

Number sense is a way of thinking about number and quantity that is flexible, intuitive, and very individualistic. It grows as students are exposed to activities that cause them to think about number in many ways and in different contexts. Number sense includes the ability to compute accurately, to self correct by detecting errors, and to recognize results as reasonable. According to the California Framework, a person has "Number Sense" if he or she has an intuitive feel for number size and combinations as well as the ability and facility to work with numbers in problem situations in order to make sound decision and reasonable judgments. The mathematics curriculum enables students to work with numbers to develop number sense traits that include a thorough understanding of number meanings, abilities to represent quantities in multiple ways, recognize the magnitude of number, to know the relative effects of operating on numbers, and to estimate and judge the reasonableness of quantitative results. Numbers enable students to count, to measure, to compare, and to make predictions. Helping students to develop number sense requires appropriate modeling, posing process questions, encouraging thinking about numbers, and in general creating a classroom environment that nurtures number sense.

What Is Numeracy?

Numeracy is the ability to make sense of math and to use it effectively in real life situations.

Numerate people:

- > can use what they know to figure out what they don't know
- > can use reasoning and evidence to prove a point
- > can explain what they are doing as they work with numbers, symbols, and geometric objects
- > know which processes to use to solve problems and can tell why
- > can talk about their ideas and show their thinking.

Components of Number Sense

Counting ----Counting is a complex idea, and foundational to other number concepts. In order to count, children must

- * Know the sequence of number names
- * Touch each item while coordinating the touching with verbal counting (one-to-one correspondence)
- * Keep track of which items have already been counted
- * Understand that the last number they say stands for the entire quantity, and includes each of the other numbers they have said (inclusion)
- * Realize that the items can be rearranged and still be the same quantity (conservation)

Number Relationships

- * Children need to know how numbers relate to each other—for example, that five is one less than six, but three more than two. This includes the ideas of "more," "less," "the same," "how many more," "how many less," and the sequencing of numbers.
- * A number line is one tool to help children visualize these relationships.

Decomposing and Composing Numbers

- * Children need to know that inside a number are other numbers, that they can break numbers apart and see what other numbers are inside. They need many chances to decompose numbers five and ten. They will use what they know about these smaller numbers to decompose larger numbers.

Landmark Numbers

* Landmark numbers are familiar landing places that make for simple calculations. They help children keep track of where they are. Children need many experiences with the number five, because everything that they know about five will help them know about ten. Later, children will use what they know about ten to help them with larger landmark numbers, such as twenty, fifty, and one hundred.

Place Value

* Place-value understanding grows from experience with counting. When students have frequent opportunities to count objects in many different ways, they come to realize the connections between quantity and the position of a digit. Until students understand place value, they solve problems based on counting and "one more than" relationships. Understanding that each digit in a multi-digit number represents a quantity as well as groups of a specific size is critical for students if they are to solve problems efficiently and flexibly.

Computational Flexibility

* Students with number sense can transfer their understandings to new situations. They know which methods are appropriate in various problem-solving situations and become more efficient with the methods they choose and use. If students are to develop computational fluency, they need experience with calculating mentally, with paper and pencil, and with a calculator. They also benefit and learn from hearing other students explain their solution strategies.

Math Language Use terms such as: the number after/before, between, more/less than, the same as/equals, the "fourth" number, 5 greater/more than, 3 less than etc.

** North Carolina <http://www.ncpublicschools.org/docs/acre/standards/common-core-tools/unpacking/math/kindergarten.pdf>

** www.georgiastandards.org/CommonCore/Documents/2.02.12_GPB

**Standards for Mathematical Practice--State

** <http://www.teacherspayteachers.com/Product/Common-Core-Math-Practice-Standards-Posters-619716> -Mrs. Ricca

**Strategies for Solving Math Problems Charts

TOOL #1 Ten Frames

Counting -Days of year: Use Ten Frames and introduce alligator $49 < 100$ for counting up to 100th day or $49 < 180$ total days of Kindergarten. Use symbol to show how many are present each day $25 = 25$ or $21 < 25$

