# stage 6:
# addition & subtraction to 20

## Big Idea: Parts to Whole

Parts-to-Whole is the big idea that underlies addition and subtraction. The central concept is that there is a whole that can be partitioned into a certain number of parts. If we combine the parts, they equal the whole. If the whole is 18, the parts could be 6 and 12. Combine the two parts (6 + 12), they equal the whole (18). We can change the order of the parts (12 + 6) and they still equal the whole. We can also find several different ways of making a whole (18) out of two parts, such as 7 + 11 or 13 + 5, or three parts, such as 4 + 13 + 1. Parts can be rearranged and maintain the whole.

A part can be taken away from the whole leaving another part left over. The whole is 17, we take away 9, 8 is left over. A student that has developed in-depth understanding of the Parts-to-Whole big idea can see addition and subtraction as different ways of forming number relationships, often called "fact families," or, related facts. Stage 5 includes combinations to 20, which necessitates adding on from ten. Ten, the focus of Stage 3, is an integral part of the Part-to-Whole hierarchy, and leads the way to Place Value concepts.

### Why is Parts to Whole Important?

Understanding how numbers are related to each other signals that children are ready to experience that each number is more than a distinct character; larger numbers, or wholes, are made up of smaller numbers, or parts. When the student sees the iconic 8 dots on a number card, combined with an additional 4 dots, she can count or add on and know there are 12 dots in total. The 8-length bar with a 4-length bar added on takes on the length that is the same as the 10-bar and 2-bar. Four jumps on the number line past the 8 mark is the same as 8 numbers past 4, which in turn shows that 12 is four more than 8.

In Stage 6, children use the unit of ten as they work with numbers in the teens. The representations of 10, in the different Symphony Math environments, offer a dynamic visual that aids students' understanding and automaticity with how parts combine to make a whole. The more familiar students become with the unit of ten, the less they need to count or calculate when adding and subtracting with ten. The connection between counting on and counting back, with addition and subtraction, is more apparent, and more efficient.

### Stage 6 Learning Progression

| Concept | Standard | Example | Description |
|---|---|---|---|
| 6.1: Addition: Missing Result to 20 | 1.OA.1 | 5 + 6 = ? | Students continue to build on combinations of 10 and the teens as they work with numbers to 20. Doubles play a role in this work, as does their foundation with smaller, known parts now called upon. As in Stage 3.1, students witness the equal sign in a variety of positions. They will also be asked to provide multiple solutions to problems, in order to extend their familiarity with the interrelatedness of numbers; part-part-whole. |
| 6.2: Addition: Missing Change to 20 | 1.OA.8 | 5 + ? = 11 | Stage 6.2 continues a student's development of his foundational numeracy through examples that call on his knowledge of missing parts. As he works through more and more tasks, he becomes able to identify a missing part when he knows the total and one part. Stage 6.2 further explores the principle that small numbers are parts of larger numbers, and that when numbers are broken apart and recombined in a variety of ways, the wholes remain the same. |

| Concept | Standard | Example | Description |
|---|---|---|---|
| 6.3: Subtraction: Missing Result to 20 | 1.OA.1 | 11 - 5 = ? | As children work on their number combinations, some will come more easily than others. Symphony Math is not striving for a memorization of number combinations, but rather, the inter-connectedness of Parts-to Wholes. In Stage 6.3, the program builds on two types of number combinations. One, knowing that 12 + 2 = 14 can lead to 14 - 2 = 12. And the other, that taking away one part leaves the other part: 14 - 2 = 12 and therefore, 14 - 12 = 2. |
| 6.4: Subtraction: Missing Change to 20 | 1.OA.8 | 11 - ? = 6 | The student who understands Parts-to-Whole approaches this problem in a different way. With 5 + 6, the student can mentally picture 5 combined with 6 as being equal to 11. When considering the result of 11 - 5, she knows that since 5 + 6 = 11, 11 - 5 equals 6. She can identify missing parts by using related combinations. |
| 6.5: Fact Families | 1.OA.3 | 7 + 4 = ?<br>4 + 7 = ?<br>11 - 7 = ?<br>11 - 4 = ? | Stage 5.5 reinforces how numbers relate to one another. Through a rich visual environment, and then with numbers, children have ample opportunities to engage in the world of related facts so that such combinations become both clear and facile. When they see that 14 + 5 = 19 in a visual model, it becomes more apparent that any order in which 14 and 5 are combined will still yield 19. And when one of these particular parts of 19 are taken away, it will consistently yield the other known part of the pair. As with previous material, the equal sign will move around, so that students experience the variety of order in which equations may be written. |
| 6.6: 3-Part Addition and Subtraction | 1.OA.6 | 3 + 4 + 2 = ? | Students solve problems that call for addition of three whole numbers, and use strategies such as: counting on, making ten, decomposing a number leading to a ten; using the relationship between addition and subtraction, and creating equivalent but easier or known sums; (adding 8 + 9 by creating the known equivalent 8 + 8 + 1 = 16 + 1= 17). The properties of operations are applied as strategies to add and subtract. |

