



NCTM 2013
Denver, Colorado
Date: April 18, 2013
12:30 am- 1:30 am
Room Mile High 4 A/B
Session Presenter: Myrna Mitchell
Email mmitchell@aimsedu.org
Topic: Number Sense and the CCSS
Grades PreK-2

Agenda
Counting Crows
I see, You see
Pond Problems

To download activities:
Visit
<http://bit.ly/nctm13mm>

The handout will be available for two weeks.
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Counting Crows



Counting

Students will connect counting to cardinality by making a one-to-one correspondence between an object and a number, and will put together and take apart sets of crows to model addition and subtraction.

Common Core State Standards for Mathematics*

- *Make sense of problems and persevere in solving them. (MP.1)*
- *Reason abstractly and quantitatively. (MP.2)*
- *Model with mathematics. (MP.4)*
- *Look for and make use of structure. (MP.7)*
- *Look for and express regularity in repeated reasoning. (MP.8)*
- *Know number names and the count sequence. (K.CC.B)*
- *Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. (K.OA.A)*

You Need

Work mat
Small crows
Large crows
Yarn
Rubber bands, optional
Toilet paper tubes, optional
Tape
Sentence strips

Before You Begin

1. Make the crows. (See video.)
2. Copy and cut out a set of 10 small crows and a work mat for each student.
3. Write the numerals and number words 1-10 on sentence strips.

Do This

1. Select three student crows. Say, "There were three crows sitting on a wire." Instruct the three student crows to fly to the front of the room. Count the crows together, 1, 2, 3. Have the students draw the number three in the air. Ask the students how many crows would be left if one crow flies away. Instruct one crow to fly back to his/her seat.
2. Ask the class how many crows were left on the wire. Count the crows together, 1, 2. Have the students draw the number two in the air. Lead the class in a discussion about the relationship between the last number they counted and the number of crows in the set.
3. Repeat this procedure using various numbers of crows on the wire. Give students problems that will model adding to the set of crows on the wire and taking away from the set of crows on the wire as well as counting problems.

4. When students are comfortable doing problems with large class crows, explain that they will each get a set of counting crows and a work mat so they can continue to count crows at their seats as you call out problems.
5. Give each student 10 small counting crows and a mat. Call out problems and allow the students to work them out on their mats. Compare answers after each problem.

Sample Problems

- There were five crows on the ground under the wire. Two came to join them. How many crows are on the ground? Draw that number in the air.
- Hold up the sentence strip with the numeral 5 and ask the students to put that many crows on the wire. Repeat using numerals one through 10.
- Hold up the word *three* and ask the students to place that many birds under the wire. Have students draw the numeral in the air that matches the number word. Repeat using number words 1-10.
- There were two crows on the wire and four more came to join them. How many crows are on the wire? Draw that number in the air.

- There were five crows on the wire and two crows on the ground. How many crows were there all together? How did you figure that out?
6. Close the lesson with a discussion about what they learned through this activity. Include the *Ask These* questions in your discussion.

