KENAN FELLOWS PROGRAM

1 Fish, 10 Fish, Many Fish, Few Fish

A Unit developed to understand the relationship of numbers and how numbers relate to the base ten number system.

Author Information

This unit was created and developed by Kenan Fellow Kimberly Marone. Marone is currently an instructional coach Harnett County Schools in North Carolina. The majority of her teaching experience has been in K-2 classrooms. In the summer of 2011, Marone worked with the North Carolina Department of Public Instruction math section to develop a unit that would better help students understand number sense and place value. Kimberly Marone worked under the direction of Math Section Chief Barbara Bissell.

Introduction

A students understanding of number sense and number sense in regards to base ten typically develop along the same continuum. When looking at the progression continuum, students need to know the skills listed previously prior to moving on to more advanced skills. In the K-2 classroom the progression is as follows:

K-2 Number Sense Progression Overview

Students will be able to answer…

- What are numbers?
- What each number represents?

While counting students will be able to …

- Demonstrate one to one correspondence
- Rote count to 120
- Determine quantity/amounts
- Develop cardinality

Students will determine relationship of numbers (ex. 8 is 2 away from 10 and 6) through …

- Conservation
- Composing and decomposing numbers to 10

Students will compare numbers by determining …

- More than
- Less than

Students will be able to compare numbers as tens and ones by …

- Combining and separating tens and ones

Students will be able to add (understand addition as putting together and adding to) by…

- Counting on
- Skip counting

Students will be able to subtract (understand subtraction as taking apart and taking from) by…

- Counting backwards

More specifically in the 1st grade classroom a student's understanding of number sense would progress as follows:

1st Grade Number Sense Progression Overview

- Students will be able to count to tell how many (Quantity)
- Students will be able to determine equality in quantity
- Students will be able to know more and less in reference to quantity without counting (don't use bigger, larger, but use the vocabulary of greater than and less than, more or less)
- Students will be able to develop number relationships by changing one quantity to another and taking some away or adding some more
- Students will be able to compare numbers using manipulatives
- Students will be able to understand numbers by breaking numbers apart to see numbers within numbers (decomposing)
- Students will be able to create combinations of 10 by composing and decomposing numbers
- Students will be able to understand teen numbers as ten plus ones
- Students will be able to decompose a number using tens and ones to determine how many tens and how many ones left over in the provided number?
- Students will be able to tell how many ones are needed to make the next ten. Example – If given the number 17 how many more ones are need to make 2 tens?
- Students will be able to compare two digit numbers

- Students will be able to combine tens – breaking numbers into tens and ones and recombining them to add 22 and 24 is 4 tens and 6 ones = 46
- Students will be able to separate tens – break apart tens when needed and reorganize what is left into leftovers (35 and 22 decomposed 35 is 3 tens and 5 ones and 22 is 2 tens and 2 ones

Critical Vocabulary

- More
- Less
- Greater than
- Less than
- Base ten blocks

Curriculum Alignment

Common Core Standards

1.NBT (First Grade, Number and Operations in Base Ten)

Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

a. 10 can be thought of as a bundle of ten ones — called a "ten."
b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).
d. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.

Teacher Preparation

Please review the progression listed in this lesson to make sure the students are ready for numbers and how they relate to base ten number system.

Exploration/Pre-activities for students

Materials needed

- six sided die labeled 1,1,1,10,10,10
- six sided die labeled +,+,+,-,-,-
- Number cards
- Tens and ones blocks ("sticks" and "units")
- Tens Frame
- Counters

Learning Outcomes

- Students will orally demonstrate that they understand how a number is changed by adding/subtracting 1 or 10 to a given number.
- By rolling one six sided die labeled 1,1,1,10,10,10 and one six sided die labeled +,+,+,-,-,- students will mentally find one more/ one less or ten more/ ten less to a given number.

Process

- Have students take turns rolling the six-sided number die in a group (labeled 1,1,1,10,10,10). The student that rolls the die gives an action (example: jumping jacks, hops, etc.) All of the students in that group then do one or ten of the given action.
- What happens when 10 was rolled?
    - Brainstorm with the students. Some example responses may include had to do more, heart was beating faster, idea that 10 is more than 1

Student Thinking

- Students will explain the idea that 10 is more than 1.
- Students will make observations in regards to using their own heartbeat when doing something 1 time versus 10 times.

<u>Whole group activity Model System</u>

- It is important to take time with this whole class to be sure that students have a firm understanding before they start to work in workstations.
- Student shares two-digit number with group
- Represented with base ten blocks
- Add one to the above two-digit number
- Teacher will model math talk by asking probing questions
    - Did any digits change?
    - What digit changed?
    - Why did that digit change?
    - Did any digits not change? Why?
    - What could you do to make the digit in the tens place change?
    - How many more 1's are needed to make a ten?
- Continue to model in the same way, but add 10 to a two-digit number.
- Demonstrate how students will use dice and also record information in math journals.
- Students will work in workstations. Make sure to listen, observe and make anecdotal notes for the math conversations that should be taking place.

