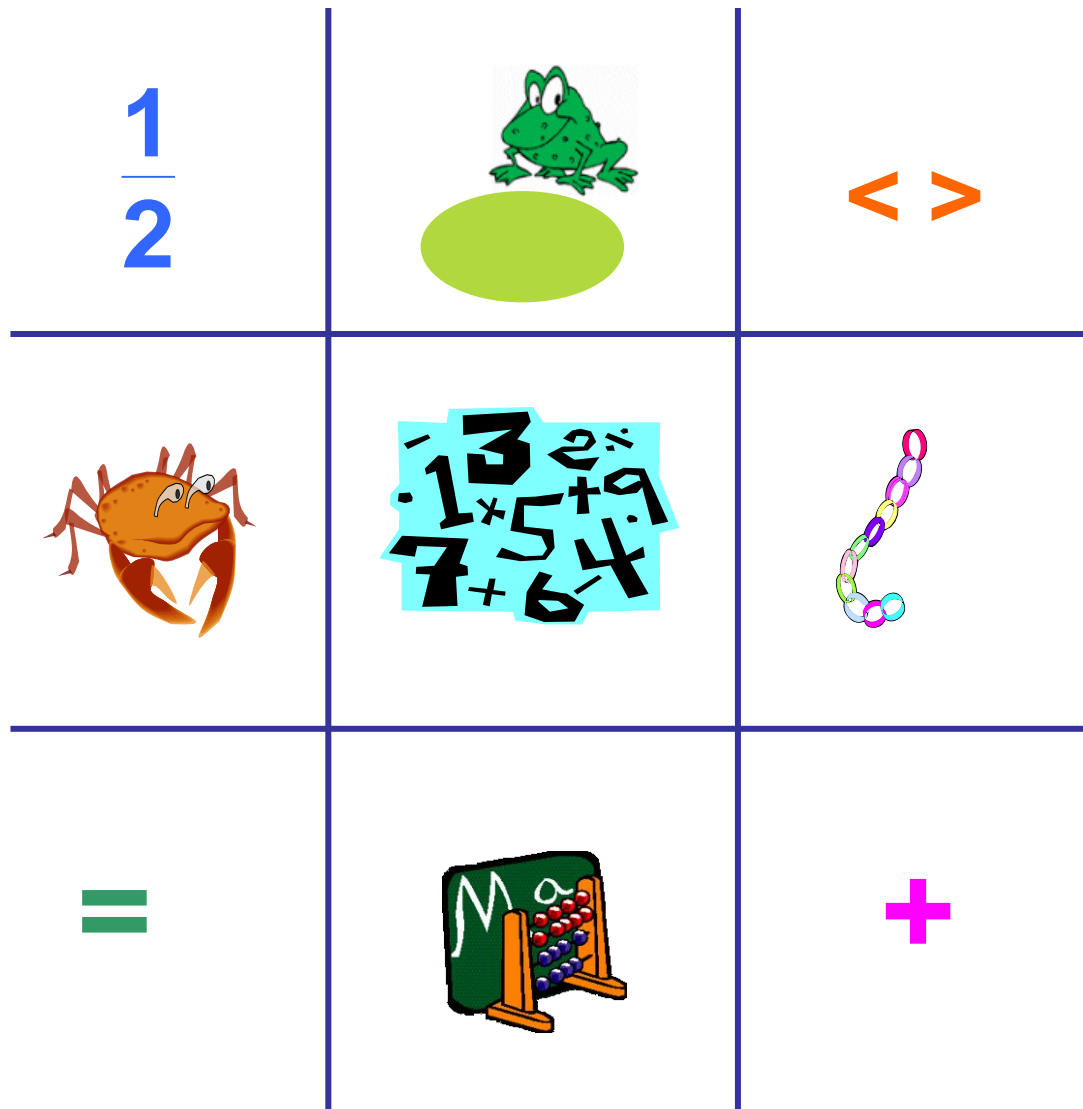


K-5 MATHEMATICS MODULE

Number and Number Sense



Office of Standards, Curriculum, and Instruction
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Acknowledgments

The Virginia Department of Education wishes to express sincere appreciation to the following individuals who have contributed to the writing and editing of the activities in this document:

- Carolyn Belsom, Chesapeake City Public Schools (retired)
- Robin Carpenter, Roanoke City Public Schools
- Laura Domalik, Hanover County Public Schools
- Debi Godfrey, Henrico County Public Schools
- Sharon Huber, Chesapeake City Public Schools
- Melinda Jenkins, Henrico County Public Schools
- Kim Lawrence, Hanover County Public Schools
- Carrie Nichols, Newport News City Public Schools
- Susan Smith, Newport News City Public Schools
- Kim Tresky, Roanoke City Public Schools
- Amy Wilcox, Newport News City Public Schools
- Jean Wimmer, Newport News City Public Schools (retired)

Introduction

The K-5 Mathematics Module *Number and Number Sense* is designed to assist elementary school teachers in implementing the 2009 Mathematics *Standards of Learning*. This module provides a sample of meaningful and engaging activities correlated to the number and number sense strand of the kindergarten through grade five mathematics *Standards of Learning*. The purpose of the Number and Number Sense module is to enhance teachers' content knowledge and their use of instructional strategies for teaching the number and number sense strand.

Through explorations, problem-solving, reasoning, and hands-on experiences, teachers will engage students in activities that address many dimensions of number and number sense including counting, combining, sorting, comparing sets of objects, comparing whole numbers, rounding of numbers, and exploring place-value and fraction and decimal concepts to develop number understanding.

By using these activities, it is anticipated that teachers will develop new instructional techniques to assist them in increasing student mathematics achievement in the classroom.