Ask These

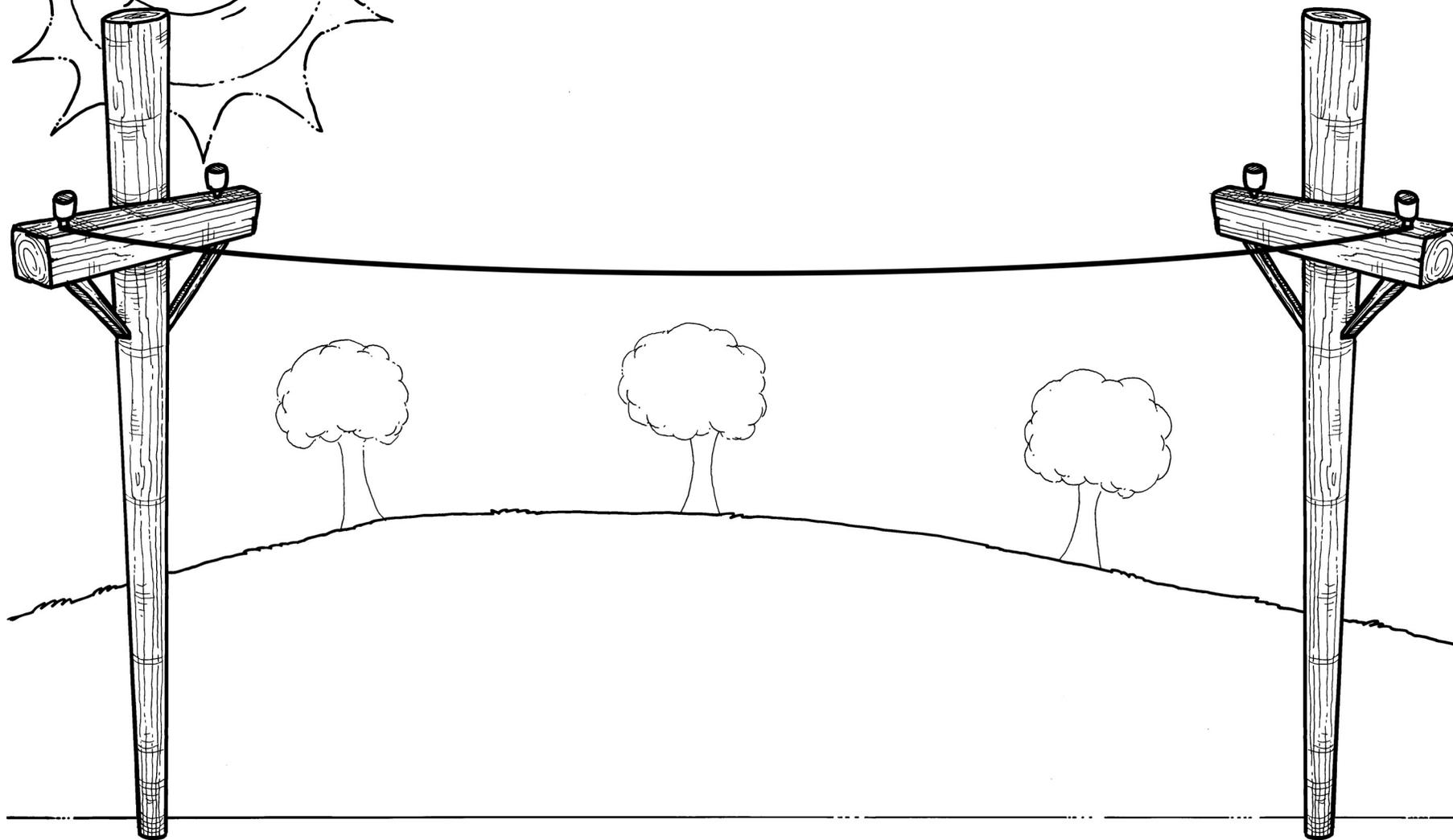
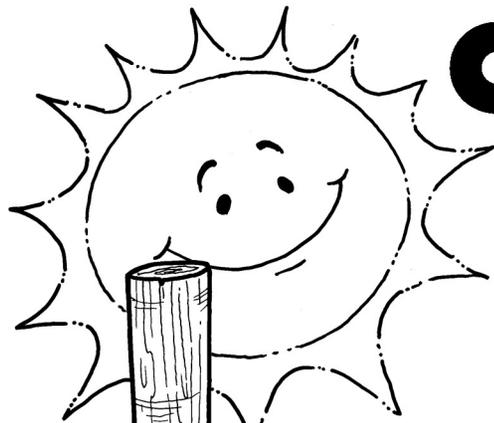
1. Show me three crows.
2. How many crows will fit on the wire?
3. If there were three crows on the wire and two more came to join them, how many crows would be on the wire? How do you know?
4. What else could we count? How would it be different than counting crows? How would it be similar to counting crows?
5. Why is it important to learn how to count?

