 5 using fingers and linking cube sticks.

Date: 11/12/13
Lesson 3

Objective: Represent composition story situations with drawings using numeric number bonds.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (5 minutes)
- Concept Development (25 minutes)
- Student Debrief (8 minutes)
- Total Time (50 minutes)

Fluency Practice (12 minutes)

- Sprint: Number Order to 5 K.CC.2 (12 minutes)

Sprint: Number Order to 5 (12 minutes)

Materials: (S) 2 copies of Number Order to 5 Sprint per student

Note: Students grow more comfortable with the Sprint routine while completing a task that involves relatively simple concepts. This will continue to build confidence and enthusiasm for Sprints.

T: It’s time for a Sprint! (Briefly recall previous Sprint preparation activities, and distribute Sprints facedown.) Take out your pencil and one crayon, any color.

T: (Distribute the first set of Sprint papers facedown.) For this Sprint, using your pencil, you are going to fill in the missing number. On your mark, get set, go!

T: (Ring the bell or give another signal for students to stop.) Pencils up!

T: Pencils down, crayons up!

T: It’s time to check answers. What do you do if the answer is right?

S: Circle it. (Circling correct answers instead of crossing out wrong ones avoids stigmatization.)

T: What do you say?

S: Yes.

T: We’ll begin at the top. Ready? 5.

S: Yes!

Continue checking the remaining answers, then have students count how many correct and write the number at the top. Keep the mood celebratory.
Lesson 3

Lesson: Represent composition story situations with drawings using numeric number bonds.

Date: 11/12/13

Materials: (S) Set of 5 linking cubes per student, number bond template in personal white boards

Chris had 3 baseball cards. Use your cubes to show his cards.
Katharine had 2 baseball cards. Show her cards with your cubes. Now, with your cubes, show how many cards they have together.

Make a picture on your personal board to show the story. Can you make a number bond picture about your story? Talk about your work with your partner.

Note: This problem sets the stage for compositions of numbers to 5 in today’s lesson and is the first time students are making a number bond drawing without a template.

A NOTE ON MULTIPLE MEANS OF REPRESENTATION:

Scaffold the Application Problem for your students who are below grade level by modeling your directions step by step, “Let’s show 3 baseball cards. Count with me, 1, 2, 3. Now let’s show Katharine’s 2 baseball cards. 1, 2,” until students are able to work on their own.
Concept Development (25 minutes)

Materials: (S) Number bond template in personal white board

T: Close your eyes and imagine this story. Two squirrels were playing in the park. Two more squirrels came to join them. Now, open your eyes. In one of your hoops, one of the parts, draw squares to show the squirrels that were first playing in the park. (Demonstrate.) In another hoop, the other part, draw squares to show the squirrels that joined them. (Demonstrate.) Where would we draw the squares to show all of the squirrels together? (Allow time for discussion.)

S: In the hoop with two paths! We would draw 4 squares there.

T: Yes, we would draw cubes for all of the squirrels together in the whole (demonstrate). Finish your number bond on your personal board and hold it up.

T: What would happen if we turned our number bond around so that the whole is on the left? Try it. Does it change our story?

S: No. It just looks different. The squirrels are the same. To me, it makes the story start with the 4 squirrels. I saw 4 squirrels. 2 were in the park and 2 more came to play.

T: Sometimes I get so tired of drawing squares! Would it be fair to use a secret shortcut? How many squares are in this part?

S: 2.

T: Can we erase the squares in that part and write a 2 instead? Would that be fair?

S: Yes! You could put a number for the squares! You could use numbers instead of the pictures.

T: Let me replace my squares with numbers. (Demonstrate.) Have I changed anything about the story?

S: No. It just looks different. You just used numbers instead.

T: Count the squares in each of your hoops, erase them, and write the numbers instead. Turn and talk to your partner about the secret shortcut. (Allow time for discussion.)

T: Erase your personal boards. Listen to my next story and draw a picture on your personal board to show what happens.

T: John read 3 picture books one night. Draw his books. (Pause to allow time for drawing.) The next night, he read 2 more picture books. Draw his new books. (Pause to allow time for drawing.) How many books did John read?

T: Hold up your personal board to show me John’s books. (Circulate to ensure accuracy.)
Lesson 3

Lesson Objective: Represent composition story situations with drawings using numeric number bonds.