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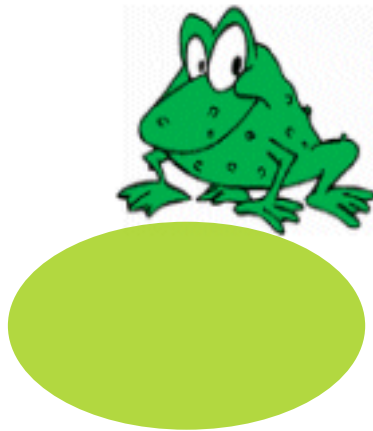
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KINDERGARTEN

Number and Number Sense



Build and Compare

Reporting Category	Number and Number Sense
Topic	Comparing set size using one-to-one correspondence
Primary SOL	K.1 The student, given two sets containing 10 or fewer concrete items, identify and describe one set as having more, fewer, or the same number of members as the other set, using the concept of one-to-one correspondence.
Related SOL	K.2, K.4a

Materials

- Deck of cards (with face cards removed)
- Linking cubes

Vocabulary

number words, more, less, same, bigger, smaller, equal

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Share number cards 1 to 10 with students. Ask them to tell something about each number shown. Using 10 as an example, students might count the number of fingers they have, share that \$10 is a lot of money, or point out that 10 is a number bigger than six. Try a few different numbers to get students talking and sharing what they know about each number.
2. Have two students hold up different number cards and compare their numbers. Ask, “Which is more/less? How do you know?”
3. Teach students the game of “Build and Compare.” Shuffle a deck of cards (face cards removed) and deal the cards evenly between the two players (facedown in two piles). Players say in unison, “1, 2, 3, compare,” as each turns over the top card.
4. Each player states his or her number. “I have a ____” and “I have a ____.” Then the players call out, “Build it!” and use linking cubes to build a tower to represent their numbers. After the towers are built, the two players compare their towers and their numbers using *more*, *less*, and *same* vocabulary. For example, “six is more than four” and “four is less than six.” The two number cards are then put into the used pile and another set is drawn. The game ends when all the cards have been compared. Shuffle and play again!

Assessment

- **Questions:**
 - Tell me a number that is bigger than ____.
 - Which is bigger? How do you know?
 - What do you notice about the two towers?

Variations

- Play with number cards or 10-frame cards instead of regular playing cards.
- Play with numbers 1 to 5 only.
- Play with numbers 11 to 20.

How Many Snails?

Reporting Category	Number and Number Sense
Topic	Identify and describe sets as having more, fewer, or the same
Primary SOL	K.1 The student, given two sets, each containing 10 or fewer concrete objects, will identify and describe one set as having more, fewer, or the same number of members as the other set, using the concept of one-to-one correspondence.
Related SOL	K.2, K.5, K.6, K.12, K.17, 1.3

Materials

- Book about snails (optional)
- Art materials (paper, markers, crayons, or paint)

Vocabulary

more, less, same, how many, count, attribute words (e.g., color, design, size)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

5. Read a book about snails to the class. The book provides many opportunities for counting sets and subsets on every page. Encourage students to take turns counting and discussing their counting strategies as the book is read.
6. Ask students to compare one group to another group on the page: “Are there more, fewer, or the same number in the two groups?”
7. Given appropriate art supplies, have each student draw a picture of a balloon. Tell the students that they should try to make their balloon unique.
8. Make a display with all the balloon pictures. (This could be done on a bulletin board or on chart paper.)
9. Allow students to develop questions about the number of balloons that other students can answer. (e.g., How many balloons are red? How many balloons are striped? Are there more round balloons or long balloons?)

Variations

- Students’ pictures can be related to a theme or season (e.g., snowmen in the winter, flowers in spring).
- Students’ drawings can be sorted and/or placed to create a physical graph based on given attributes.
- Students can take turns sorting the pictures and having other students guess what attribute was used for sorting.

Number Boards

Reporting Category	Number and Number Sense
Topic	Count, write, and select numerals to 15
Primary SOL	K.2 The student, given a set containing 15 or fewer concrete objects, will <ol style="list-style-type: none">tell how many are in the set by counting the number of objects orally;write the numeral to tell how many are in the set; andselect the corresponding numeral from a given set of numerals.
Related SOL	K.7, K.13