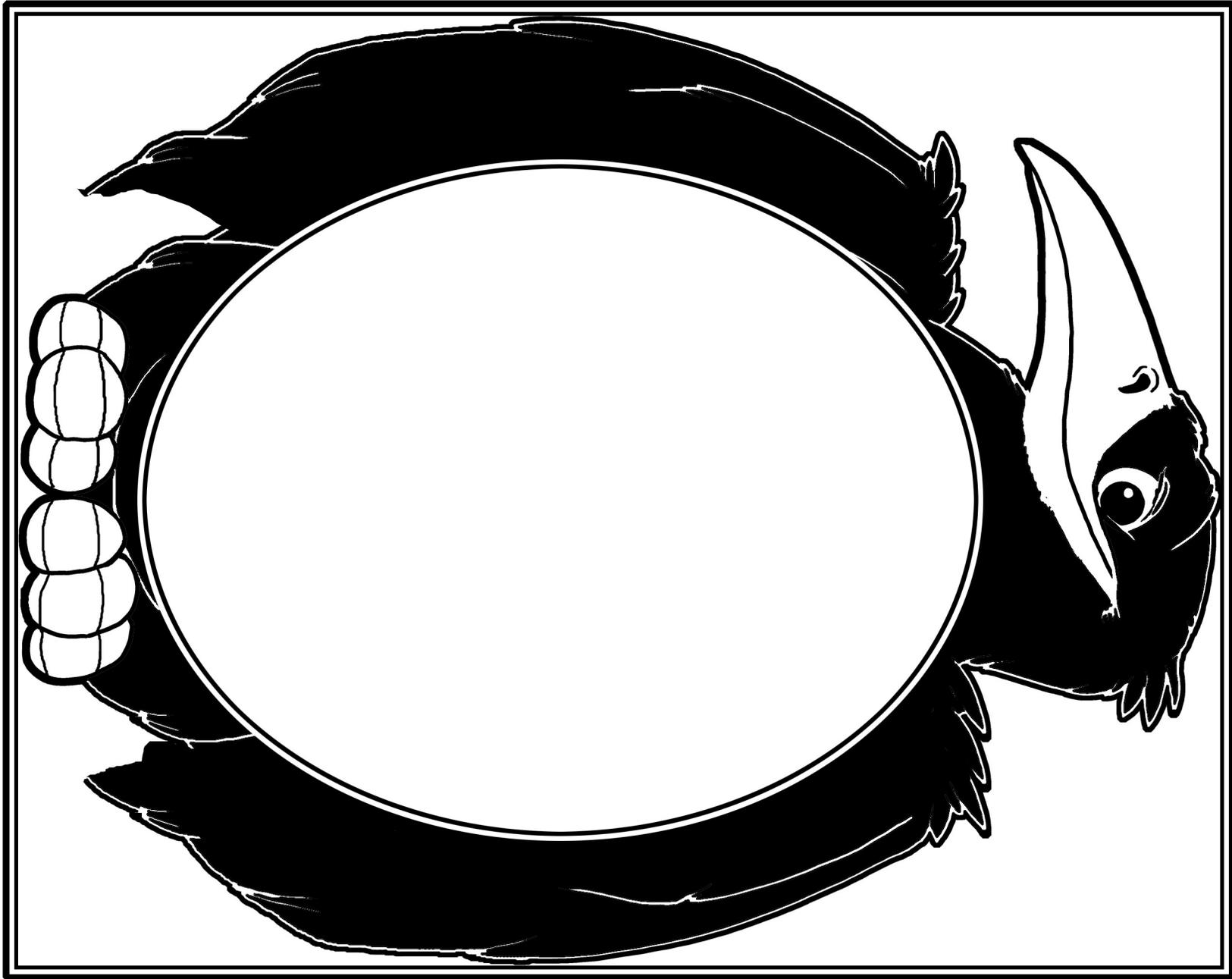
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Counting Crows

