

Number Stories

Strand: Computation and Estimation
Topic: Creating and solving story problems, using basic addition facts.
Primary SOL: 1.6 The student will create and solve single-step story and picture problems using addition and subtraction within 20.
Related SOL: 1.7

Materials

- Story Problems
- Storyboards (attached)
- Counters/cubes
- Mini whiteboards/markers

Vocabulary

add, combine/join, equal, minus, parts, plus, put together, strategy, subtract, take apart, whole

Join (Result Unknown)	Join (Change Unknown)	*Join (Start Unknown)
Sue had 9 pencils. Alex gave her 5 more pencils. How many pencils does Sue have altogether?	Sue had 9 pencils. Alex gave her some more pencils. Now Sue has 14 pencils. How many did Alex give her?	Sue had some pencils. Alex gave her 5 more. Now Sue has 14 pencils. How many pencils did Sue have to start with?
Separate (Result Unknown)	Separate (Change Unknown)	*Separate (Start Unknown)
Brooke had 10 cookies. She gave 6 cookies to Joe. How many cookies does Brooke have now?	Brooke had 10 cookies. She has 4 cookies left. How many cookies did Brooke give to Joe?	Brooke had some cookies. She gave 6 to Joe. Now she has 4 cookies left. How many cookies did Brooke start with?
Part-Part-Whole (Whole Unknown)	Part-Part-Whole (One Part Unknown)	Part-Part-Whole (Both Parts Unknown)
Lisa has 4 red markers and 8 blue markers. How many markers does she have?	Lisa has 12 markers. Four of the markers are red, and the rest are blue. How many blue markers does Lisa have?	Lisa has a pack of red and blue markers. She has 12 markers in all. How many markers could be red? How many could be blue?
Compare (Difference Unknown)	*Compare (Bigger Unknown)	*Compare (Smaller Unknown)
Ryan has 7 books and Chris has 2 books. How many more books does Ryan have than Chris?	Chris has 2 books. Ryan has 5 more books than Chris. How many books does Ryan have?	Ryan has 2 more books than Chris. Ryan has 7 books. How many books does Chris have?
Ryan has 7 books. Chris has 2 books. How many fewer books does Chris have than Ryan?	Chris has 5 fewer books than Ryan. Chris has 2 books. How many books does Ryan have?	Chris has 5 fewer books than Ryan. Ryan has 7 books. How many books does Chris have?

*Join Problems (Start Unknown), Separate Problems (Start Unknown), Compare Problems (Bigger Unknown – using “fewer”), and Compare Problems (Smaller Unknown – using “more”) are most difficult and should be mastered in Grade 2.

Student/Teacher Actions: What should students be doing? What should teachers be doing?

Note: Story problems give students a context for developing meaning for the operations of addition and subtraction. There are a variety of problem structures that enhance student understanding of the relationship between addition and subtraction. All students need experiences with the various problem types. These problems give students multiple entry points and encourage the use of a variety of student strategies for solving. Discussion about student strategies is critical for developing student fluency with numbers to 10.

1. Explain to students that throughout the year, you will be solving story problems and discussing strategies for solving problems. Walk students through a routine for solving problems.
2. First, share a story problem with students from the problem type chart that illustrates the concepts of adding and/or subtracting with sums up to 10 or less. (Work your way up to 20 only as students are ready.)
3. Next, have students visualize what is happening in the problem and ask them to share what is happening with a partner or with the group. Have students determine what information is important in the problem and discuss what they are trying to figure out. It is important to ask students questions to get them talking about their reasoning. For example, ask: “Will your result be more or less than the amount you started with? How do you know?”
4. Then, have students brainstorm strategies that they could use to solve the problem. Ask: “What tools will you need?” “How have you tackled similar problems?” “Would it help to draw a picture?”
5. Give students time to work individually or with a partner to solve the problem. Have manipulatives readily available and/or whiteboards/markers for them to act out what is happening in the problem. Observe students while they are working to see what strategies they are using. Use the “Addition and Subtraction Strategy Charts” as a guideline of the various strategies to look for and bring out as students are working. *Are they working randomly? Are they counting up or back? Are they using number combinations that they know? Do they use addition/subtraction notation accurately? Does their work model how they solved the problem, or did they just write down something that was easy to record?* Use these observations and student work as you begin discussion about how students solved the problem.
6. Ask students to share strategies with the group for solving the problem while you record their thinking on chart paper/board. Have them include how they modeled the story problem with manipulatives or their drawings. Here are some possible questions to encourage student reflection: “How did you get your answer?” “Can you describe how you solved the problem to us?” “Can you explain what you have done so far?” “Why did you decide to do this?” “What do you think about what (student) said? Do you agree? Why or why not?” “Does anyone have the same answer but a different way of explaining