Materials

- One number board
- Two sets of digit cards for each pair or group

Vocabulary

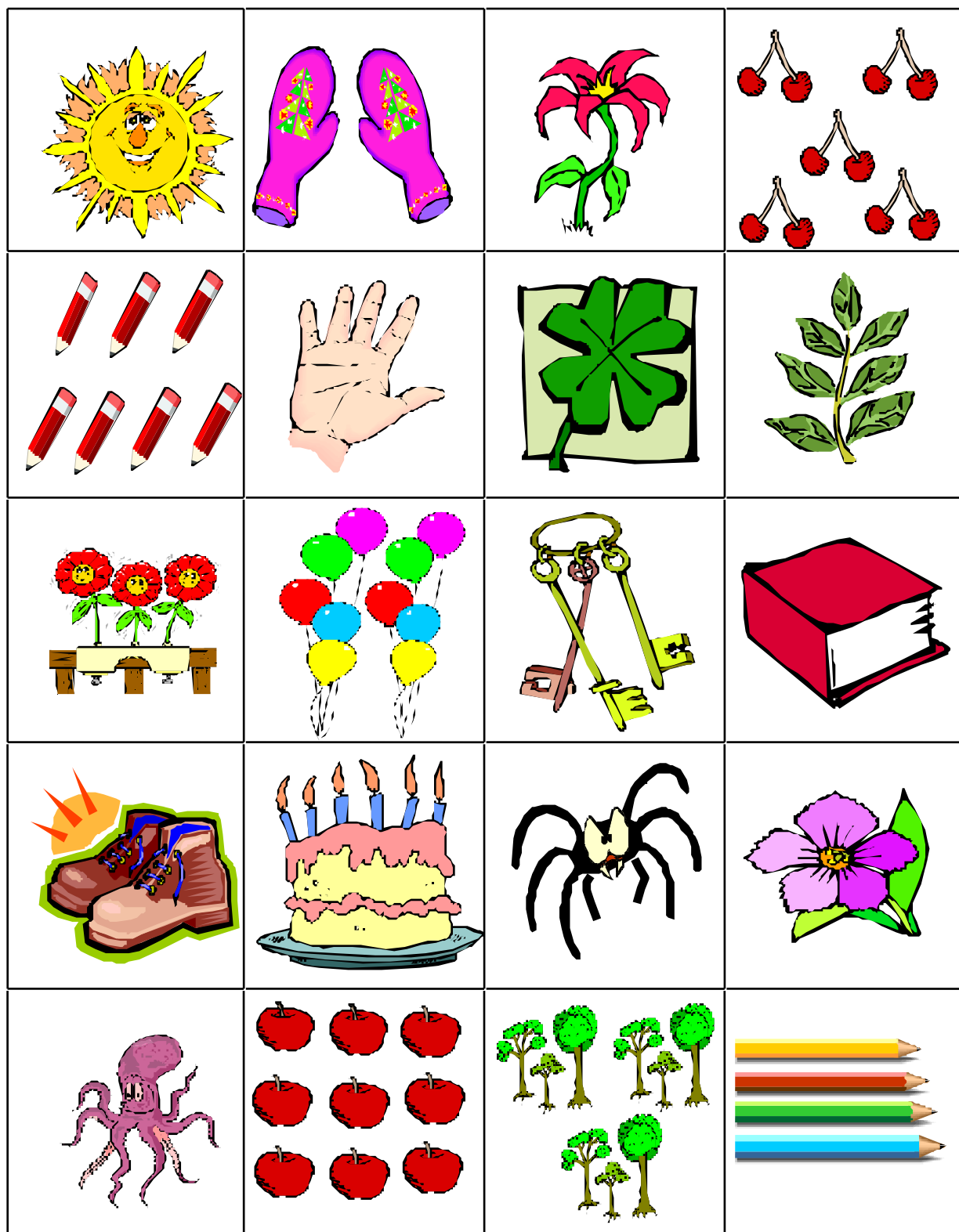
Varies, depending on clues given

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

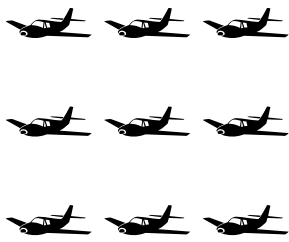
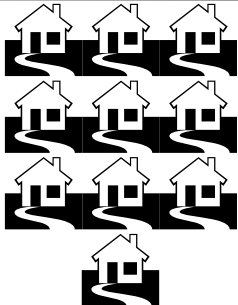
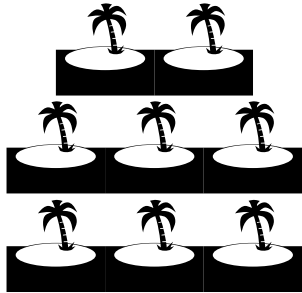
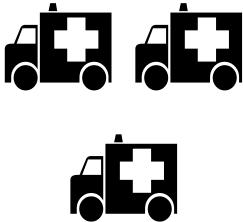
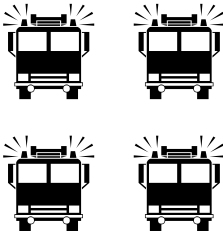



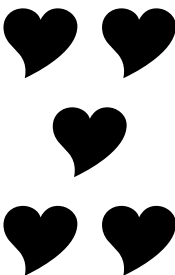
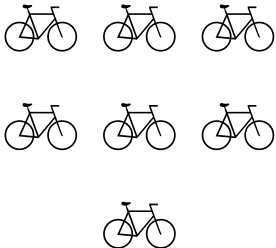
1. Direct students to work with a partner to cover the spaces on a number board, based on clues given by the teacher. Each number board has two representations for the numbers from 1 to 15. After providing a clue, have each student choose the appropriate number card and cover a corresponding space on the number board.
2. Representations for the numbers on the number boards may vary so as to give students experience with thinking about the numbers in a variety of forms. You may create different number boards as needed.
3. Clues for the numbers will vary depending on the students' needs and your goals. One number can be left uncovered for a quick check of accuracy at the end of the activity. "Which number is not covered on your board?"
4. Examples of clues:
 - Cover the number that is one more than 4.
 - Cover the number of pennies equal to one nickel.
 - Cover the number that comes right before 6.
 - Cover the number of legs that a puppy has.

(Note: You should develop additional clues as appropriate. Clues may include a variety of concepts or concentrate on a specific skill.)


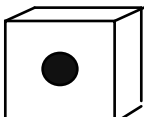

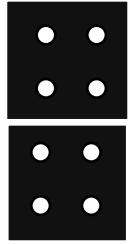
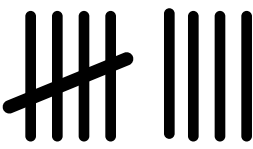
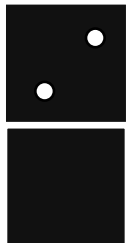
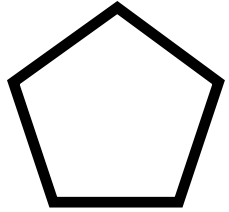
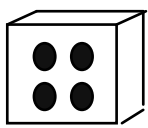
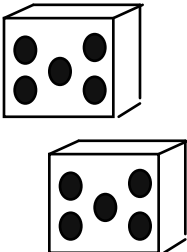

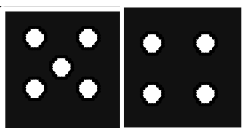
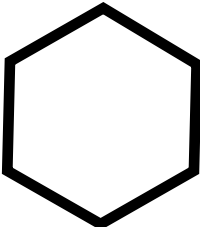
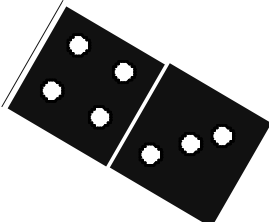
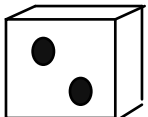
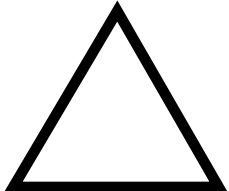