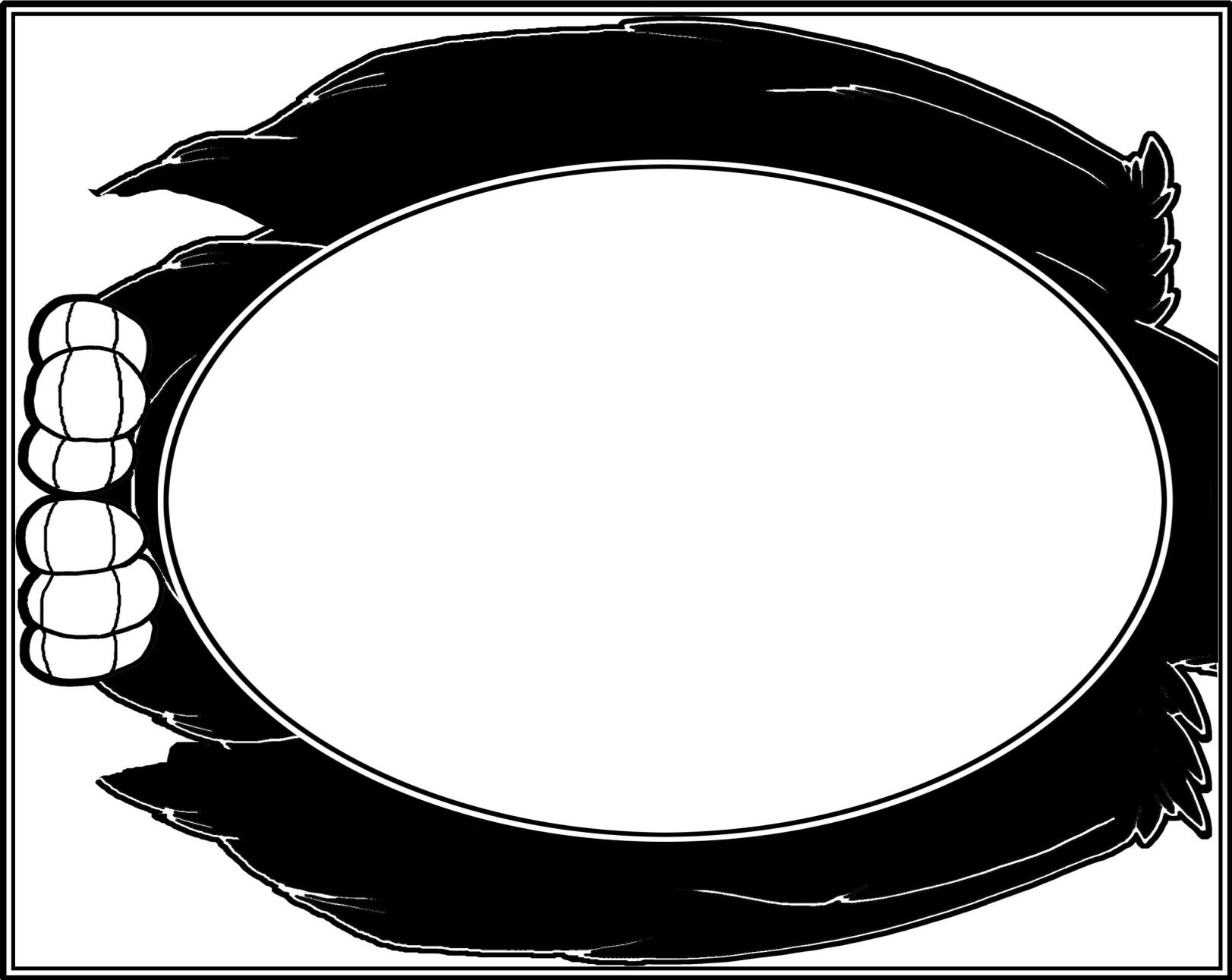


Counting Crows





Counting Crows



Counting Crows

I See, You See

Commutative Property of Addition

Students will add two numbers that total 20 and find that the total doesn't change when the order of the addends changes.

Common Core State Standards for Mathematics*

- *Make sense of problems and persevere in solving them. (MP.1)*
- *Think abstractly and quantitatively. (MP.2)*
- *Model with mathematics. (MP.4)*
- *Understand and apply properties of operations and the relationship between addition and subtraction. (1.OA.B)*
- *Work with addition and subtraction equations. (1.OA.D)*

You Need

For each four students:

shoelace
20 pony beads, 10 each of two colors
paper
pencil

Before You Begin

1. Students will work in groups of four.
2. String 20 beads on each shoelace in alternating groups of five of the same color. For example: five green, five white, five green, five white.