it? Does your answer make sense?” “How is (student’s) strategy similar to (student’s) strategy? How are they different?” If there were student strategies that you would like to highlight, have those students share their thinking during the group discussion.

7. It is important for your students to feel comfortable discussing their thinking in your mathematics class. Mathematics should be a place where problems are tackled together and mistakes are valued because learning takes place.
8. After the debriefing student strategies, introduce the barnyard or playground storyboard to students. Have students discuss the details in the illustration. Pose various story problems from the chart above for students to act out using counters/cubes. For example: There are some animals on the farm. Five are grazing in the grass and six are sleeping in the barn. How many animals are on the farm?
9. Continue making up various addition and subtraction problems and demonstrating them with the cubes until students are familiar with the process.
10. Give each pair of students a storyboard and a bag containing up to 10 counters/cubes in two different colors, and have them create and solve their own addition and/or subtraction stories. As students work, circulate and monitor the students’ discussions and representations, checking to ensure that they are understanding the concepts and making appropriate representations.
11. After students have had extended practice with verbally creating and solving problems, have them begin recording the corresponding number sentences on paper or in their journals.
12. As a closing activity, the teacher could choose one of the assessment ideas from the next section and have students apply their understanding of problem solving.

Assessment

- **Questions**

- What is a number story that uses 13 counters or cubes? How could you write and represent this story? How would your story change if you added one more cube? If you subtracted one cube?
- Last night, I picked up nine pencils from the floor. I put three of the pencils in the pencil box. How many pencils did I have left in my hand?
- There are 11 pigs on the farm. Some are eating corn and some are rolling in the mud. How many pigs could be eating corn? How many could be rolling in the mud?

- **Journal/writing prompts**

- Distribute index cards containing number sentences. Ask students to create a story problem that represents the number sentence on his/her card using one of the storyboards. Share it with a partner and have them solve each other’s story problems.
- Create a number story with illustrations, and write the corresponding number sentence under your story.

- **Other Assessments**

- Place storyboards and counters in the mathematics center for students to create number sentences.
- Have students represent a few of their created number stories in their mathematics journals.

Extensions and Connections (for all students)

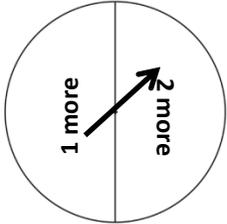
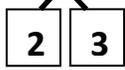
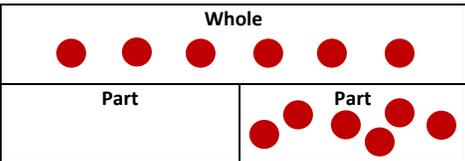
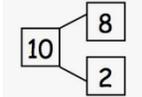
- As students become comfortable representing various number sentences, have them work with related facts and create and represent stories, using manipulatives and/or drawings that correspond with each fact.
- Have students create a picture of two kinds of things that add up to a selected number. Students can draw two kinds of animals, two kinds of food, two kinds of toys, as long as the total things in his/her picture equals the selected number. Students will decide how many of each thing they want to have. Distribute paper to students for their illustrations. Have students use their picture to create a story problem. Use student-created story problems in future lessons with students.
- Encourage the use of numeration and number sentences whenever the opportunity presents itself. For example, when discussing and interpreting a graph, ask students to develop a number sentence about it. Have students act out seasonal favorite stories in which they present addition and subtraction sentences orally. Use students' favorite books with number themes to develop "Reader's Theatre" productions, and use these as springboards for class story problems. Have students develop fluency with addition and subtraction within 10 by acting out number stories and sharing their methods for solving the problems.
- Integrate picture books involving addition and subtraction situations into math time.