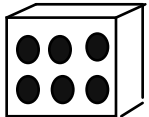
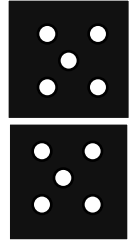

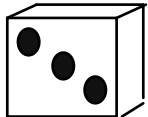
Number Board 1



Number Board 2

2			3
5			8
	9	1	
	6		
4		10	7

Number Board 3

Digit Cards (copy and cut apart)

1	2	3	4
5	6	7	8
9	10	1	2
3	4	5	6

7	8	9	10
11	12	13	14
15	16	17	18
19	20	11	12

13	14	15	16
17	18	19	20

Garbage!

Reporting Category	Number and Number Sense
Topic	Count, write, and select the number of objects in a set
Primary SOL	K.2 The student, given a set containing 15 or fewer concrete objects, will <ol style="list-style-type: none">tell how many are in the set by counting the number of objects orally;write the numeral to tell how many are in the set; andselect the corresponding numeral from a given set of numerals.
Related SOL	K.4a, 1.2, 1.1a

Materials

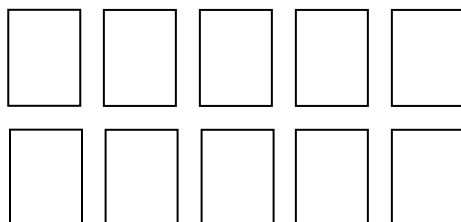
- Large deck of cards for display
- Regular decks of cards with face cards removed (one deck per partner set, or small groups of three) or decks made from 10-frame cards (attached)

Vocabulary

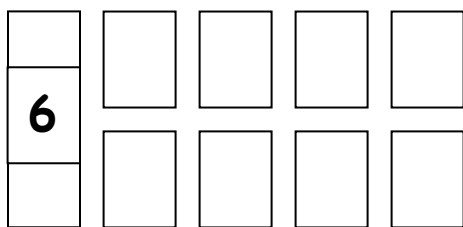
more than, less than, greater than, before, after, counting on, counting back

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Place cards 1 to 10 randomly on the floor. Have students share numbers they recognize and can name. Ask, “Are the cards in order?” Have students share ideas about the order of numbers 1 to 10.
2. Teach students the game “Garbage.” Shuffle a deck of cards with the Jack, Queen, King, and Jokers removed. Deal 10 cards facedown to each player. Place extra cards in the draw pile. Players arrange their cards (facedown) in a 10-frame pattern as shown below.



3. The first player takes a card from the draw pile and looks at it. The player names the card and then places it in the proper place by counting. For example, “I have a 6 and it goes in the 1, 2, 3, 4, 5, 6 space.” The 6 is placed face up and the card underneath is revealed.



4. The card revealed under the 6 is then named, and the player tries to explain where it goes in relation to the first card (i.e., the 6). For example, if the uncovered card is a 10, the student might say, “10 is more than 6,” and count on from 6 to get to 10. Or, the player may have to start back at 1 to count all the way to the 10’s space. Once the appropriate space is determined, that card is placed face up and the card beneath it is revealed. With each play, the student tries to articulate how the two numbers relate to one another in order to place the new card.
5. Play continues until a card is revealed that has already been played. If the player uncovers a card that has already been placed (face up), he or she calls, “Garbage!” and puts that card into a pile next to the draw pile.
6. Player Two begins the same way, by drawing from the draw pile. Or, the player may use the top card in the “garbage” pile to start play.
7. Each time “Garbage!” is called, play transfers to the next player. The object of the game is for the players to reveal and order their cards from 1 to 10. The game is over when the first player achieves that objective.
8. You should observe and listen for students to use *counting on*, *counting back*, *before*, and *after*, as well as other strategies to describe the placement of each number.

Assessment

- **Questions**

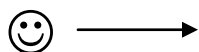
- How did you know where the ____ went?
- Which numbers are you missing?
- Is there another way you know that the number goes in that space?
- What do you know about these two numbers: ____ and ____?
- Can you tell me where ____ goes? Is it before or after ____? How do you know?

Variations

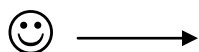
- Use 10-frame cards (attached) instead of regular playing cards. You will need three sets of 1 to 10 for each partnership.
- Play with numbers 1 to 5, slowly adding numbers to the game as the first five are mastered.
- Play with teen numbers (up to 20), ordinal numbers, fractions, and/or decimal numbers.

10-Frame Cards

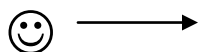
(copy and cut out three sets per pair)



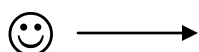
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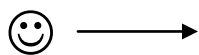
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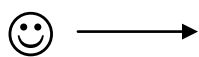
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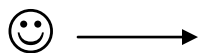
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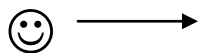
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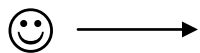
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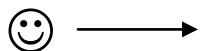
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How Many?

Reporting Category	Number and Number Sense
Topic	Count, write, and select the number of objects in a set
Primary SOL	K.2 The student, given a set containing 15 or fewer concrete objects, will <ol style="list-style-type: none">tell how many are in the set by counting the number of objects orally;write the numeral to tell how many are in the set; andselect the corresponding numeral from a given set of numerals.
Related SOL	K.4a, K.6, K.12, K.15, 1.5

Materials

- Overhead projector
- Magnetic counters
- Magnet wand
- Bingo supplies

Vocabulary

count, total, more

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

This activity helps develop fluency with composing and decomposing numbers, meaning that a whole number can be broken down into multiple addends. Decomposition of numbers is necessary to support a rich place value concept and a sound basis for mental computation.