Odd and Even- using tens frames- -partner way vs. column way

Attendance/Sign-in Question

Use with a yes/no question. Choose one side of graph. Determine multiple ways to show the total of that group. Ex. $6 = 3+3$; $2+4$; $1+1+1+1+1 = 6$ Use # line

TOOL #2 Rekenrek A rekenrek is composed of 2 rods with ten beads on each rod. Each rod is composed of 5 beads of one color and 5 beads of another color. This "five

structure" offers visual support allowing the quantity of five to be visualized as a whole. Soon the child will see that 7 is just 2 more than 5 and thus will see the 7 as "chunks" or groups, rather than as 7 individual beads to be counted. By conceptualizing numbers as groups, instead of as things to be counted, students are able to see early on how they can combine numbers to make other numbers. The grouping of beads in two colors and two rows also invites students to investigate the relationships between, and nurtures the use of 5s, 10s and doubles as points of reference for mathematical thinking. This tool was designed to support the natural ways that children develop mathematical understandings and to encourage them to use strategies like doubles or near doubles, and "thinking 10" in place of counting from one or counting on to solve addition and subtraction problems. Along the way, children develop a better sense of number relationships that form the basis for efficient calculation and allow for quick recall of math facts. <http://www.k-5mathteachingresources.com/Rekenrek.html>

Number Chats are a fun way to develop number sense in your students. It provides a way for children to decompose numbers. This means the ability to take apart the number in a variety of ways. Show a picture. Ask the following three questions:

1. How many do you see altogether? (mark it on the board) 2. How do you know it's _____? (I see 2 and 3) (Can you show it on the Rekenrek/ ball rope?) 3. Does anyone see _____ a different way? Repeat above **Kim Sutton -Do The Math Use language that repeats in different ways. ^ Example: If looking at a photo of 12 treats. 4 are ice cream and 4 are cookies and 4 are cupcakes. 12 treats is the whole and 4 is one part and 4 is another part and 4 is another part. 4 and 4 and 4 make 12. 12 treats- 8 with icing and 4 with no icing = 12 treats. 12 treats ---6 on the top row and 6 on the bottom row- 12 treats.

How Many Ways to Get to 11? Eve Mirriam How Many Snails? Paul Giganti
Act out with the kids.....
(See later section in handout for language prompts.)

We create # charts with the students. All About 3 /Talking About 5 -Number Quilts

We also make a chart about counting books after a circle read and pass.

Math Chants:

A counting we will go, a counting we will go,
We'll start at _____ and end at _____. A counting we will go. -Rozanne Lanczak Williams TOOL #3 Number Chart

TOOL #4 Pony Bead- Pipe Cleaner/Shoelace- Sliding Number Line
Number Line Glued on Tag Board-Pipe Cleaner Slider poked through above
TOOL #5 Number Line--Lakeshore

Ten Apples Up On Top -Theo LeSieg

Counting/One to One using cards/tiles Use child's photo- they draw body and add apples for class book. Add friend's faces for labeling the counting job on vertical columns of cubes stacked in 10. TOOL #6

Stay in Line- Teddy Slater

Combinations of 12- good for acting out in class - do not always use equal groups
Ways to show "How many more?" More doesn't mean bigger number - it is the "extra" ones that don't match Line up side by side -arms over shoulder. Sit facing each other - feet to feet

London Bridge style.

Get into groups of..... So much fun. Pick a day when you have an equal number of kids. I did 2s, 4s, 5s and 10s on a day I had 20. Make both standing and sitting 10 frames.

TOOL #6 --Life-size Ten Frame

Number Partners Pocket Chart Activity- use with particular theme Use paper cut-outs. Separate sets with a popsicle stick. Label with number tiles. Record.

Pete the Cat - cutting shapes !! "Did Pete cry? Goodness no!" (Teacher almost did!)

Halloween Cat Paintings Cat Count- addition sign "Before I turn the page; Can you predict how many cats will be on it? How do you know? What makes you say that? How many legs/tails/eyes?"