Strategies for Differentiation

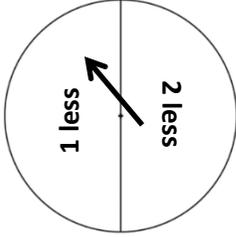
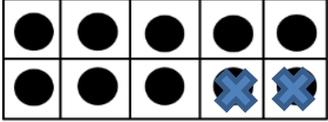
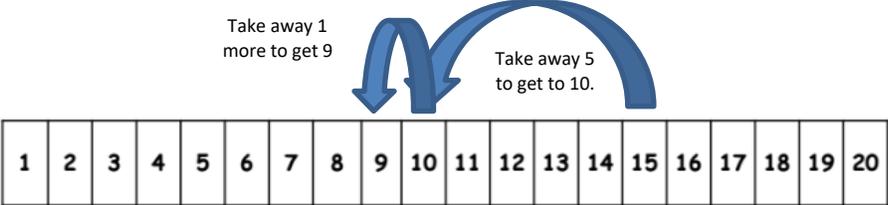
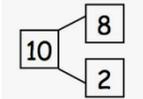
- Begin working with a small number of cubes and increase the number as students demonstrate competency in handling larger numbers.
- Provide different manipulatives for students to create and solve story problems.
- Provide a story frame (e.g., There were _____ frogs in the pond. _____ more frogs jumped in. Now, a total of _____ frogs are in the pond.) to support student's thinking, as needed. Provide a template for various problem types reflected in the curriculum framework for first grade.
- Read problems to students, as necessary.
- Provide a problem-solving mat that provides space and prompts for students to show their work.
- For students who struggle, encourage the use of a problem-solving strategy checklist.
- Post anchor charts for addition and subtraction strategies for student reference.
- Modify the language in story problems as needed.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