1. Place 6 to 10 counters randomly on the overhead projector. Have the students determine the total number of counters shown and describe their counting strategies.
2. Turn the projector off and use the magnet wand to pick up some of the counters. (Students should not see how many counters are on the wand.)
3. Turn on the projector. Have students identify the number of counters showing.
4. Ask students, “How many counters are on the wand? How do you know?”
5. Replace the counters from the wand and repeat, picking up a different number of counters with the magnet wand each time.

Assessment

- **Questions**
 - What is the missing part of (target number)? How do you know?
 - Is there another way to make (target number)?
 - Can you think of all the combinations to make (target number)?
 - How can you be sure you have made all the combinations?

Variations

- Larger numbers of counters can be used (up to 20).
- Counters can be arranged spatially (e.g., in rows of two or groups of three).
- Number sentences (symbols) can be introduced for recording purposes.

Quick Images

Reporting Category	Number and Number Sense
Topic	Count, write, and select the number of objects in a set
Primary SOL	K.2 The student, given a set containing 15 or fewer concrete objects, will <ol style="list-style-type: none">tell how many are in the set by counting the number of objects orally;write the numeral to tell how many are in the set; andselect the corresponding numeral from a given set of numerals.
Related SOL	K.1, K.5, K.6, K.12, K.17, 1.3, 1.8

Materials

- 10-frames, or dot cards

Vocabulary

more, fewer, less, above, below, beside, group, set

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

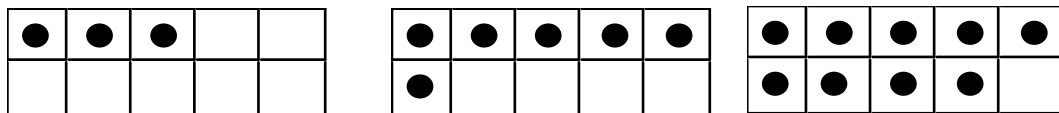
1. Present the students with a dot card, or 10-frame, for approximately 5 seconds.
2. Ask students to report the total number of dots, and describe how they got that answer.
3. Encourage students to share different strategies. For example, when presented with a 10-frame that has eight dots, some students may see it as five and three more, while others may see two fewer than 10. An arrangement of five dots, such as those seen on a dot cube, might be seen as two groups of two dots plus one more, or a group of three above another group of two.
4. Repeat this activity frequently with a variety of numbers and spatial arrangements.

Note: Creating and using specially patterned arrangements to represent numbers encourages students to create mental images that are important for developing fluency in composing and decomposing numbers with automaticity. The 10-frame model is especially useful for developing ideas about the benchmark numbers of 5 and 10.

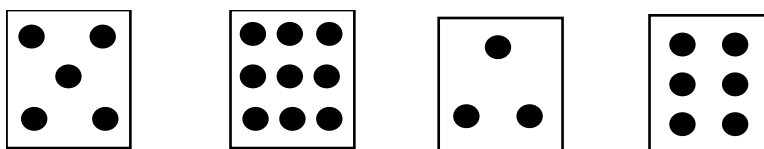
Variations

- Dominoes, playing cards, and standard number cubes all have representations of common spatial arrangements for numbers. Multiple experiences with each of these help develop student understanding.

10-Frame Examples



Dot Card Examples



Spill the Beans

Reporting Category	Number and Number Sense
Topic	Count, write, and select the number of objects in a set
Primary SOL	K.2 The student, given a set containing 15 or fewer concrete objects, will <ol style="list-style-type: none">tell how many are in the set by counting the number of objects orally;write the numeral to tell how many are in the set; andselect the corresponding numeral from a given set of numerals.
Related SOL	K.4a, 1.1

Materials

- Raw lima beans painted on one side and left white on the other (or two-color counters)
- Plastic cups
- Recording sheets
- Crayons

Vocabulary

and, plus, equal, make, and other addition words

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Show students the beans. Count out five together. Ask, “What might happen if you spill the five on the floor? How might they land? What are the possibilities?” Let students share their ideas.
2. Shake five and spill them. Ask, “How did they land? How many colored? How many white? How many in all? What if we spilled them again, how might they land? Will it be the same?” Let the students share their ideas.
3. Shake the beans, spill them, and talk about how they land.
4. Teach students how to play “Spill the Beans.” Students will use between five and nine beans. Count out the beans and place in a cup. Students say, “Shake, shake, shake, and spill,” while shaking the cup and spilling the beans on the table. Have students separate the beans by colors and record how many of each by coloring a row on the recording sheet. (You may want to give specific directions for coloring, e.g., color all the colored counters first and then leave the rest white.) Repeat again and again until the students feel they have found all possible combinations.
5. Come back together as a class and talk about how students might know that they found all of the different combinations.
6. List all the combinations on the board and talk about the patterns that can be seen. Ask, “What happens to the number of colored beans as the number of white beans increases? Why is this so?”

Assessment











































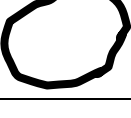

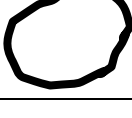
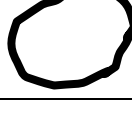






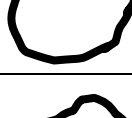






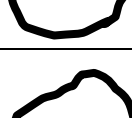
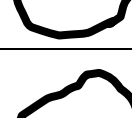
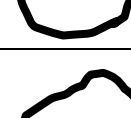
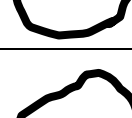

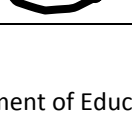





- **Questions:**

- What are some ways you can make ____?
- What goes with ____ to make ____?
- Is there another way to make ____?
- How will you know when you have all the combinations of ____?

Variations

- Try other numbers or sets of beans.
- Record numbers along with pictures of beans.
- Add symbols or number sentences to be completed, such as $__ + __ = __$.
- Have students cut the recording sheet apart by rows to organize their results and discuss the resulting patterns.