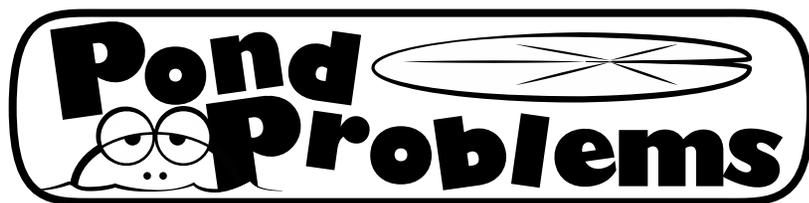
Do This

1. Invite four students to the front of the class to demonstrate the procedure for this activity.
2. Assign two students to each hold an end of the shoelace with beads. Move the beads to one end of the shoelace. Ask students how many beads are on the shoelace. [20] Encourage the class to share different ways they could use to find out if there are 20 beads. [Count each bead. Count by fives because the beads are grouped by fives in different colors. Put five beads of one color and five of another to make 10, then add 10 and 10. Count by twos. Etc.]
3. Position one student on each side of the shoelace so they are looking at the beads and the shoelace. Move three beads to the opposite end of the shoelace. Ask one student what he/she sees, looking from left to right. [Seventeen beads on one side and 3 on the other.] Ask the other student what she/he sees. [Three beads on one side and 17 on the other.] Write the equations on the board: $17 + 3 = 20$, $3 + 17 = 20$.
5. Invite students to study the two equations and share their observations. [The equations use the same numbers except that the numbers we're adding are switched around.]
6. Tell students that you want them to use the shoelaces and beads to find as many combinations that make 20 as possible and write them on their paper. Say that you also want them to see if the same pattern holds true for all of them that shows you can switch the two addends around and the total still equals 20.
7. Distribute the shoelaces and beads, paper and pencil to each group of four students. Make sure they understand the process. Circulate to encourage students to find all the possibilities. [20 + 0, 19 + 1, 18 + 2, 17 + 3, 16 + 4, 15 + 5, 14 + 6, 13 + 7, 12 + 8, 11 + 9, (and all these combinations in inverse order) and 10 + 10] Encourage students to switch roles so all students have the opportunity to determine the equations that go with the beads.
8. When students are finished, have them share their results. Record them on the board as the equations are shared, putting them in order so students will see the patterns of increase and decrease (as one addend increases, the other decreases) and that the addends can always be switched within a family and still equal 20.
9. Conclude with a discussion using the *Ask These* questions.

Ask These

1. If $16 + 4 = 20$, what does $4 + 16$ equal? How do you know?
2. Do you think the pattern holds true that we can switch the addends for 10? Explain your answer. [Yes, it is true. For example, $4 + 6 = 10$ and $6 + 4 = 10$]
3. Does it matter if I add $12 + 8$ or $8 + 12$? Why?
4. What other addition problems do you know for which you can switch the addends?

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Addition and Subtraction

Students will use manipulatives to represent number stories and write equations that describe what is being acted out on their storyboards.

Common Core State Standards for Mathematics*

- *Make sense of problems and persevere in solving them. (MP.1)*
- *Reason abstractly and quantitatively. (MP.2)*
- *Construct viable arguments and critique the reasoning of others. (MP.3)*
- *Model with mathematics. (MP.4)*
- *Attend to precision. (MP.6)*
- *Represent and solve problems involving addition and subtraction. (2.OA.A)*

You Need

Storyboards (see *Before You Begin 1*)

Equation pages (see *Before You Begin 2*)

Frogs (see *Before You Begin 3*)

Dry erase markers

Paper towels

Before You Begin

1. Each student will need his or her own copy of the storyboard and equation mat. The storyboard can be enlarged, colored, and laminated for extended use.
2. Each student will need an equation mat. (See video.)

3. Frog counters can be purchased from AIMS in sets of 72 (item number 4629). Because of the ease of using the frog counters, they are highly recommended; however, if this is not possible, make enough copies of the page of frogs so that each student can have 20 frogs. Unifix cubes or other counters may also be substituted for the frogs.
4. Remind students to clear their boards after solving each problem.
5. Depending on your students' reading abilities, you may choose to write some of the questions on the board or on sentence strips. This reinforces their reading and is most like the way that they would see similar problems in a testing situation.

Do This

1. Give each student a pond storyboard, an equation mat, a dry erase marker, a paper towel, and 20 frogs.
2. Have students identify the various objects on the storyboard. Explain that they will be using the board and the frogs to solve several story problems. Make sure that all students understand what they will be doing.
3. Read the questions from the *Pond Problems Questions* page to your students. Then repeat them and ask the students to act out

the problems using the pond storyboards and frogs. After each problem, discuss what information they knew and what was unknown. Demonstrate how they can use an equation to represent what they are doing on the storyboard.

4. Using the equation mat, have students fill in what is known and what is unknown.
5. Have students turn to their neighbors and discuss what they have filled in on their equation mats and to talk about how they can find the unknown number. Allow students time to explain their thinking processes and to question others about theirs. _____ and _____ Direct students to record their equations on the student page.
6. Continue giving the class problems that will require them to solve for an unknown in various positions.