Student thinking

* Explain an idea – what digit changed? Why?
    * Did any digits not change? Why?

* Use information in a new way
* Make observations, generate and respond to questions
    * How many more 1's are needed to make a ten?

<u>Activities to further develop understanding of number sense</u>

The additional activities that have been provided are for use in small groups and work stations, but can also be used as additional assessments. The following activities were developed to provide students with numerous opportunities to work with numbers.

Classroom Time Required

For each of the activities provided the teacher must model with the class how to play each game. Once the students understand how to play and are able to play

with minimum support from the teacher they are ready to play with a partner or in small groups. Each activity should take about 20 minutes to complete. These activities were designed to be played multiple times throughout the unit and the year.

Assessment

Teachers need to observe students. The most valuable component of assessment will be the conversations that students are having with other students as well as with the teacher.

Teacher's Role

As the students are working independently, with pairs or in small groups the teacher should be moving around the classroom observing and recording what the students are doing and discussing. Teachers should be interviewing students to clarify their thinking and probing questions should be used to further understand a students understanding of the concepts and also to provide insight into the students thinking. The teacher should record all observations and interactions with the students to further understand the strengths and weaknesses and to drive instruction in the future.

Pick A Number

Topic: Counting to Tell How Many (Quantity)

Essential Question: How can numbers be shown in more than one way?

Student Outcomes:

- Students will show various representations of the same number.

Kid Friendly Objectives:

- "I can show a number in more than one way."

Materials:

- Number Cards
- Manipulatives for counting (cubes, tiles, toothpicks, beans and etc.)
- Markers, pencils, crayons
- Poster (Same Number, Many Ways) or large paper

Lesson Plan

Before: Show the students 10 cubes, the number 10, a drawing of 2 hands and a ten frame. As students what notice about the objects and what they have in common. Give students time to think (about 3 seconds) on their own and then with a partner share their thinking. Create a list of the students' suggestions. After brainstorming, tell the students that all of these objects represent 10.

During: Allow the students to work collaboratively in small groups. Have number cards in a bag and have one member of each group reach into the bag to pick a number 1 -10. The small group will then work together to represent the number that they selected in a variety of ways.

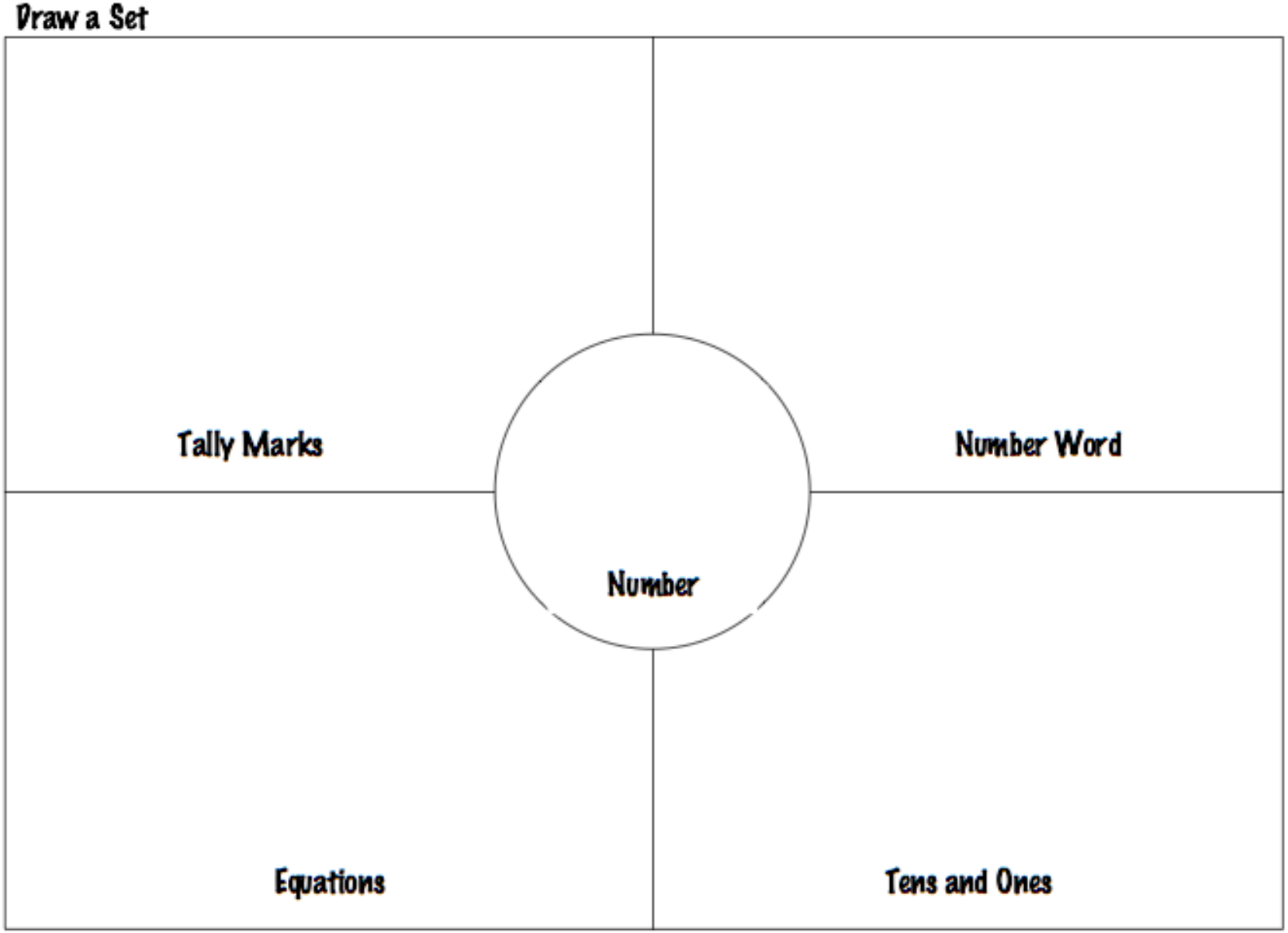
After: Each group will share their representations with the class. The group will need to justify their responses. After each group has had the opportunity to present their representations display posters visibly in the class for class.