At the Edge of the Woods This book has a two page spread Read it once through. Then ask how many animals are there altogether. Try these ways to count with different books and when the kids are ready- read a new book and have them, while in thirds, use the techniques. Compare at the end to see if the three groups match. 1) fingers 2) unifix cubes 3) tally marks

Owl Chart --Chart it! -make a growing pattern by one on one side of chart- and a "doubles" growing pattern on the other (ex. 1 owl -2 wings, 2 owls- 4 wings)

Another: Flowers, 1 flower. 2 leaves. 4 petals

Seven Ducks/Multiple ways to show a Number

llllll and 1--- 6 and 1 --- $6+1=7$

10 Little Ducks - Use different color puppets. Play like musical chairs. Kids sit in a row at end of song and class says, "The first duck is green. The second duck is blue." We also use different ways to line up. I randomly pass out the cards 1-20 and they have to put themselves in order without talking. This is awesome!

Five Little Ducks *www.k-5mathteachingresources.com -- Free Resources- sign up

*Georgia Department of Education
www.georgiastandards.org/CommonCore/Documents/2.02.12_GPB_Kindergarten_Resource_Packet.pdf
Bo Peep Domino and Old Farmer McDonald

After listening to the story, 'Ten Flashing Fireflies' solve the following problem: How many different ways could 10 flashing fireflies be arranged with some in the jar and some in the night sky? After listening to the story, 'Mouse Count' solve the following problem: How many different ways could 10 mice be arranged with some in the jar and some in the grass? Use pictures, numbers and words to show your thinking. Count forwards and backwards.

Adding One More-

One More Bunny-Rick Walton Shows pictures and addition fact families-Great for visual "close reading" -multiple things to search for on each page.

Itsy Bitsy Spider-Keith Chapman

Spiders, Spiders Everywhere-Rozanne Lanczak Williams-Great chart in back

*www.heidisongs.com check "blog" Number Trees (pumpkin, apples, spiders)
Use dot painters/ten frames/counters Can they alter # without clearing board?
Use Dollar Store "jewelry" and toys to sort. Take photos and add lift the flaps to label.

Bears on Chairs -Parenteau

Math booklet- kids draw, stamp and write. When done assemble out of order for better comprehension work.

Eating Fractions- McMillan Pie Graphs-Bodach

20 Bear Counters -circle graph work mat Count out 20 randomly colored bears onto 2 tens frames. Put bears around circle in color groups. Draw lines to center. Color in to match. Color bears at the bottom to match. Talk about more/less/equal-same (Mark each end ¼ days of school!)

*10 Little Fingers- count by 10s

Baby graph - Sort by Baby Hair. Always have a "What do you notice?" chart on your graph. The reason for a graph is to display information. Teach kids how to "read" and explain that information.

Starry Arms- count by 5s/counting chart on page

Eggs and Legs count by 2s Make chart comparing different animals that hatch from eggs. Snakes/no legs; geckos/4legs; chickens/2 legs-These all come with "Fun Facts"

Go Away Big Green Monster- Ed Emberly Make Monster- emphasis on tearing/building small muscles. Take photo for guessing book. What can he eat? Two items 10 or less each. Use double tens frame/counters/volunteer. Two separate frames first and then combine into "10 and some ones".

A Family of Five- Use Family photo to make a counting book "I slide first. Mom slides second."

Five Little Pumpkins - reading binder-speech bubbles.

10 Little Pumpkins- reading binder match words to numerals.

Ten Grid Pumpkin Number Line

Sequencing Numbers-Pumpkins 1-20 anchor numbers/more/less

Turkey Feathers Math-Kim Jordano-many fabulous resources on her site kinderbykim

Apples, Peaches, Pears and Plums-reading binder///Birthday chart and observations

Name graph and observations

Chicken Soup with Rice-Maurice Sendak -Month poems for reading binder.