T: Great! Let’s use our secret shortcut to make a number bond for this story. How many books did John read the first night?
S: 3.
T: Write the number 3 in this part of the number bond. (Demonstrate). How many books did he read the second night?
S: 2.
T: Write the number 2 in this part of the number bond. Now, turn and talk to your partner to find out how many books John read in all. (Allow time for discussion.) How many?
S: 5!
T: Write the number 5 in the whole part of the number bond. We did it! Hold up your personal board! (Circulate to ensure accuracy.)

Use other combinations to create additional number bonds. For example, “What if John had read only 1 book the first night and 4 the second? How would that change our number bond? Could you write the number bonds using only numbers?” Let students practice writing the bonds without demonstrating on the board.

Problem Set (10 minutes)
Students should do their personal best to complete the Problem Set within the allotted 10 minutes.

Student Debrief (8 minutes)

Lesson Objective: Represent decomposition story situations with drawings using numeric number bonds.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- What is a part? What is the whole? How do they work together?
- Does it matter if we use pictures or numbers to show a story? Does it matter if we use pictures or numbers in our number bond? Why or why not?
- Look at the smiley faces on your Problem Set. Did your neighbor put the yellow (gray) faces and the white faces in the same parts as you did? Does it matter where we draw the smiley faces that are in the parts?
- What is the fastest way to tell about the triangles and squares in a number bond? Drawing the shapes or writing the numbers?
- Does it make a difference where I write the numbers in the number bond?
Fill in the missing number.

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Lesson 3: Represent composition story situations with drawings using numeric number bonds.

Name ___________________________ Date ______________

Draw and write the numbers to complete the number bonds.

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Write numbers to complete the number bond. Put the dogs in one part and the balls in the other part.

Look at the picture. Tell a story about the birds going home to your neighbor. Draw a number bond and write numbers that match your story.
Fill in the number bond to match the domino.

Fill in the domino with dots and fill in the number bond to match.
Lesson 4

Objective: Represent decomposition story situations with drawings using numeric number bonds.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (5 minutes)
- Concept Development (25 minutes)
- Student Debrief (8 minutes)
- Total Time (50 minutes)

Fluency Practice (12 minutes)

- Comparing Towers K.MD.2 (5 minutes)
- Show Me Part or Whole K.OA.1 (3 minutes)
- Draw Lines to Make a Bond of 4 K.OA.1 (4 minutes)

Comparing Towers (5 minutes)

Materials: (S) Dice and 12 linking cubes per pair

Note: This fluency activity again relates length with number. It also encourages students to explore how many more cubes are needed to make the towers the same length and number.

Each partner rolls a die and creates a tower using the number shown on the die. Students compare towers and make a less than, more than, or same as statement. Then the students must add cubes to the shorter tower so it is the same height as the longer tower. Consider providing cubes of different colors so that students can easily count how many more cubes they added to make the towers the same length.

Show Me Part or Whole (3 minutes)

Materials: (T) Familiar objects that exemplify the part–whole relationship such as a whole apple and an apple slice or a whole banana and a banana peel

T: Show me the sign for whole. (Model two hands clasped together).
S: (Hold two hands clasped together.)
T: Let’s use our math muscles and take it apart (exaggerate with facial expression, as if straining to pull the two hands apart).
S: (Pull two hands apart.)
T: Show me whole.
S: (Hold two hands clasped together.)
T: Show me parts.
S: (Pull two hands apart.)
T: Whole, part, whole, part, part, part, whole, whole, part....
S: (Show hand gestures as indicated.)
T: Now, I'll show you some objects, and I want you to decide if it's the whole thing (reinforce with hand gestures), or just part of something (emphasize with gesture). (Hold up an apple slice.) Is this the whole apple, or part of the apple? Think (pause). Now show me.
S: (Hold hands apart, as before.)
T: Now tell me. Is it whole (gesture) or part (gesture)?
S: Part!
T: Very good. Look at what I have now (show a whole apple). Whole or part? Think (pause). Now show me.
S: (Hands clasped together to indicate whole.)
T: Raise your hand when you know the math word. (Wait for all hands to go up, then signal.)
S: Whole!

Repeat with a few more objects, being careful to avoid a predictable pattern. Increase the pace, and reduce scaffolding as students demonstrate mastery.

Note: This activity prepares students for today's lesson by linking mathematical vocabulary to kinesthetic movement, and seeing the part-whole relationship in familiar objects.