## Using the Guided Practice Materials

When students struggle with a concept, you will see suggeted Guided Practice materials in your HELP data view of your Symphony Math Dashboard. These materials provide extended practice using the Multiples Ways of Knowing from the Symphony Math program:

| Worksheet | Purpose | Instructions |
|---|---|---|
| Manipulatives | Use a visual model to represent the concept. | Create bars, dot cards, or number lines for each item. |
| Bridge | Connect symbols to their visual representations. | Create objects, numbers, and symbols to complete each item. |
| Symbols | Understand the concept at the abstract level. | Create numbers and symbols to complete each item. |
| Apply | Extend understanding to real-life problem solving. | 1) Read the story presented at the top of the page.<br>2) Create a number model of the full solution.<br>3) Write the number sentence that matches the model. |

## Group Learning

The Symphony Math Extra Practice materials are designed to promote a conversation about the Big Ideas in math. One-on-one or small group instruction with the materials is recommended for students who need more time to make connections between the mathematical concepts in the Stage and the application of those concepts in their math curriculum.

## Stage Checkpoint

When students complete a Stage, they come to a Checkpoint. Checkpoints provide students an opportunity to draw and create models in their offline journals. When they are done, you can evaluate their work and make sure they are ready to move on in the Symphony Math curriculum. Here is a short checklist to guide your evaluation:

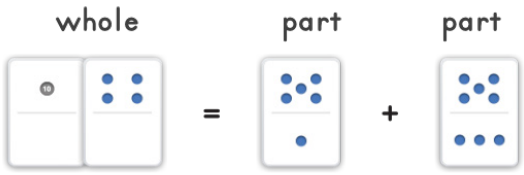
- ☐ All Checkpoint steps have been attempted
- ☐ Student demonstrates understanding of models
- ☐ Solutions are correct, or intervention has led to self-correction
- ☐ Student can talk about their work using mathematical language

Students' math understanding is evolving. Their work at Checkpoints gives them a chance to transfer their new skills to another context (an offline journal). It is also an opportunity for reflection. Be sure to allow students to create more pages if they need it. When you are confident they are ready, accept the student checkpoint from your Symphony Dashboard.

Name: _____ Date: _____

# Stage 6: Teacher Reference

Dot Cards:

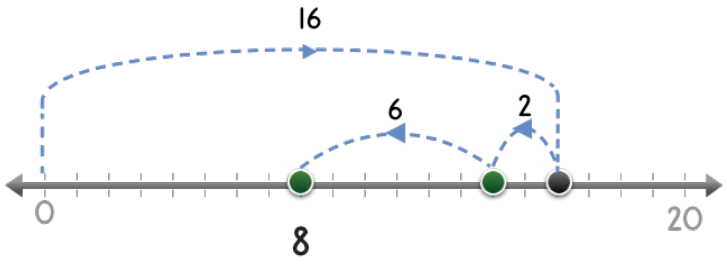



14 = 6 + 8

Number Bars:

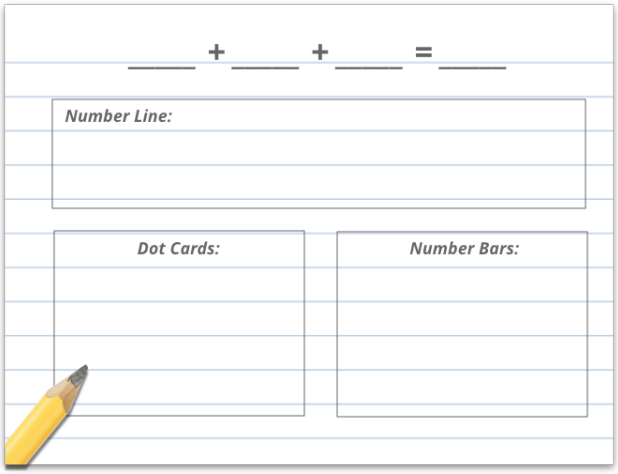

3 + 3 + 6 = 12

Number Line:




16 − 2 − 6 = 8

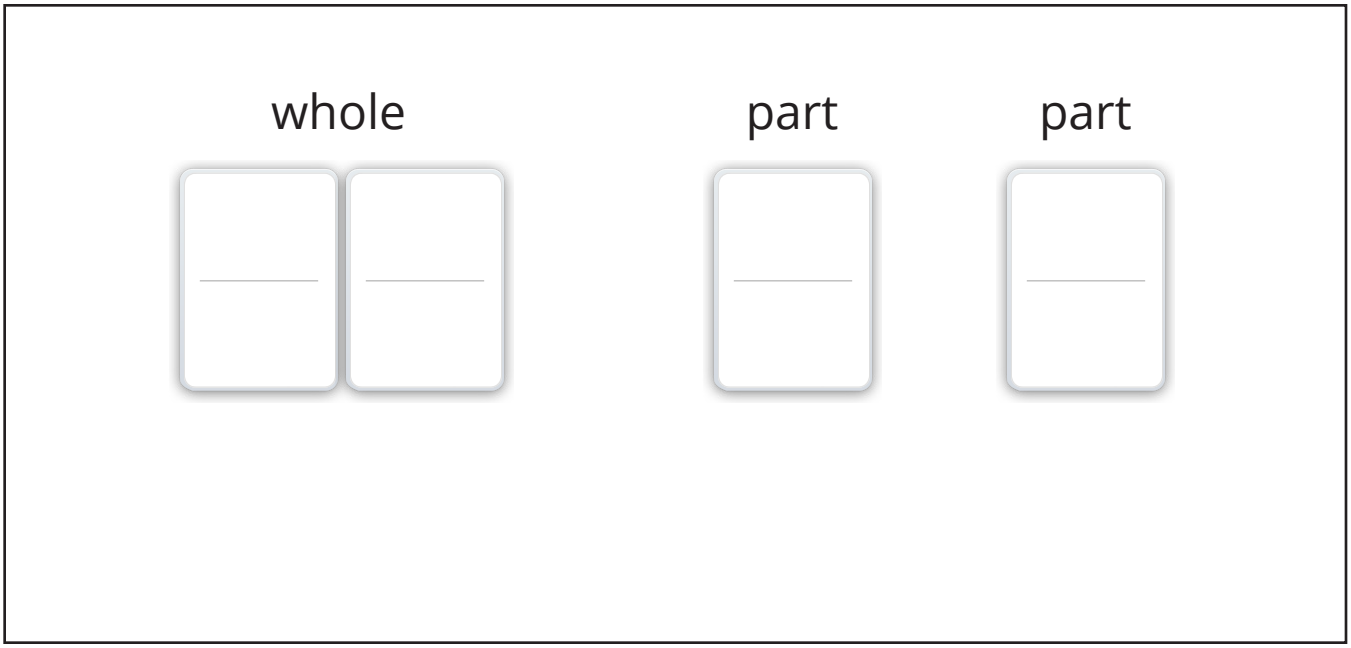
Create Your Own:



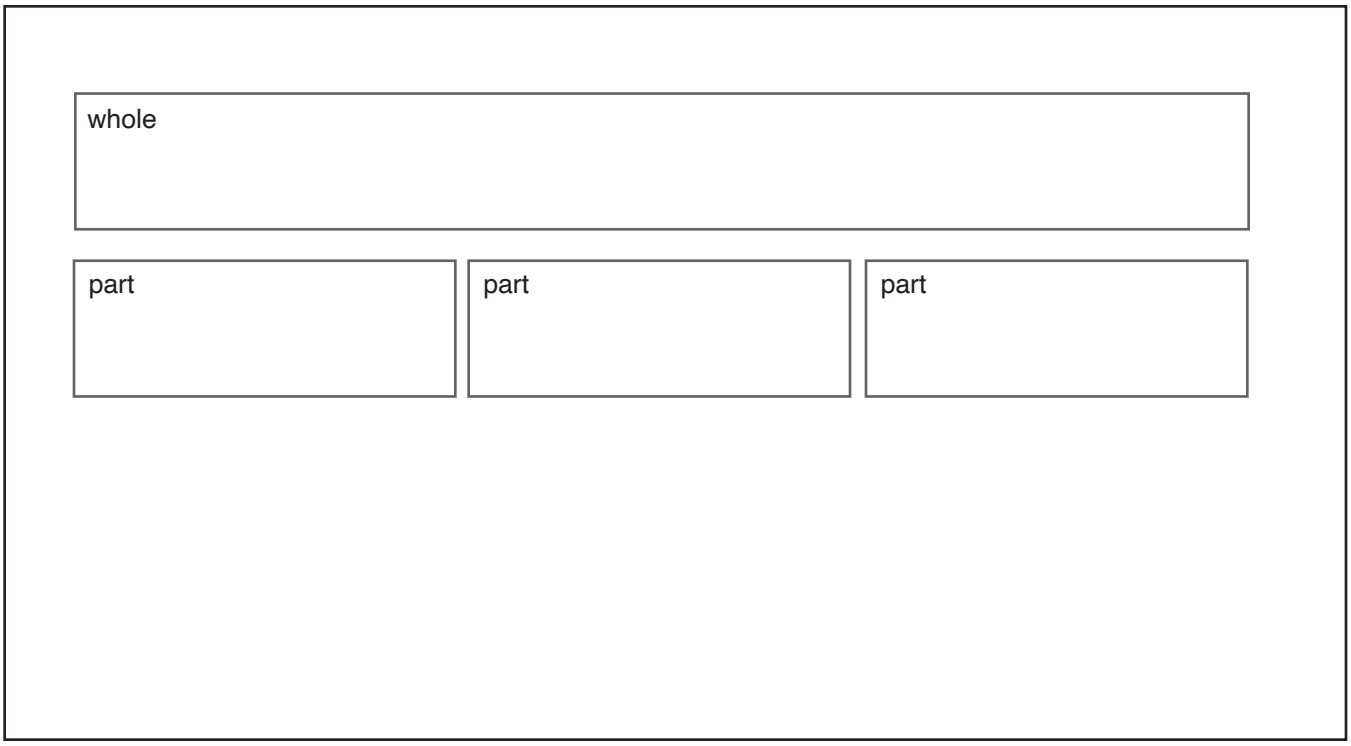
Name: _____ Date: _____

# Stage 6: Add & Subtract to 20

Dot Cards:

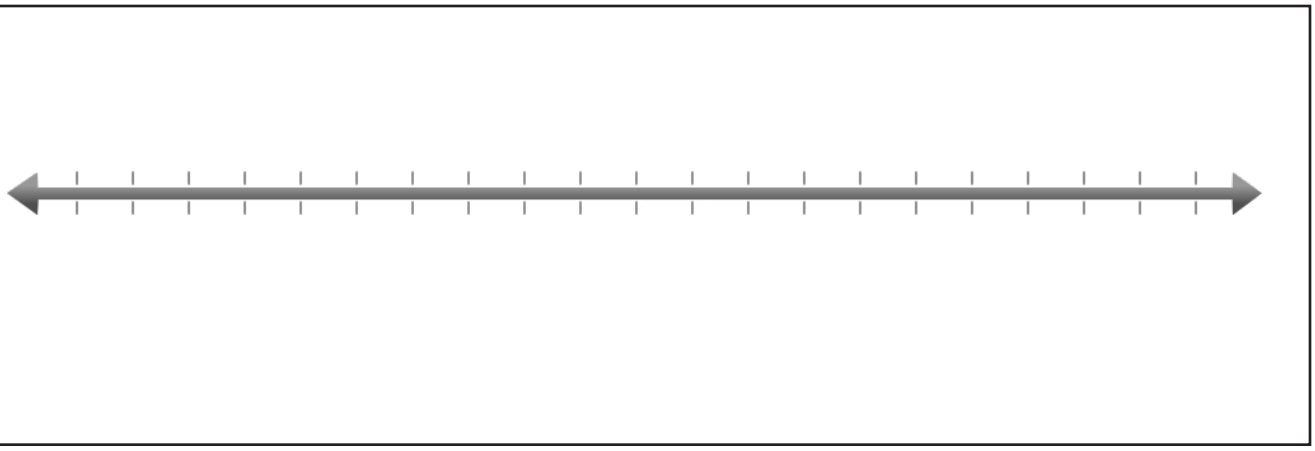



Number Bars:



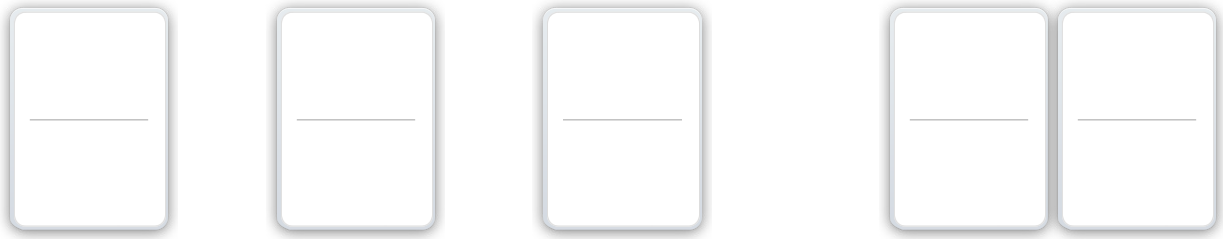
Name: _____ Date: _____

Number Line:



MY OWN:

___ + ___ + ___ = ___



whole

part | part | part