Up, Down and Around- Ayres Make an inchworm to help act out story

Large craft sticks/one inch squares and caterpillar foam shape from the dollar store

How Many Snails? Paul Giganti

12 Ways to get to 11 Eve Merriam

Do the Math Kim Sutton

A-Counting We Will Go- Rozanne Williams

30 Chart Marcy Cook

10 Apples Up On Top Theo LeSieg

Stay in Line Teddy Slater

Pete the Cat Eric Litwin

Cat Count Betsy Lewin

At The Edge of the Woods Cynthia Cotton

Ten Little Fingers and Ten Little Toes Mem Fox

Starry Arms Michael Dahl

Eggs and Legs Michael Dahl

Ten Flashing Fireflies Philemon Sturges

Mouse Count Ellen Walsh

One More Bunny Rick Walton

Spiders, Spiders Everywhere Rozanne Williams

Itsy Bitsy Spider Keith Chapman

Bears on Chairs Shirley Parenteau

Eating Fractions Bruce McMillan

Pie Graph Vijaya Bodach

Go Away, Big Green Monster Ed Emberley

A Family of Five Gare Thompson

Chicken Soup with Rice Maurice Sendak

Up, Down and Around Katherine Ayres

Reading Our Graph

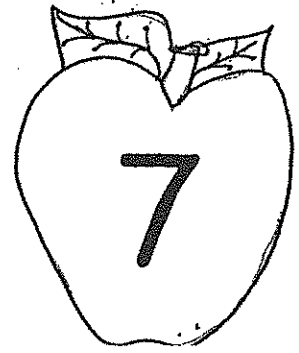
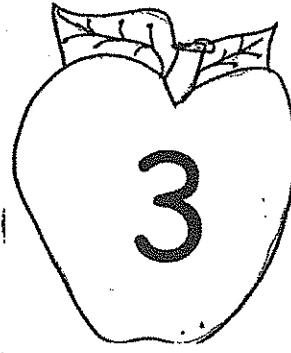
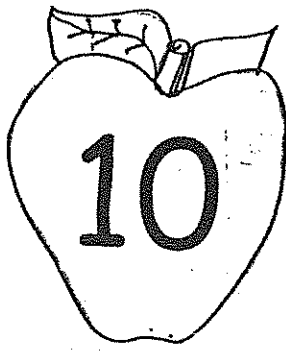
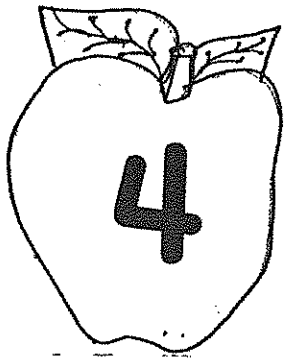
How many items are in the smallest group? _____

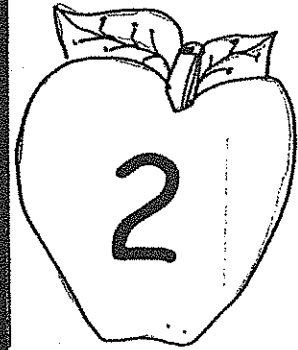
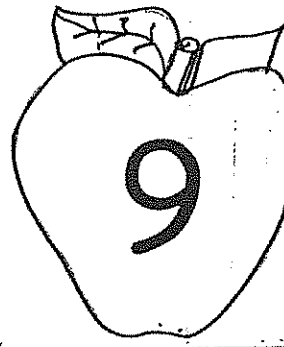
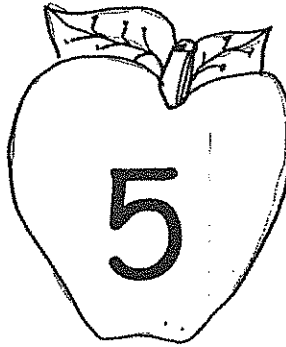
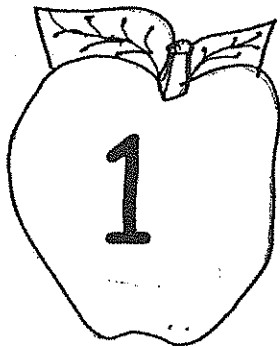
How many items are in the largest group? _____