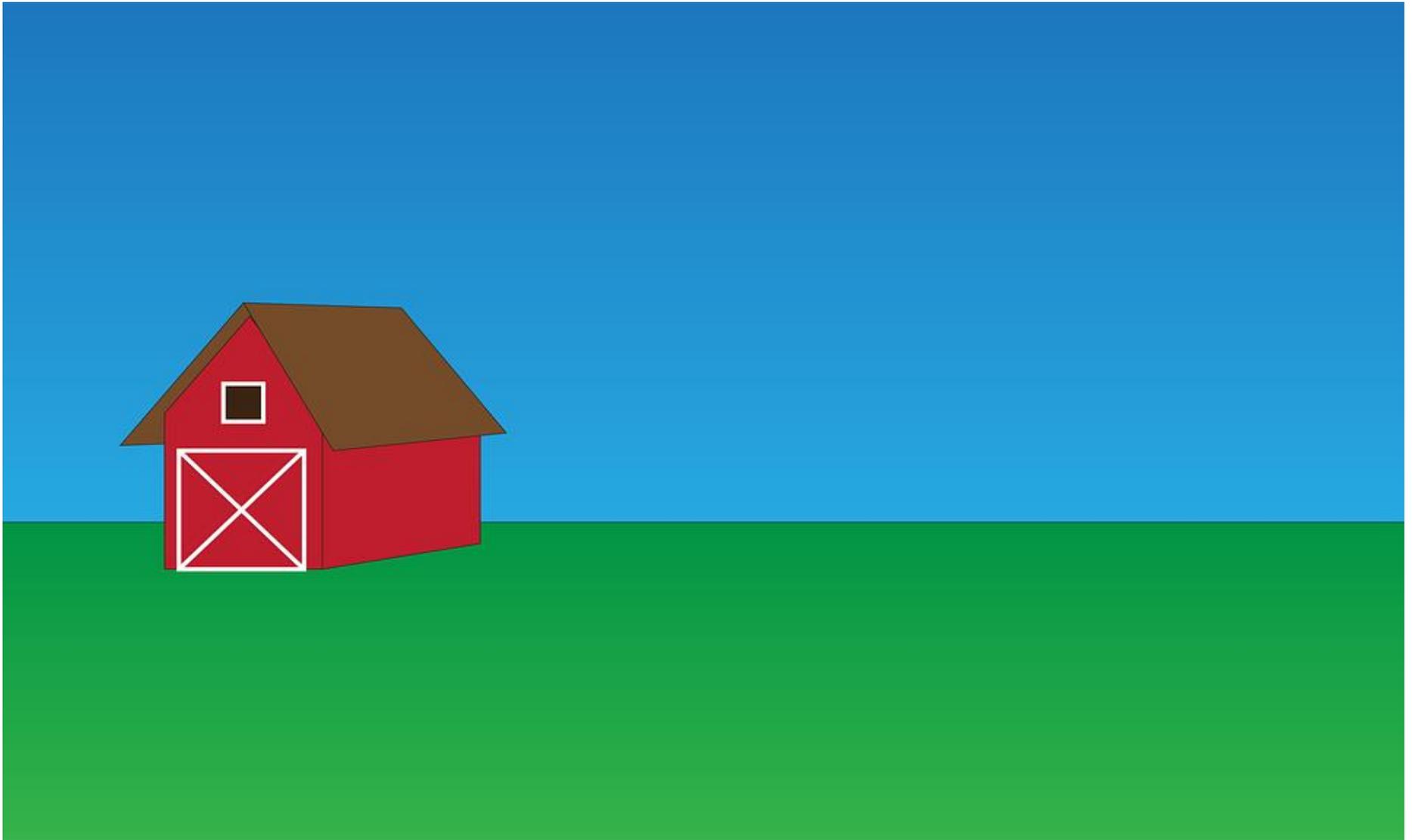
Addition Fact Strategies

<p>Count On When you add 0, 1, 2, or 3, count on from the other number.</p> <p>$6 + 3$ is 7, 8, 9, so $6 + 3 = 9$</p> <p>7 8 9</p> <p>6 + </p>	<p>One More Than/Two More Than</p> <p>$6 + 2 =$</p> <p></p> <p></p>
<p>Doubles These facts are easier to remember.</p> <p></p> <p>$5 + 5 = 10$ or $10 = 5 + 5$</p>	<p>Near Doubles These include all combinations where one addend is one more than the other. Double the smaller number and add one.</p> <p></p> <p>$4 + 5$ is $4 + 4$ and one more, So $4 + 5 = 9$.</p>
<p>Make 10 Split one addend to make a ten from the other addend and find the sum.</p> <p>$8 + 5$</p> <p></p> <p>8 and 2 is 10 and 3 more is 13.</p>	<p>Adding Zero Model using drawings, manipulatives, and/or a part-whole mat with one of the parts empty.</p> <p>$12 + 0 = 12$ $0 + 6 = 6$</p> <p></p>
<p>Turn Around Facts (Commutative Property) Any two addends always equal the same sum, no matter what their order.</p> <p></p> <p>$3 + 4 = 4 + 3$</p>	<p>Use of Related Facts Use the relationship between parts and the whole to figure out other facts.</p> <p></p> <p>$2 + 8 = 10$ and $8 + 2 = 10$ $10 - 2 = 8$ and $10 - 8 = 2$</p>
<p>Patterns to Make Sums $0 + 15 = 15, 1 + 14 = 15, 2 + 13 = 15, \text{ etc.}$</p>	

Subtraction Fact Strategies

<p>Count Back</p> <p>When subtracting, 0, 1, 2, or 3, count back from the total. For example, with $10 - 3$, start at the 10, and count back three numbers, 9, 8, 7.</p>  	<p>One Less Than/Two Less Than</p> <p>To solve $8 - 1$, seven is 1 less than 8, so $8 - 1 = 7$.</p> 
<p>Think Addition</p> <p>To find the difference for a subtraction fact, think of the related addition fact. What goes with this part to make the total?</p> <p>$7 - 3 = ?$ Think $3 + ? = 7$. Since $3 + 4 = 7$, then $7 - 3 = 4$.</p>	<p>Subtracting From 10</p> <p>This strategy involves visualizing the removal of counters from a 10 frame.</p> 
<p>Back Down From 10</p> <p>Ten is a friendly number. For $15 - 6$, take off 5 to get to 10. Then take off 1 more to get to 9</p> 	
<p>Patterns</p> <p>Some facts become easy to remember because they follow a pattern. For example, any number minus itself is always equal to zero.</p> <p>$5 - 5 = 0$ $12 - 12 = 0$</p>	<p>Use of Related Facts</p> <p>Use the relationship between parts and the whole to figure out other facts.</p>  <p>$2 + 8 = 10$ and $8 + 2 = 10$ $10 - 2 = 8$ and $10 - 8 = 2$</p>

Barnyard Storyboard



Playground Storyboard