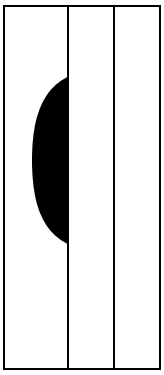
This lesson can be differentiated by changing the numbers.

Extensions:

Allow students the opportunity to add representations to the posters. This can be an ongoing activity in your classroom. For example, students can add equations and word problems as they develop their mathematical thinking.

Same Number, Many Ways





Car Valet

Topic: Ten plus ones

Essential Question: How many ones are needed to make the next ten?

Student Outcomes:

- Given a number students will accurately count objects to match the number

Kid Friendly Objectives:

- "I can count to tell how many."

Materials need for each group:

- Ten Frame or Parking Lot (see attached)
- 20 Small Toy Cars (cubes can be substituted)
- Provided Questions
- One Die

Lesson Plan

Before: Thumbs Up/ Thumbs Down - Ask students if they know what a valet is. This quick informal assessment will determine the depth of discussion. Before the discussion is complete students should know that a valet is someone that parks your car. Spend no more than two minutes on this discussion. Show students the "cars" and the "parking lot." Tell students that they are going to be valets today and will be parking cars. Model rolling

the die and parking that amount of cars in the parking lot. For example you roll 6, place 6 cars in the parking lot. Determine how many more cars you need to fill the parking lot. Engage the students in math talk. *I rolled six. The parking lot has 10 spaces. I wonder how many more cars I need to fill the parking lot. Using your fingers how many more cars are needed to fill the lot?* Student response should be 4. Roll the die again. Allow a student to park that many cars in the parking lot. Continue with this until parking lot is full.

While demonstrating game some possible questions to ask students are;

- Is your lot full?
- If not, how many more cars are needed to fill your lot?
- If your parking lot is full, how many cars are not parked in a space?
- How many cars do you have in all?

Working with a partner, tell students that they will each be valets of their own parking lot. Students will take turns rolling the die and parking cars. The goal of the game is to be the first one to fill the parking lot. Check to make sure that students understand procedures before they meet with their partner.

During: Students each have their own lot and a collection of cars (cubes). Students each roll a die. The person with the largest number goes first. Students take turns rolling the die and parking that amount of cars in their parking lot. While the students are engaged the teacher should walk around to make sure that the students are using math talk. If students are not engaged in math talk, model asking questions to get them to talk with their partners. Before leaving, encourage them to ask their own questions. For example, Tomika and Kim are playing. Tomika rolls a 4 and parks 4 cars in her parking lot. Kim rolls the die and places that many cars in her parking lot. These students are following the procedures, but are not enhancing their mathematical thinking by determining how many cars are still needed to fill their lots.

After: Bring the whole group back together to discuss the activity. Suggested discussion can be to talk about the different combinations of numbers to fill the parking lot. For example 4 and 6, 5 and 5, 2 and 2 and 6, etc.