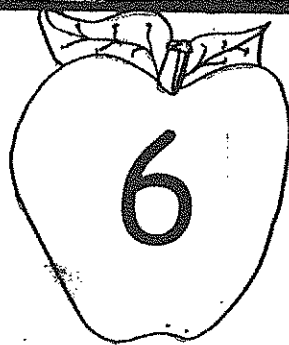
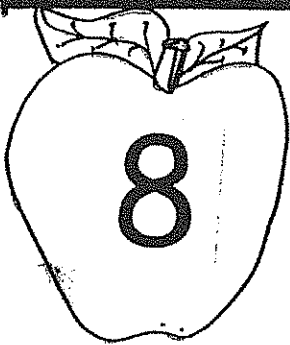
Do any of the groups tie? _____

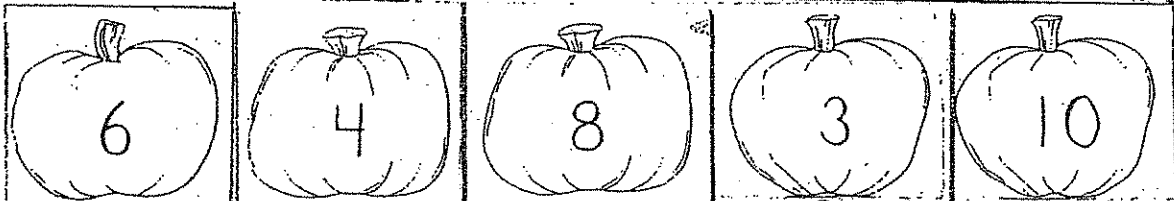
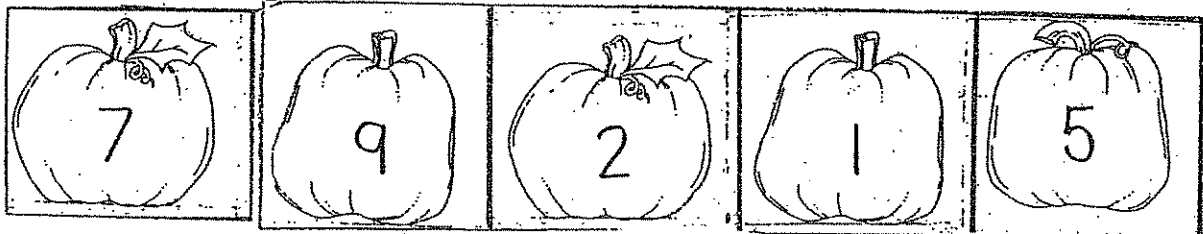
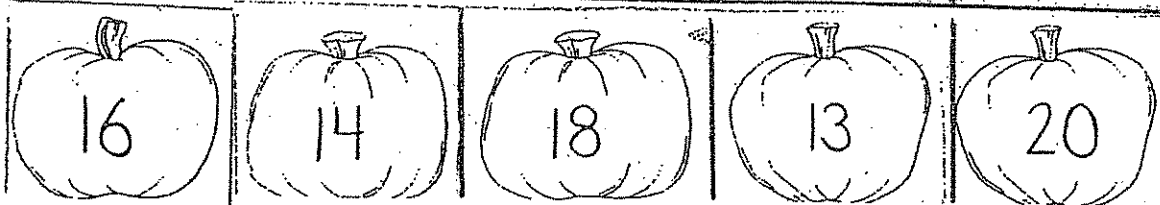
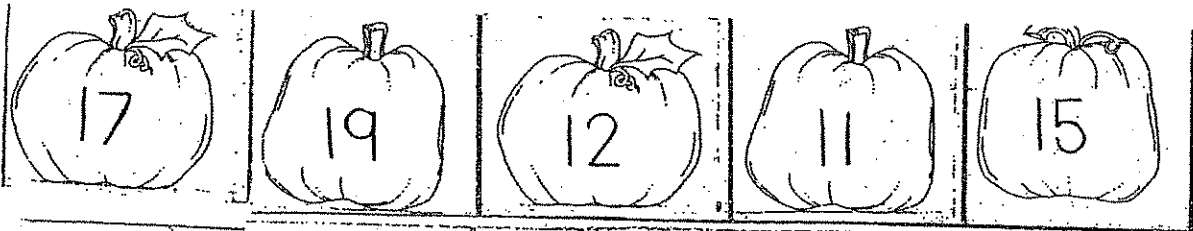
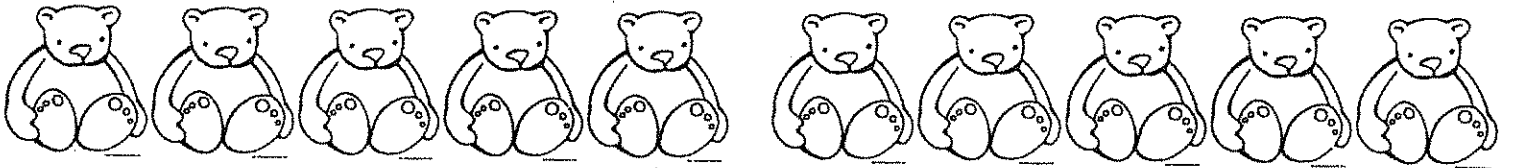
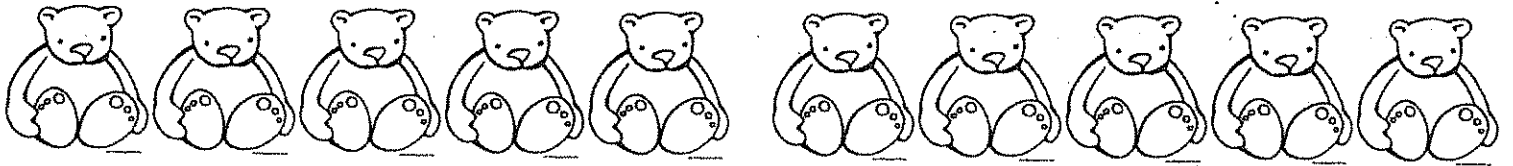
How many items are there all together? _____