**Draw Lines to Make a Bond of 4 (4 minutes)**

Materials: (S) 4 beans, fluency template inserted into personal white board per student

Note: This fluency activity reinforces the part–total relationship represented by the number bond. It helps students understand that the lines of the number bond should connect the two parts with the total and that the orientation of the parts and total do not affect the numerical relationship.

Conduct activity as outlined in GK–M4–Lesson 2. As a variation, have students write the numerals into the parts and wholes (on top of the dots) and then state the decomposition (e.g., 4 is 2 and 2).
Lesson 4

**Application Problem (5 minutes)**

Materials: (S) Small piece of clay, paper, and pencil

Anthony had 5 bananas. Make the 5 bananas with your clay.

He wanted to share the bananas with one of his friends. Draw two plates on your paper. Put the bananas on the plates to show one way he could share the bananas with his friend. Draw a number bond to show how he shared his 5 bananas.

Turn and talk with your partner. Did she do it the same way? How many different ways can you find to share the bananas? What if there were only 4 bananas?

Note: The Application Problem will encourage the students to explore different configurations of 5 in preparation for today’s lesson on decomposition.

**Concept Development (25 minutes)**

Materials: (S) Number bond template from prior lessons, two linking cube 5-sticks (all of the same color) per student

Ensure that student templates are oriented with the whole on the top and the parts on the bottom.

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**NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

Chunk the Application Problem into small pieces for students with disabilities. Give a direction, and then watch as the students carry it out before moving on with the next one. For example, “Make 5 bananas with your clay. (Pause.) Draw two plates on your paper. (Pause.) Put the bananas on the plates to show one way to share the bananas.”

**A NOTE ON MULTIPLE MEANS OF ACTION AND EXPRESSION:**

Using cubes of one color to represent the apples pushes students to think abstractly about the problem. If it is necessary to start with different color cubes to support a student who is struggling with decomposition, do so, but repeat the problem with cubes of one color to help the student move toward more abstract thinking.

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T: Let’s pretend today! Pretend that you have 5 apples. Show me with your cubes how the group of 5 apples would look on your mat.

T: I’m going to draw the linking cubes into this number bond on the board, just like you put them in your whole.

T: Now pretend that 3 of your apples are red and 2 are green. Show with your other set of cubes how that would look on your mat.

T: Good! I’ll draw those cubes in the number bond, too. Look carefully at your groups of cubes. Let’s show how they would look in the number bond if we used numbers instead. Take your cubes off and write the numbers with your marker as we have done before. Who would like to tell me how to fill in our numbers?

S: The 5 is in this circle, in the whole. \( \rightarrow \) I put the 2 in this part and the 3 in the other part.

T: Great job! You separated the 5 cubes as a set of 2 cubes and a set of 3 cubes. 5 is the same as 2 and 3 together. Did anyone do it a different way? (Allow time for discussion.)
Lesson 4: Represent decomposition story situations with drawings using numeric number bonds

Date: 11/12/13

Lesson Objective: Represent decomposition story situations with drawings using numeric number bonds.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.
You may choose to use any combination of the questions below to lead the discussion.

- Share with your neighbor the number bond you drew on your Problem Set. How are they the same? How are they different?
- Yesterday, we started with the parts and found the whole. When we started with the parts, could we figure out what the whole had to be?
- Today we started with the whole and found the parts. When we start with the whole can we figure out what the parts have to be, or do we need to be told more of the story? If we just know the whole, can we still figure out what the parts in our story might be?
- When we start with the whole, it makes sense to me to put the whole on top so it’s as if the parts are falling down. When we start with the parts, I like to put them on top. Then it’s as if they are falling down and landing in the same spot. It doesn’t have to be like that but do you understand my thinking? Can you explain my thinking to your partner? (It is also valid to think of the story progressing from left to right. Explaining this orientation supports the pattern of reading text from left to right.)
- When you drew your bananas in the number bond, did your number bond look exactly like your partner’s? How were they different? (Focus in on orientation of the number bond.) Does it really matter where we put the parts and the whole?
- How do we know where to write each number in a number bond?
Draw lines to make a bond of 4.

Represent decomposition story situations with drawings using numeric number bonds.

11/12/13
Lesson 4: Represent decomposition story situations with drawings using numeric number bonds.

Date: 11/12/13

Draw and write the numbers to complete the number bonds.

Name _______________________________ Date ________________

[Diagram of number bonds and drawings]

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Look at the picture. Tell your neighbor a story about the dogs moving and sitting. Draw a number bond and write numbers that match your story.
Lesson 4 Homework

Finish the number bonds. Finish the sentence.