Extensions:

- Create a list of the possible combinations.
- Using teacher created stories about the parking lot, allow students to solve the problems with use of their parking lot and cars.
    - June's lot has 2 cars. How many more cars are needed to fill her lot?
    - Shawn's lot has 6 cars in it. At lunch time he had 10 cars in his lot. How many cars left Shawn's parking lot?
    - Felipe's lot has 8 cars parked. 4 cars leave the lot and 2 cars drive in. How many cars are now parked in Felipe's lot?
- Through questioning lead the students to create their own stories about cars in the parking lot.

Ten Frames

Tens Of…. (Hundreds Of….)

Topic: Building bundles of tens (hundreds)

Essential Question: How many ones do I need to trade in order to make a ten?

Student Outcomes:

- Students will roll the die to determine the number of ones to get and then will trade ten ones in for a ten. By composing ones, students will make a 10.

Kid Friendly Objectives:

- "I can trade ten ones for one bundle of 10."

Materials:

- A Tens Of Game board (one for each player)
- 5 manipulatives (plastic soldiers) (five for each player)
- one die or number spinner
- assortment of base ten blocks (ones, tens, and hundreds)

Lesson Plan

Before: Discussion of what a unit (one) represents and what a stick (ten) represents. What can be done with the units in order to make a stick?

During: The object of the game is to get all five soldiers to their tank on the game board. Base ten blocks are kept in the center of players. The game begins when a player rolls (or spins) to show how many ones they are to get. Players take turns rolling in this manner. Once the player has 10 ones he/she trades them in for one ten. Each time a player trades for a ten they put a soldier on a tank. Players keep the place value manipulatives they have acquired so that they can visually see the numbers they have created.

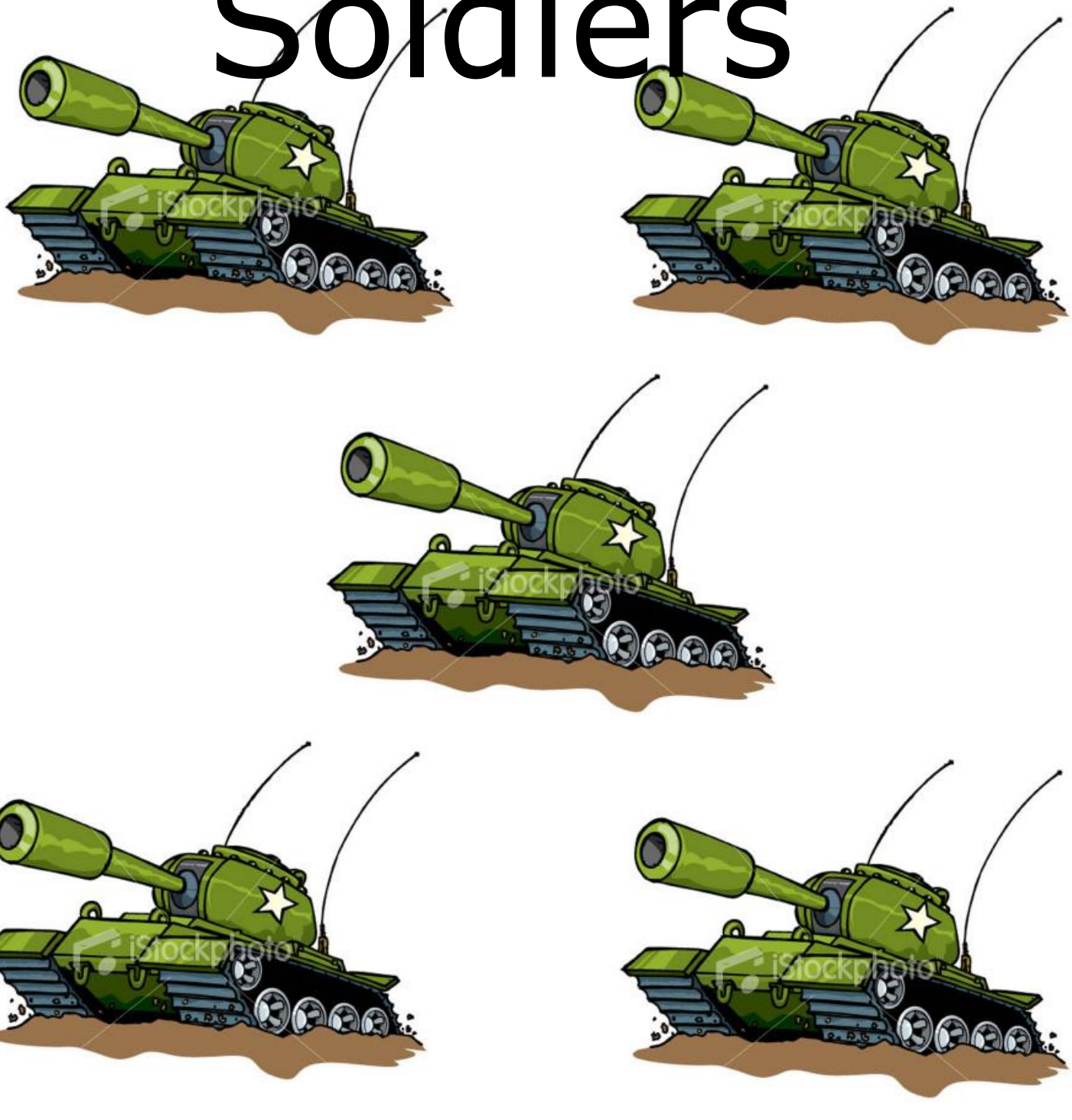
After: Class discussion. The following questions serve as a guide for the discussion.