0 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30









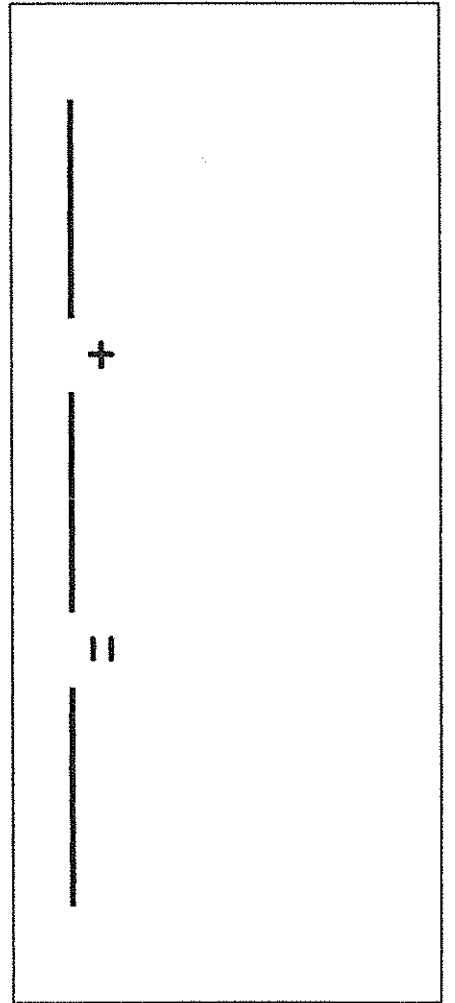
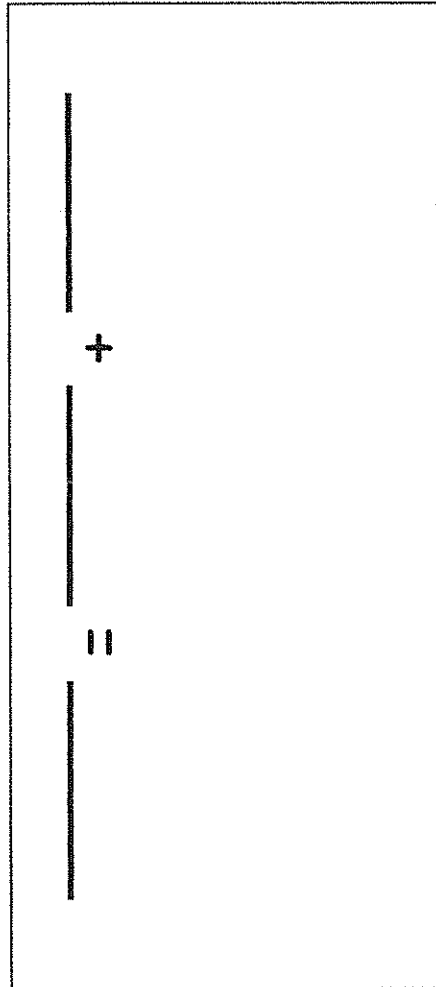
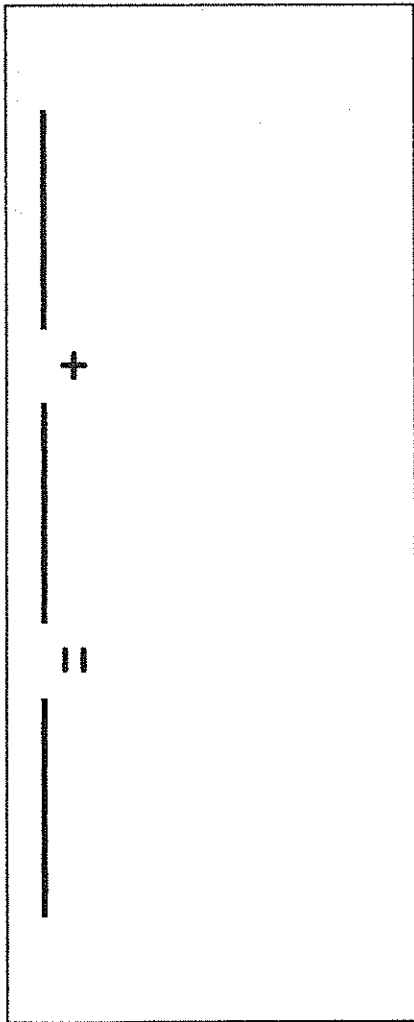