3 is □ and □ 2 1

□ is □ and □

Tell an adult a story about the animals and then make a number sentence and number bond about it.

□ is □ and □
Lesson 5

Objective: Represent composition and decomposition of numbers to 5 using pictorial and numeric number bonds.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (5 minutes)
- Concept Development (25 minutes)
- Student Debrief (8 minutes)

Total Time: (50 minutes)

Fluency Practice (12 minutes)

- Counting the Say Ten Way with the Rekenrek \( \text{K.NBT.1} \) (4 minutes)
- Draw Lines to Make a Bond of 5 \( \text{K.OA.1} \) (4 minutes)
- Making 4 with Squares and Beans \( \text{K.OA.3} \) (4 minutes)

Counting the Say Ten Way with the Rekenrek (4 minutes)

Materials: (T) 20-bead Rekenrek

Note: This activity is an extension of students’ previous work with the Rekenrek, and anticipates working with teen numbers.

T: We can count with the Rekenrek the same way we do our Say Ten push-ups. (Keep the screen on the right side of the Rekenrek to cover beads that are not being counted. Slide over all of the beads on the top row.) How many do you see?

S: 10.

T: Here’s 1 more (slide over 1 bead on the bottom row). How many do you see?

S: Ten 1.

T: (Slide 1 more bead over on the bottom row.) How many do you see?

S: Ten 2.

T: (Slide 1 more bead over on the bottom row.) How many do you see?

S: Ten 3.

Continue counting forward and backward. Here is a suggested sequence: ten 1, ten 2, ten 3, ten 2, ten 3, ten 4, ten 5, ten 4, ten 3, ten 4, ten 3, ten 2, ten 1, etc.
Draw Lines to Make a Bond of 5  (4 minutes)

Materials: (S) 5 beans, fluency template inserted into personal white board per student

Note: This fluency activity reinforces the part–total relationship represented by the number bond. It helps students understand that the lines of the number bond should connect the two parts with the total and that the orientation of the parts and total do not affect the numerical relationship.

Conduct activity as outlined in GK–M4–Lesson 2. Have students add numerals to the first two bonds if needed to help them move from pictorial to abstract thinking.

Making 4 with Squares and Beans  (4 minutes)

Materials: (S) 4 beans, paper or foam squares

Note: This fluency activity is a familiar way for students to practice decompositions of 4 while reviewing geometric properties of squares (4 corners). Students will take what they know about this activity and apply it to number bonds.

T: Touch and count the corners of the square.
S: 1, 2, 3, 4.
T: Touch and count your beans.
S: 1, 2, 3, 4.
T: Our job is to make 4. Use 3 beans to mark 3 of the square’s corners. Keep the other one in your hand. How many beans on your square?
S: 3.
T: How many beans in your hand?
S: 1.
T: We can tell how to make 4 like this: 3 and 1 make 4. Echo me, please.
S: 3 and 1 make 4.

Have students record this on a number bond. Continue with all of the number combinations, including 4 and 0.

Application Problem  (5 minutes)

Windsor the puppy had 5 juicy bones. He buried some of them in the yard and put some of them by his dish. Draw his bones. Compare your picture to your friend’s. Did you make your pictures the same way? Talk to your friend about how your pictures are alike and how they are different. Make a number
Lesson 5

Lesson 5: Represent composition and decomposition of numbers to 5 using pictorial and numeric number bonds.

Date: 11/12/13

Lesson 5

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Ask students who above grade level to explain (either orally or in writing) how they know which circle to draw the total number of triangles in. Ask them to explain why they should not draw the total number of triangles in one of the circles with just one path to it. If other students are confused about where to draw their triangles, ask the advanced students to help.

Note: In this problem, the students work with and discuss different decompositions of 5 in preparation for today’s lesson.

Concept Development (25 minutes)

Materials: (T) White board and various color markers (S) Personal white boards

Draw 4 triangles on the board. Draw a blank number bond.

T: What do you notice on the board?

S: There are 4 triangles! → There are some empty number bonds.

T: I wonder if we could use these triangles to help me make a number bond? Do you remember some ways we learned to sort shapes earlier this year? Let’s color 2 red and 2 blue. What would I do now?

S: We could sort them by color!