- How did you know when to trade your ones in?
- What does trading in for a ten (stick) mean?
- What would you do if you had 23 ones?
- What did the soldier represent?

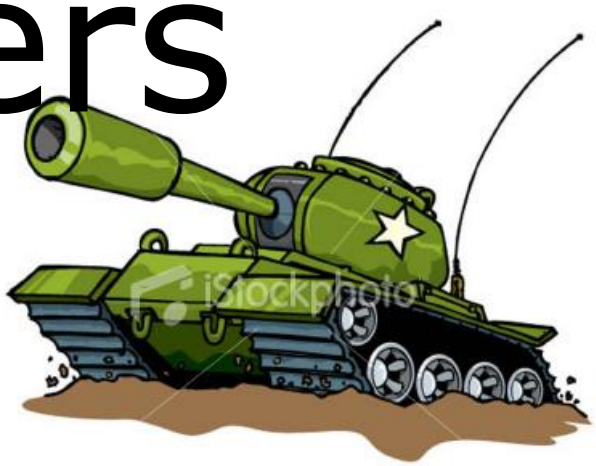
Adaptations/Extensions:

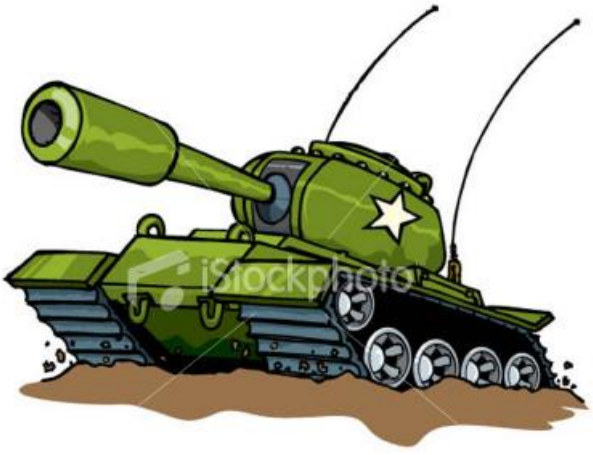
- Allow students to use blank ten frames to put their ones in.
- As students master building bundles of tens, they can then play hundreds of soldiers. The game is played in the same way, but as students create a bundle of 10 tens they trade for a hundred and put a soldier on their tank.
- Students can roll a double die (transparent large die with small die sealed inside) The number on the large transparent die determines the number of tens the student is to get and the number on the smaller die is how many ones the student is to get.

Tens of Soldiers



Hundreds of Soldiers





Changes Up and Down

Topic: Adding or subtracting 1, 10 or 100.

Essential Question: How are numbers changed when adding or subtracting 1, 10, or 100.

Student Outcomes:

Students will understand how a number is changed by adding/subtracting 1, 10 or 100.

Kid Friendly Objectives:

- "I can change a number by adding/subtracting 1, 10, or 100.

Materials: (per pair of students)

- Base-ten blocks
- One die labeled 1,1,1,10,10,10 (to use with two-digit numbers)
- One die labeled 1,1,10,10,100,100
- Operation die labeled +,+,+,-,-,-
- Paper (math journal)
- Pencil

Lesson Plan

Before: Ask a student to share a two-digit number with the class. Together as a class work with the number that the student gave by representing it with base-ten blocks. For example, if the student shared 32 students would place 3 tens and 2 ones in their work area. (Please note, if any student represents 32 by placing 32 ones in their work area then they still need work on building a bundle of "ten".) Have all students add one one (unit) to 32. Model math talk by asking probing questions such as;

- Did any digits change? Which digit changed? Why did that digit change?
- Did any digits not change? Why?
- What could you do to make the digit in the tens place change?

- How many more ones are need to make a ten? Once the next ten is made, how many in all?