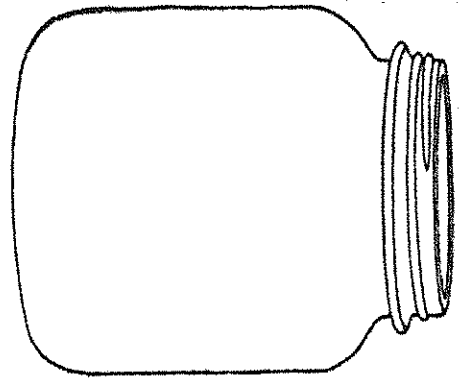
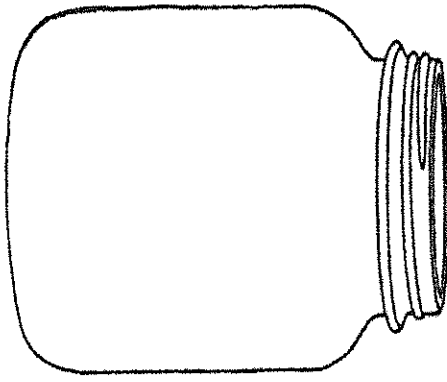
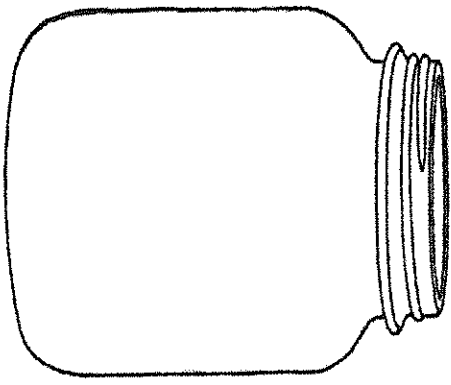
Big Green Monster ate

_____ and

_____ !

_____ + _____ = _____

Name: _____ Number partners for 5 !