T: Could we put the total number of triangles somewhere in my number bond? In which circle should I draw the whole group of 4 triangles? (Allow time for discussion.)

S: In the place where you put the whole thing!

T: I will draw them in the whole. Now, where could I draw my set of 2 red triangles?

S: In one of the parts.

T: And the blue ones?

S: In the other part!

T: You are right! Please draw these groups on your number bond mat.

T: You showed me how I can take my 4 triangles and make them into 2 groups of 2! 4 is the same as 2 and 2.

T: Help me write the triangle story with numbers in the number bond. (Allow students to assist in writing the numerical number bond and to copy this onto their number bond mat.) We can write what we did in a special number sentence:

4 = 2 + 2. (Say as you write, “4 is the same as 2 and 2.”)

T: Let’s try another one. I’m going to make a new number bond and put another shape surprise on the board. (Draw a red circle and create a new number bond template in a different orientation.)

T: Draw your number bond like mine. How could I use all of my shapes to make a new number bond? How could we sort them?

S: Some are triangles and one is a circle! → We can sort them by shape.

T: What would my number bond look like?
Lesson 5

Lesson Objective: Represent composition and decomposition of numbers to 5 using pictorial and numeric number bonds.

Student Debrief (8 minutes)

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Since this worksheet is single sided, ask early finishers to draw a picture of a story about tomatoes and carrots that either brings the vegetables together or separates them. Ask them to make a number bond to match.

S: You would draw a circle in one part. → Draw the triangles in the other part.
T: Good. Please draw this picture in your number bond. (Demonstrate.) So, we have 1 shape in this part and four in the other. How many shapes do we have in all?
S: 5!
T: Yes, 1 shape and 4 shapes make 5 shapes altogether. Please draw the whole group of shapes in your number bond.
T: Now, let’s write the numbers instead to show our story. Replace the shapes with numbers! (Demonstrate.) 1 and 4 make...
S: 5!
T: I can write it like this: 1 + 4 = 5. (Say as you write, “1 and 4 make 5.”) Is there another way we could sort our shapes?
S: We could sort them by color again. → 2 are blue and 3 are red.
T: (Guide students to help you create pictorial and numerical number bonds for the new situation, having them write the number bonds on their mat.) Are we putting the groups together or taking them apart?
S: We are putting the shapes together.
T: When we put them together, where do we put the number for our whole?
S: We put the 5 in the place where the parts come together.
T: You are right. 2 blue shapes and 3 red shapes make...
S: 5 shapes in all!!
T: Yes, 2 and 3 together make 5! We could write that like this: 2 + 3 = 5. Great job!
T: With your partner, draw more shapes and make your own number bonds! (Allow time for drawing and discussion.) Who would like to share their number bonds with the class?

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Since this worksheet is single sided, ask early finishers to draw a picture of a story about tomatoes and carrots that either brings the vegetables together or separates them. Ask them to make a number bond to match.

Student Debrief (8 minutes)

Lesson Objective: Represent composition and decomposition of numbers to 5 using pictorial and numeric number bonds.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.
Lesson 5: Represent composition and decomposition of numbers to 5 using pictorial and numeric number bonds.

- Look at the cats in the Problem Set. How many cats are there in each problem? (5.) Are they the same or different? Why?
- What ways did we sort our shapes on the board?
- How did we know which number to write in which circle?
- Today we put some things together. Can anyone think of something we put together? How did we use the number bond to show putting together?
- We also took things apart. What did we take apart? How did we use the number bond to show taking apart?
Draw lines to make a bond of 5.
Write numbers to fill in the number bonds.

Name _______________________________  Date ____________

Represent composition and decomposition of numbers to 5 using pictorial and numeric number bonds.

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Lesson 5: Represent composition and decomposition of numbers to 5 using pictorial and numeric number bonds.

Name ____________________________    Date ____________

There were 2 pandas in a tree. Two more were walking on the ground. How many pandas were there? Fill in the number bond and the sentence.

Tell a story about the penguins. Fill in the number bond to match your story.
Lesson 6

Objective: Represent number bonds with composition and decomposition story situations.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (5 minutes)
- Concept Development (25 minutes)
- Student Debrief (8 minutes)

Total Time (50 minutes)

Fluency Practice (12 minutes)

- Sprint: Make 5 K.OA.5 (12 minutes)

Sprint: Make 5 (12 minutes)

Materials: (S) 2 copies of the Make 5 Sprint per student

Note: This Sprint focuses on composing 5 in anticipation of the Concept Development. Students grow more comfortable with the Sprint routine while completing a task that involves relatively simple concepts. This will continue to build confidence and enthusiasm for Sprints.