Continue to model with a new two-digit number and replace adding a one with adding a ten. For example, have all students start with the number 67. Have students represent this number using base-ten blocks in their work area. Have all students add a one ten to the number 67. Model math talk by asking probing questions such as;

- Which digit changed? Why did that digit change?
- Did any digits not change? Why?
- Why didn't the ones digit change?
- How many more ones are need to make a ten? Once the next ten is made, how many in all?

It is important to take the time to model this with the whole class to develop full understanding before allowing students to work independently in workstations. Demonstrate how students will use the dice to complete the activity

During: Allow students to play *Changes Up and Down* with a partner. If you have an odd number of students they can work in a group of three. As students play remind them to use the vocabulary. Monitor students as they play and if needed please see extensions for differentiated activities.

After: Discussion about the patterns the students noticed when working with each of the numbers. This would be a great time to continue to play the game and color start number and end number (+1, -1, +10, -10, +100, -100) on a large hundreds board. What does it mean to add/subtract one? Ten? One Hundred? How do the numbers change for each of these scenarios? What digits change? After discussion students should reflect in their math journal about the patterns that they notice.

Adaptations/Extensions:

- For students that need more support, provide them with the numbers.
- For students that continue to need support in building a bundle of ten, have them begin this activity single digit numbers.
- Ten frames may be used for additional support.

Number Detective Headbands

Topic: How many tens and how many ones left over.

Essential Question: Can a mystery number be determined asking clarifying questions?

Student Outcomes:

- Students will work with a partner to ask questions in order to determine the mystery number on their head.

Kid Friendly Objectives:

- "I can ask questions to figure out the secret number. "

Materials:

- Sentence strip stapled to make a crown for head (each student will need one
- Number Cards (Numbers will vary depending on the students level of understanding)
- Paperclips
- Math Journal

Lesson Plan

Before: Teacher will need to prepare the headbands prior to the lesson by stapling them into crowns and putting a paperclip on the top center so number cards can easily be attached to the headband. Model for the students' appropriate questions to ask when trying determine number on headband. An anchor chart should be made during this time with the kids for further review. (Please note that it is more meaningful and useful if the kids help in the creation of an anchor chart rather than having it pre-made.) Questions that may be included on anchor chart;

- Is the number greater than or less than _____?
- Does the number have _____ tens?
- How many more ones are needed to make the next ten?
- Is the number even or odd?

During: Students will work in pairs to become number detectives to

After: Bring the class back together to discuss the game. As detectives, do you feel that the more numbers that you investigated did the task get easier or harder? Why? Invite students to share questions that could be added to the anchor chart. Have students write clues for a number in their math

journal and then have a friend to try and guess the numbers. For example, a student may write "This number is greater than 20, but less than 40. This number has a 3 in the tens place. You need 6 more ones to make the next ten. What is my number? (Answer: 34) A framework of what to write can be created and displayed for those that need support.

Adaptations/Extensions:

- Students could use a timer to see how many secret numbers could be identified before time runs out.
- Numbers that are used should be appropriate to the student's current level of number sense knowledge. For the student that is still working on understanding ones

16	23	33
25	9	14
7	24	11

54	76	82
99	37	41
49	50	60

Par-Part-Whole Bingo

Topic: One to one correspondence and decomposing numbers

Essential Question: Can I cover all of the tracks of the BINGO game board by decomposing numbers?

Student Outcomes:

- Students will roll the dice to determine the number of cubes to get and then will cover a single track or decompose the number to cover two tracks that have not been covered.

Kid Friendly Objectives:

- "I can decompose numbers to cover all tracks of the BINGO board."

Materials:

- Part-Part-Whole game board (one for each player)
- Two dice labeled 0-5
- 60 unifix cubes per student