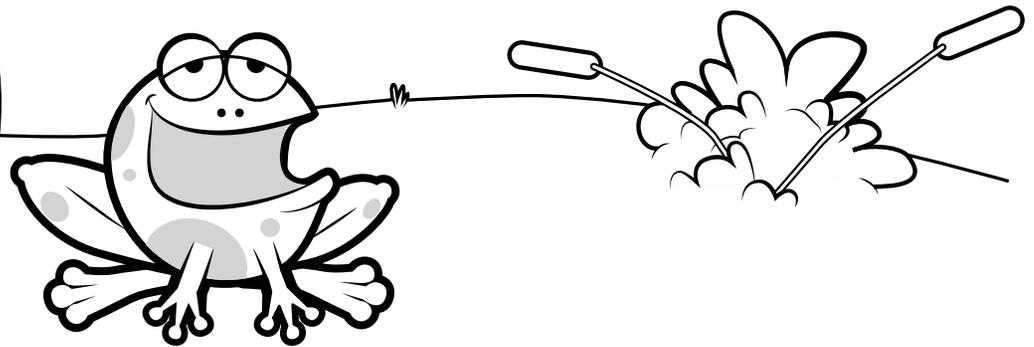
Ask These

1. How did the storyboard help you solve problems? Explain.
2. How did you know whether the equation should be addition or subtraction?
3. How would you go about solving a problem like this: There were six green and black frogs at the pond? Two were green. How many were black?

4. Write the equation for this problem: There were some frogs on the log and three more frogs came to join them. Now there are five. How many were on the log to start with?
[_____ + 3 = 5]
5. Tell me the story that $17 + \underline{\hspace{1cm}} = 20$ might represent.

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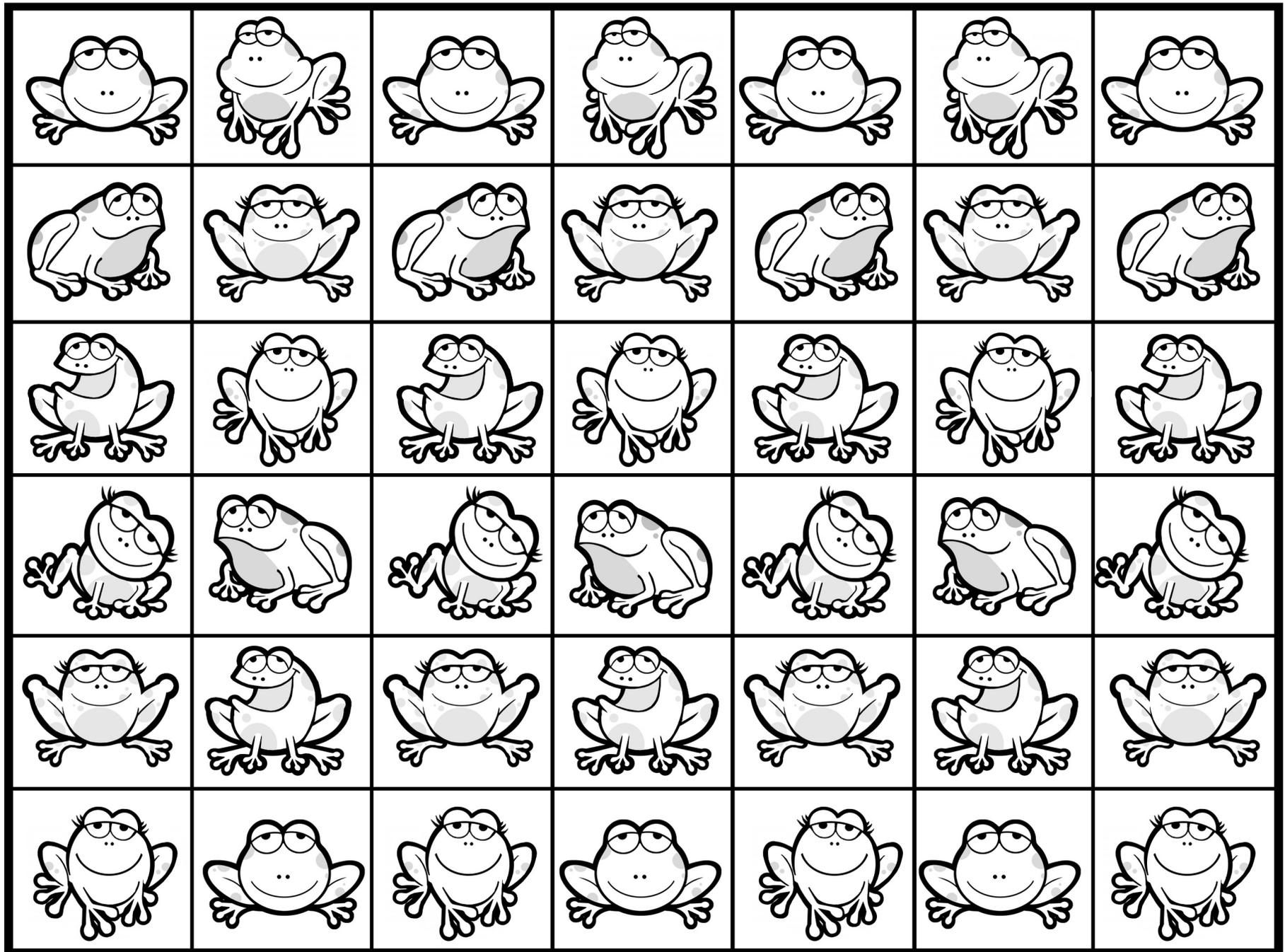
Pond Problems