Recording Sheet (example for seven beans)

							= 7
							= 7
							= 7
							= 7
							= 7
							= 7
							= 7
							= 7
							= 7
							= 7

Splash!

Reporting Category	Number and Number Sense
Topic	Count, write, and select the number of objects in a set
Primary SOL	K.2 The student, given a set containing 15 or fewer concrete objects, will <ol style="list-style-type: none">tell how many are in the set by counting the number of objects orally;write the numeral to tell how many are in the set; andselect the corresponding numeral from a given set of numerals.
Related SOL	K.1, K.3, K.4a, K.6, K.12, K.15, 1.5

Materials

- Story book about splashing in water
- Counters
- Story mats

Vocabulary

first, second, third, more, less, same

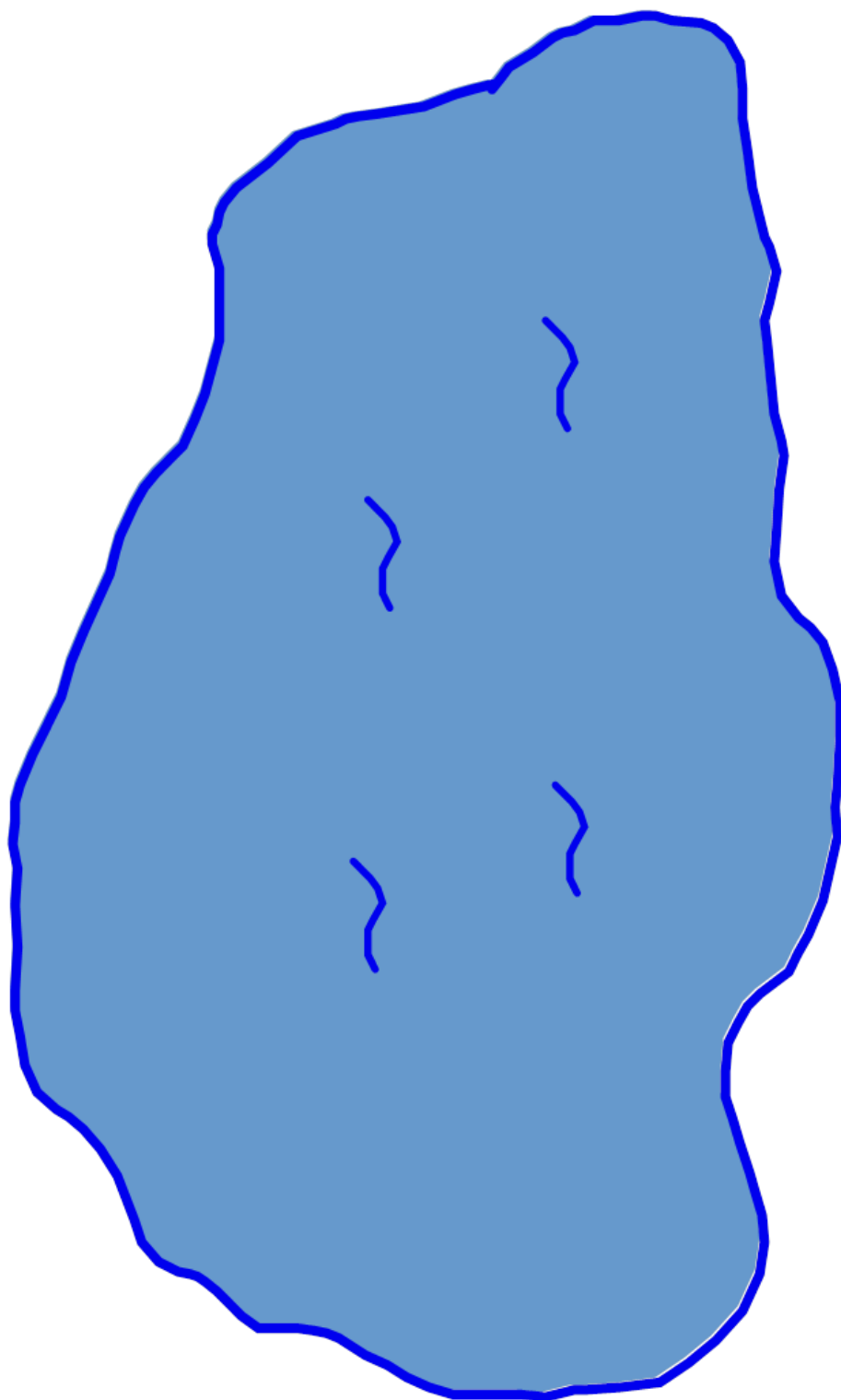
Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Read the book about splashing to the class.
2. Provide each student with a story and some counters.
3. As you read the story, have students use the counters to model the characters' movements in and out of the pond.
4. Pause frequently to ask how many animals are in the pond and how many are out.
5. Have students compare the number of animals that are in the pond to the number of animals that are out of the pond. Ask, "Are there more, less, or the same number? How do you know?"
6. Ask students to identify the animals that went in the pond first, second, and third.
7. Create new "splash" stories for the students to act out and describe.