Name _____

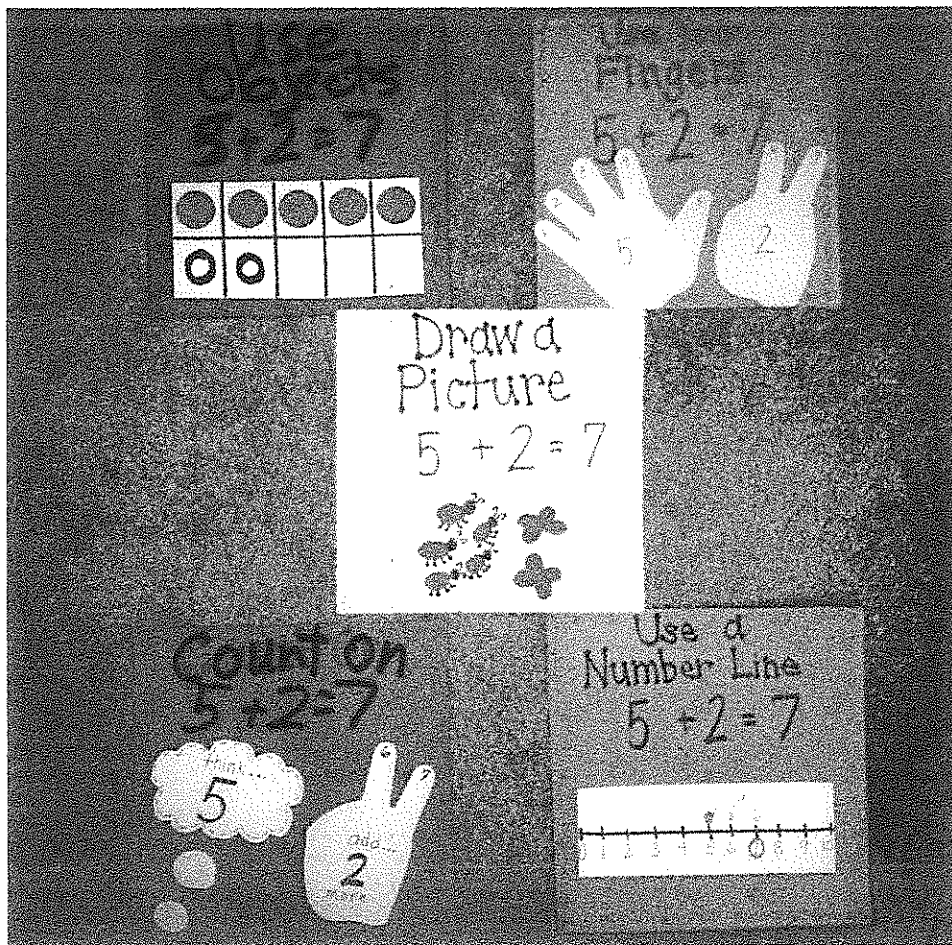
Write the numbers 11-20 in the boxes.

Cut and Glue the numbers in order from 11-20.

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15	12	19	16	11	20	14	18	13	17
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The *after* phase, or Share component, is a crucial component of the math journal session where academic talk between, and among, students is promoted. Several students may be selected to share their solutions and justify their reasoning. Selecting students who have used different strategies, models, or recording styles will provide models for other students of possible new approaches to try at another time. The teacher's role in creating an environment where students come ready to think, listen, share, and evaluate both their own and the reasoning of their peers is critical. Building this environment takes time, patience, and consistency. Strategies such as moving to a specific location in the classroom to gather for the share, using appropriate wait time after asking a question, accepting all ideas and answers regardless of obvious errors, and having students share their work with a partner before the whole class Share all encourage student communication. A chart of Math Talk stems can provide a useful support to scaffold students' interactions during the Share. Possible stems include:

- I think
- I used
- I recorded by
- I agree with ___ because
- I disagree with ___ because
- I noticed that
- The first thing I did was
- I don't understand
- My strategy was
- Another strategy is to ...