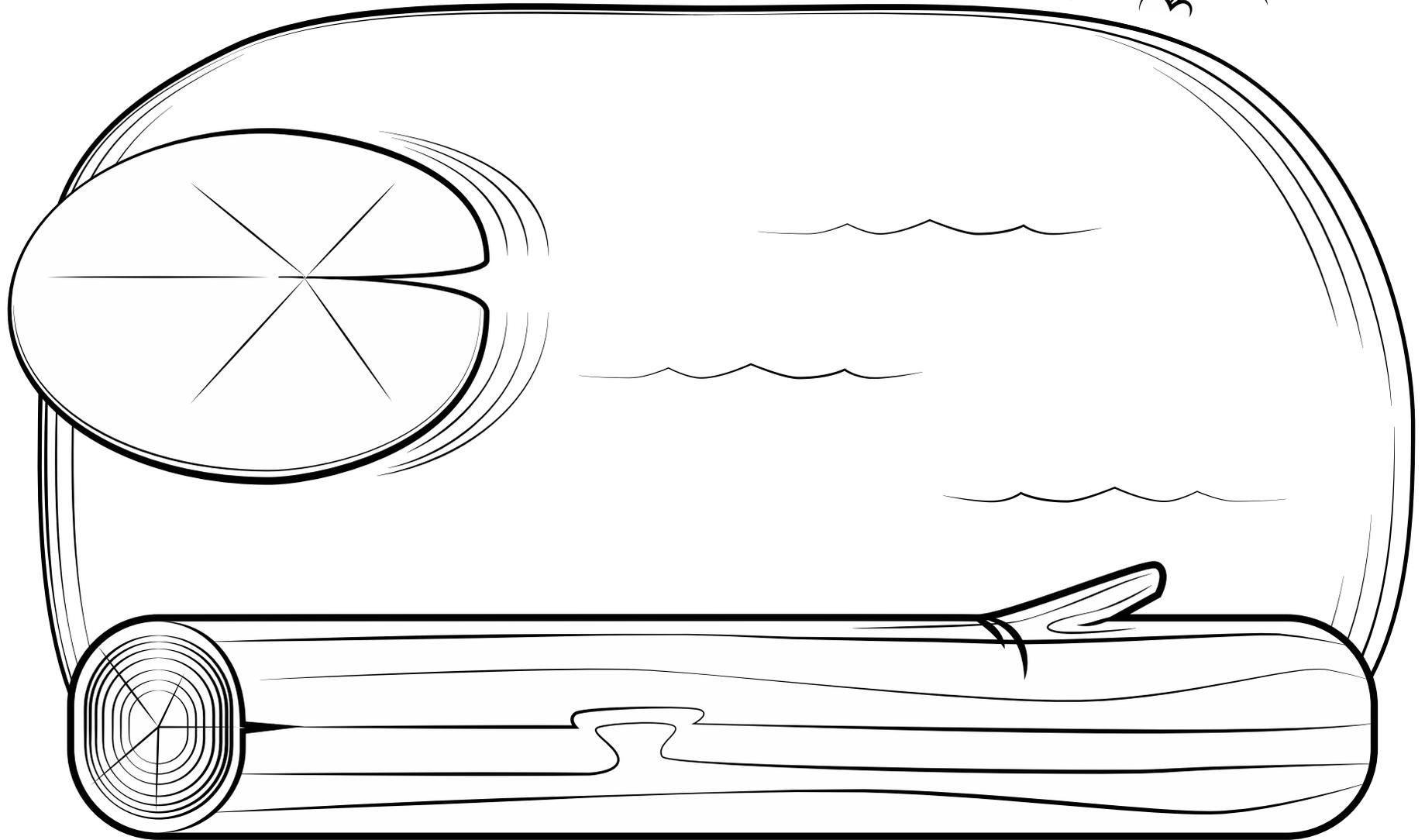
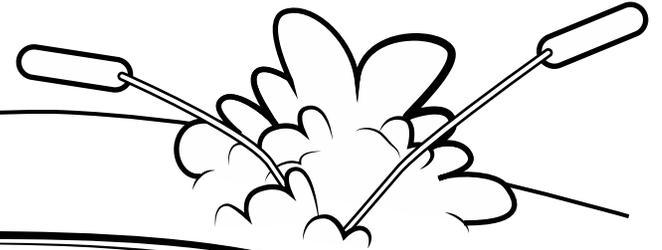
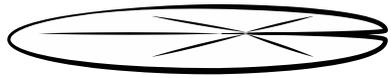
Questions