Variations

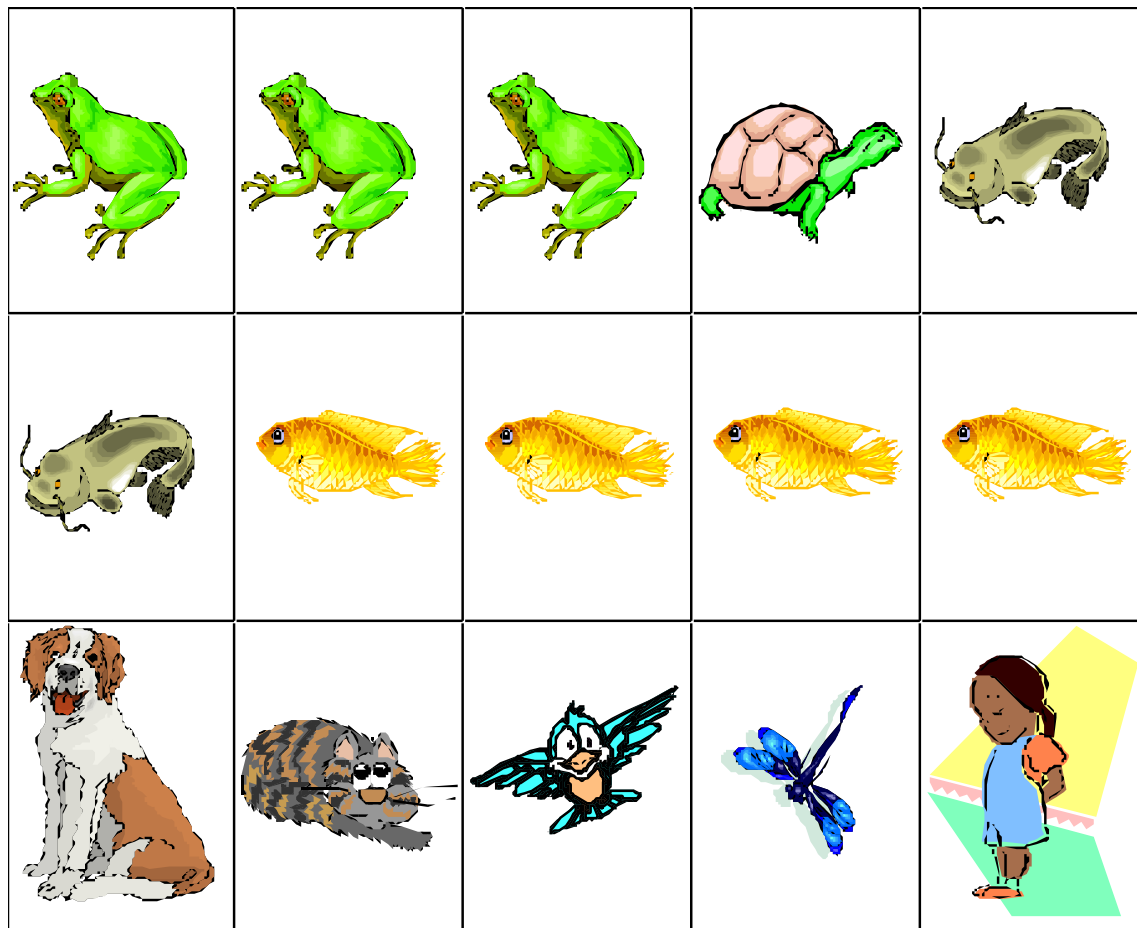
- Number sentences can be written to record the events in the story.
- Students can use the counters and mats to model and describe additional scenarios.

Story Mat



Counters

(copy and cut out one set for each student)



Paper Chains

Reporting Category	Number and Number Sense
Topic	Indicate ordinal position of an object
Primary SOL	K.3 The student, given an ordered set of ten objects and/or pictures, will indicate the ordinal position of each object, first through tenth, and the ordered position of each object.

Materials

- Book about *Henry the Fourth*
- 1-inch strips of construction paper (pre-cut and in different colors)
- Glue

Vocabulary

ordinal number words (first, second, etc.), *top, bottom, left, right, place, position, line, loop*

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Read a book, about *Henry the Fourth*.
2. Discuss the story and the ordinal number words in the story. Ask: "How many dogs come before Henry? How do you know? If there were five dogs, what would be the last dog's position? If there were three more dogs what would be the position of the last dog in the show?"
3. Give each student 10 1-inch strips of different colored construction paper.
4. Have each student make a paper chain with 10 paper strips in the same color order. (Before the lesson, you should predetermine the order of the different colors for the paper chain.)
5. Demonstrate how to glue the two ends of the first paper strip together in a loop. Have students get the second color they are supposed to use and put it through the first loop and then glue the two ends together. The loops should be intertwined to form a chain. Continue this process with students until their chain has 10 paper loops.
6. Working with a partner or in a small group, have students take turns asking questions about the chains. For example, "What color is third if the chain is facing the door? What color is seventh? In which place is the blue loop? The green loop?"
7. Have students turn their chains in another direction, and continue asking each other questions about the ordinal positions of the colored loops.

Assessment

- **Questions:**
 - In which place is the (color) loop?
 - How about the (color) loop? How do you know?
 - Which color is first, fifth, tenth?
 - How many loops come before yellow (or another color)?

Variation

- Have students make a five-loop paper chain using two colors of construction paper strips. They should arrange their strips in an AB, AAB, etc., pattern. Challenge students to determine which color would come seventh if the pattern continued? Tenth? Ask them to explain their thinking.

Lily Pad Hop!

Reporting Category	Number and Number Sense
Topic	Counting forward and backward
Primary SOL	K.4 The student will a) count forward to 100 and backward from 10.
Related SOL	K.1, K.2, 1.3

Materials:

- Game board
- Number cube
- Markers/counters
- Green construction paper circles for lily pads
- Children’s storybook on leap frogs (optional)

Vocabulary

counting, number words, dots or pips

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Ask students to share some things they know about frogs. What do they do? Read students the story book, if available. The story should have in it a variety of animals. The frog gets around by jumping or hopping.
2. Have students pretend they are frogs and hop. Ask, “How can we tell how far the frog has gone?” (Answer: “We can count his hops.”) Have students call out a number and hop that many times, getting their whole bodies involved in counting.
3. Lay out the green circles as lily pads. Have students hop and count how many lily pads they land on. Each time a student frog lands, talk about counting hops. The other students can use their hands and hop on their legs to get the feel of hopping and counting together, practicing one-to-one correspondence.
4. Teach students to play “Lily Pad Hop.” Each set of partners or small group needs a game board, a number cube, and markers/counters. For each turn, the player rolls the number cube, names the number rolled, and then moves one of the markers/counters across the board. The object is to get all of the frogs to the pond or lily pad. If a frog gets to the pond and the player still has hops remaining, the student can move another frog toward the pond. In other words, players can split their hops between two frogs if needed. The game is over when all of the frogs get to their ponds.