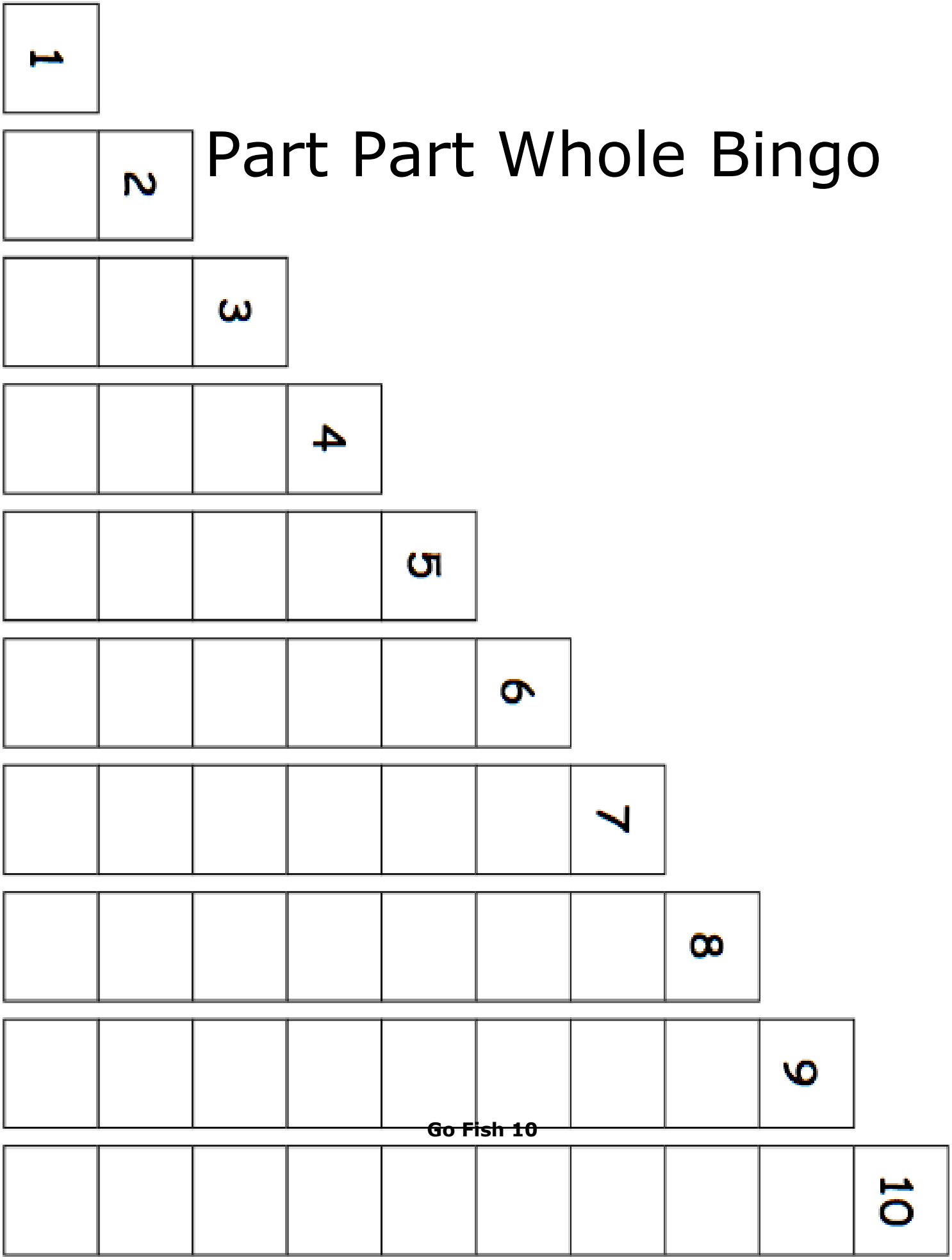
Lesson Plan

Before: Discussion BINGO board and how it works. Discussion of what it means to decompose numbers to equal a sum.

During: The object of the game is to be the first player to cover all tracks of the game board. Players take turns rolling both dice, computing the sum, and taking that many cubes. Players then use the number of cubes to cover a single track that matches their sum or to cover smaller tracks that add up to that sum. Tracks must be covered completely in a single turn so no tracks can be partially covered. The winner is the player who covers all of the tracks first. Example: If 5 and 4 are rolled, totaling 9, nine counters are taken by the player rolled. The player might choose to cover only the 9 track with them or cover the 3 and 6 tracks or the 1,2, and 6 tracks, etc. Tracks must be completely covered during a turn. If the player is unable to fill a track completely, they must pass their turn to the next player.

After: Class discussion. The following questions serve as a guide for the discussion.

- How did you know when to decompose your number?
- Was there a particular track that was difficult to cover? Do you think that you would have difficulty with the same track if you were to play again?



Part Part Whole Bingo

Topic: Composing and decomposing numbers to 10

Essential Question: What numbers can be combined to equal 10?

Student Outcomes:

- Students will create pairs of cards that when combined the sum is equal to 10.

Kid Friendly Objectives:

- "I can combine numbers to equal 10.

Materials:

- Number cards 1 -10 (4 of each number – playing cards can be used with the faces removed and Aces serve as the number 1)

Lesson Plan

The goal of this game is to match pairs of cards that equal 10. The game can be played in a group as large as four, however it would be best to start the students working in pairs.