- Ten frogs were swimming in the pond. Eight more hopped into the water. How many frogs are in the pond now? [$10 + 8 = \underline{\hspace{1cm}}$ (result unknown)]
- Seven frogs were sitting on the large lily pad. Some hopped on to join them. Then there were 12 frogs on the lily pad. How many joined them? [$7 + \underline{\hspace{1cm}} = 12$ (change unknown)]
- Some frogs were sitting on the log. Three more frogs hopped onto the log. Now there are 17 frogs on the log. How many frogs were on the log to start with? [$\underline{\hspace{1cm}} + 3 = 17$ (start unknown)]
- There are 18 frogs in the pond. Three are on the large lily pad. The others are on the log. How many frogs are on the log? [$\underline{\hspace{1cm}} + 3 = 11$ (start unknown) or $3 + \underline{\hspace{1cm}} = 18$ (change unknown) or $18 - 3 = \underline{\hspace{1cm}}$ (result unknown)]
- There were three frogs swimming in the pond. How many would have to join them to make 12? [$3 + \underline{\hspace{1cm}} = 12$ (change unknown) or $12 - 3 = \underline{\hspace{1cm}}$ (result unknown) or $3 + \underline{\hspace{1cm}} = 12$ (change unknown)]
- There are 16 frogs on the log. Two are black and the rest are green. How many green frogs are on the log? [$16 = 2 + \underline{\hspace{1cm}}$ (change unknown) or $16 = \underline{\hspace{1cm}} + 2$ (start unknown) or $16 - 2 = \underline{\hspace{1cm}}$ (result unknown)]
- Fifteen frogs were at the pond. Seven were swimming and the rest were on the log. How many frogs were on the log? [$7 + \underline{\hspace{1cm}} = 15$ or $15 - 7 = \underline{\hspace{1cm}}$ put together/take apart (addend unknown)]
- The log had two more frogs on it than the lily pad. The lily pad had nine frogs on it. How many frogs were on the log? [$9 + 2 = \underline{\hspace{1cm}}$ (compare, difference unknown)]
- There are three fewer frogs on the log than in the water. There are 15 in the water. How many frogs are on the log? [$15 - 3 = \underline{\hspace{1cm}}$ or $3 + \underline{\hspace{1cm}} = 15$ (compare, smaller unknown)]
- The lily pad has four fewer frogs than the log. The lily pad has seven frogs. How many frogs are on the log? [$7 + 4 = \underline{\hspace{1cm}}$ or $4 + 7 = \underline{\hspace{1cm}}$ (compare, bigger unknown)]

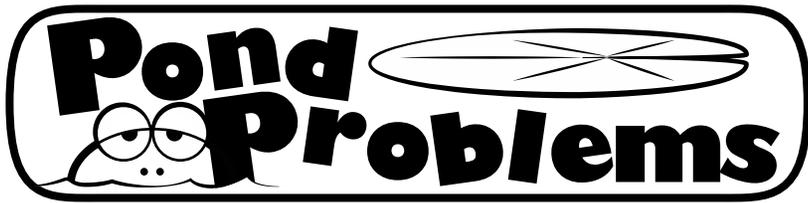




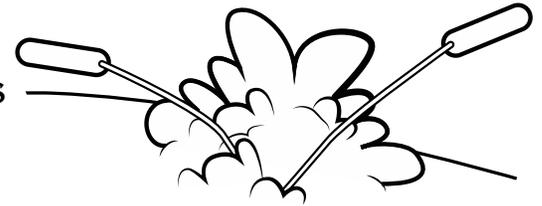
Pond Problems



Pond Problems



Write the equations.
Put the correct symbols
(+, -, =) in the circles.



1.

6.

2.

7.

3.

8.

4.

9.

5.

10.