T: It’s time for a Sprint! (Briefly recall previous Sprint preparation activities, and distribute Sprints facedown.) Take out your pencil and one crayon, any color. For this Sprint, you are going to circle the number that will make 5. (Demonstrate the first problem as needed.)

Continue to follow the Sprint procedure as outlined in GK–M4–Lesson 3. Have students work on the Sprint for a second time (they will soon work on two different Sprints in a single day). Continue to emphasize that the goal is simply to do better than the first time and celebrate improvement.

Application Problem (5 minutes)

Materials: (S) 5-stick of linking cubes per student, pencil, paper.

Play a game called Snap with your friend! Show him your 5-stick. Now, put your linking cube stick behind your back. When he says, “Snap!” quickly break your linking stick into two parts. Show him one of the parts. Can he guess the other one? If not, show him. Draw a number bond to show what you did with your cubes. Then, it is his turn! If you have time, play it with a 4-stick, a 3-stick, and a 2-stick!
Lesson 6

Notes: This game will serve as a very concrete review of the composition and decomposition of the numbers to 5 as well as a chance to practice creating number bonds.

Concept Development (25 minutes)

Materials: (T) White board and markers (S) 5-stick per student

T: (Draw the number bond on the white board.) Oh, no! I have a number bond and no story! Who could help me? Use your 5-sticks to help me make up a story. Think about the missing numbers and let’s talk about a story to go with your picture. Does anyone have an idea?

S: There were 5 red and green balls. 2 were red. 3 were green. → There was 1 horse sleeping and 4 horses came running up. Then there were 5 horses. → (Various answers which might move from part to whole or whole to part. Accept all responses. We are not encouraging a rigid interpretation of the number bond but rather want students to think flexibly. What matters is that within their stories the sum of the parts equals the whole, though not using those terms.)

T: That’s a great story! Let’s fill in the number bond. (Demonstrate.) You are right. 5 is the same as 2 and 3 together! We can also write the story in a number sentence like this: 5 = 2 + 3.

T: Let’s try one more. (Draw the number bond to the right on the board.)

T: Oh, no! We have another number bond with empty circles! Could you use your linking cubes to help us solve the problem? Could one of my friends help me make up a story to go with this picture?

S: There were 2 sleeping cats and 2 awake cats. How many cats were there in all? → There were 4 cats sleeping. 2 woke up and 2 were still sleeping.

T: Yes! 2 sleeping cats and 2 awake cats make 4 cats in all. Let’s fill in our number bond. (Demonstrate.) We could also write it in a number sentence like this: 2 + 2 = 4.
Repeat exercise for several more number bonds for 5, 4, 3, and 2 before proceeding to the Problem Set. Allow students to share and discuss their stories. Model the associated number sentences in a casual manner, but do not focus on them. Students will begin formal work with expressions (e.g., 3 + 4) and equations (e.g., 3 + 4 = 7) in Topic C.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes.

**Student Debrief (8 minutes)**

**Lesson Objective:** Represent number bonds with composition and decomposition story situations.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- How did you decide what numbers to use for your number story?
- Do your stories and the number bonds tell the same thing?
- How were your number stories different from your friends’?
- How did the Snap game connect to today’s lesson?
- Look at the Problem Set with the cubes. Look at the first two sticks. How many cubes are in each stick? (5.) Look at the matching number bond. Are the numbers the same in each bond? There are 5 cubes in each stick, so why are the parts different?
Lesson 6: Represent number bonds with composition and decomposition story situations.

Date: 11/12/13

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Fill in the number bond. Tell a story about the birds to your friend.

Tell a story that matches the number bond. Draw pictures that match your story.

Tell a story. Draw pictures and a number bond that match your story.
Draw a line to match the number bond to the cube stick.

- For the number bond with 5, draw a line to match it with 2 and 3.
- For the number bond with 4, draw a line to match it with 2 and 2.
- For the number bond with 3, draw a line to match it with 1 and 4.
- For the number bond with 4, draw a line to match it with 1 and 5.
Tell a story. Complete the number bonds. Draw pictures that match your story and number bonds.

Draw some balls for your story.

Draw some crayons for your story.

Draw some shapes for your story.

On the back of your paper, draw a picture and make a number bond to match it.