How to play:

Students are each dealt five cards. The rest of the cards are placed face down in a stack. Students look at their hand to see if they have a pair of cards that when combined equal 10. For example, James has 7, 3, 6, 1, and 2 in his hand. James can pair up 7 and 3 and place them face up in front of him. Throughout the game partners are to double check each other's pairs. Students should say the addition sentences as they pair cards. So James would say "Seven and three are equal to 10/" Once students have had a chance to look for pairs, player one, can ask their partner for a number to help them create a pair. "Do you have a _____?" Jamie has 2, 5, 7, 9, and 9. Jamie can ask her partner does she have an 8. **Please note it's not "any" as in typical go fish, but "a" because students will give only one of that number and not all that they have.** Jamie asked for an 8, because she wants to add 8 and 2 to equal 10. If their partner does not have that number, their partner should say, "Go Fish!" Then player one must "fish," take a card from the face down stack. If Player One makes a match they will place the pair face up with other pairs. Their turn is now over and it's Player Two's turn (moving counter clockwise to play.) Player two will ask for a specific number to help them get a pair with a difference of one. If they have to go fish their turn is over. If a player runs out of cards they can pick one card from the "Go Fish" pile. Play continues until all cards are out of the "Go Fish" pile and no more combinations of 10 can be created.

Students count their pairs of cards and the student that made the greatest number of pairs wins.

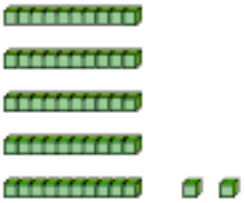
Adaptations/Extensions:

- Students can make combinations with 3 or more cards. For example, a combination could be created by combining 5,3 and 2.

Content Wrap-Up

- As a class model making a poster about a specific number. Make the poster together and use as an anchor chart for future reference.

- 5 tens and 2 ones
- number is less than 60
- number is greater than 50
- 8 more ones are needed to make the next "10"
- If you add a one, the tens place will not change



Guided Practice

- Students will work with a partner to create a poster about a provided number and then present the poster to the class.
    - Students should use the following vocabulary
        - Tens
        - Ones
        - Greater than
        - Less than
- The audience will provide feedback to the presenters.
    - Can anything else be added to the poster?

Modifications

- Encouraging the use of manipulatives
- Providing students with fill in the blank poster
- Students choose the number to work with

Poster Example

52	**fifty-two**

- 5 tens and 2 ones
- number is less than 60
- number is greater than 50
- 8 more ones are needed to make the next "10"
- If you add a one, the tens place will not change

Additional Resources

Literacy Connections

- *A Place for Zero: A Math Adventure* by Angeline Sparagna Lopresti
- *1 Hunter* by Pat Hutchins
- *Ten Black Dots* by Donald Crews
- *Ten Little Fish* by Audrey Wood
- *Two Ways to Count to Ten: A Liberian Folktale* by Ruby Dee
- *More or Less* by Stuart J. Murphy
- *Number Rhymes Tens and Teens* by Opal Dunn

Websites

- Illuminations
  http://illuminations.nctm.org/

- NCTM
  http://www.nctm.org/

- Common Core Standards
  http://www.corestandards.org/

- Van de Walle
  http://www.ablongman.com/vandewalleseries/

Links to SmartBoard Base-Ten Activities

- Tens and Ones
  Given a number, students build that number using base ten blocks
  http://exchange.smarttech.com/details.html?id=9ffd5885-0524-4add-bcbf-2790728624f9

- Place Value Identifying Tens and Ones
  Given a provided number (numbers range from 12 – 40) students make the number with base ten blocks
  http://exchange.smarttech.com/details.html?id=ba4fb30a-8e76-4205-9554-a0e1bce50012

- Mathematical Ideas of Place Value
  Identifying the value of digits in the ones, tens and hundreds place
  Can be used with smart response clickers
  http://exchange.smarttech.com/details.html?id=16273086-1f51-4093-a911-ef73c2548d05

- Greater Than, Less Than or Equal To?
  Using the symbols for greater than >, less than < or equal to = to determine quantity in sets
  Can be used with smart response clickers
  http://exchange.smarttech.com/details.html?id=40f0c923-bded-4fdb-a547-07dae5f150e0

- Base Ten and Place Value (tens and ones)
  Sort numbers by 10's and 1's, circle number in tens place red and ones place green, look at base ten blocks and write correct number, use blocks to build provided number

http://exchange.smarttech.com/search.html?q=Base+ten+blocks+and+place+value&subject=All+subjects&grade=All+grades&region=en_US

- Using Place Value
  Make sets/groups of ten, roll dice and build number with base ten blocks, use clues to solve riddles about numbers

  http://exchange.smarttech.com/details.html?id=9c6f6a20-69bb-45e6-9b69-81f57412312c

iPad Apps

- ScreenChomp – students can draw and write ideas, narrate their thinking and their work and then can send it to their teacher. With this the student can become the teacher as key learning takes place if the student is able to explain their thought processes.
- ShowMe – records voice and handwriting. Students are able to verbally explain their work.