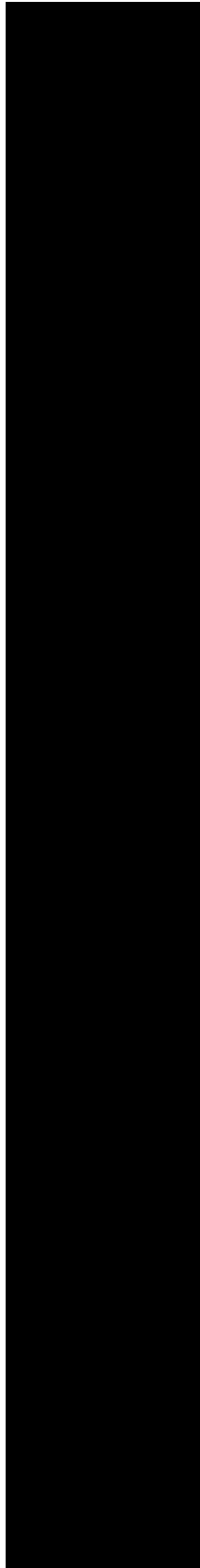
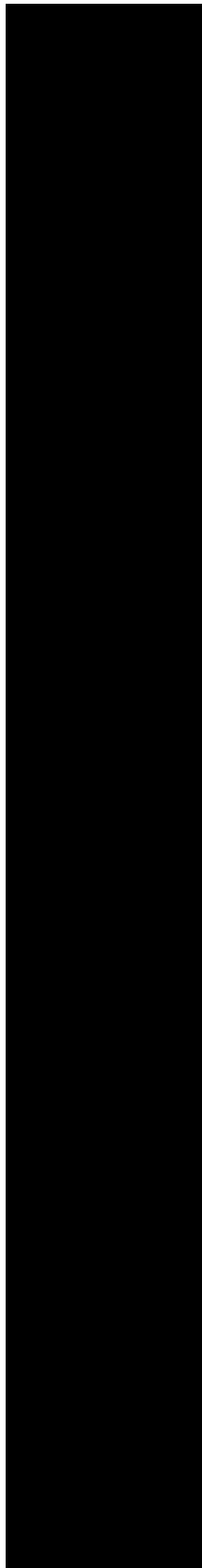
Assessment

- **Questions**
 - How many more spaces do you have to get to the lily pad, or to the end? How do you know?
 - Are you halfway there? How do you know?
 - Do hops and number names stay together?

Variations:

- Play with regular six-sided dot cube with pips (small dots).
- Play continuously by letting the frogs start over each time they reach the pond.

Lily Pad Hop! Game Board



Math to 100 and Back: More or Less

Reporting Category Number and Number Sense

Topic Counting by ones, fives, and tens and backwards from ten

Primary SOL K.4 The student will

- count forward to 100 and backward from 10;
- identify one more than a number and one less than a number; and
- count by fives and tens to 100.

Materials

- Hundreds board
- Linking cubes

Vocabulary

count, ones, fives, tens, one more than, one less than, skip counting, patterns

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Have students use the Hundreds Board to count by ones to 100. They will place their finger on each number as they count. Have students count beginning with any number while placing their finger on that number (e.g., 11) Then have students move their finger to the number that is one more (e.g., 11,12). Have students use the vocabulary of “one more than “11 is 12.”
2. Have students place a linking cube on the number 10. Students will move the linking cube backwards while counting (10..9..8..7..6..5..4..3..2..1). Use the vocabulary of “one less than a number” as they move to the left by counts of one.
3. Students can place their finger (or use a linking cube) on 7 and count back one stating “6 is one less than 7.” You may have students continue counting back from any number to model “one less than.”
4. Beginning with the number 5, students will skip count by 5s marking the multiples of 5s with a linking cube.
5. Beginning with the number 10, students will skip count by 10s marking the multiples of 10s with a linking cube.

Assessment

- **Questions**
 - “What are some numbers that come before 50? What are some numbers that come after 50? How do you know?”
 - “Can you model counting by 5s?”
 - “Can you model counting by 10s?”
 - “How many brownies would you like? Why?”

Hundreds Board

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Sharing

Reporting Category	Number and Number Sense
Topic	Identify halves and fourths
Primary SOL	K.5 The student will identify the parts of a set and/or region that represent fractions for halves and fourths.

Materials

- Oranges, cookies, brownie, or candy bar pieces
- Chart paper for recording
- Pencil

Vocabulary

equal, fair shares, parts, whole, total, fraction

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Introduce the activity by dividing the orange, cookie, brownie, or candy bar into different sized parts so the students can see. Pose the question, “If I give everyone a piece of the _____, will this be an equal way of sharing the _____? Why or why not? How could the _____ be shared equally?” Have students brainstorm and discuss their ideas. (Students should realize that the parts are not equal-sized and thus not an equal way of sharing.)
2. Divide a second orange, cookie, brownie, or candy bar into equal shares using one of the student’s strategies for division, and let the students enjoy the treat while you begin the next part of the activity.
3. Next, explain to the students that they will be working with a partner or in a small group to solve the following problem: *There are two children who want to share one orange so that each child gets the same amount. Show how many orange pieces each child can have. Explain your thinking using pictures, numbers, and words.*
4. Discuss the problem with students. Ask, “What are we trying to figure out? How many children are sharing? How many oranges are they sharing? What are some ways we could show our work on this problem?”
5. Set the small groups to work and remind students that they need to draw pictures to show how many parts one child will get if they share the orange equally.
6. Allow students to work on the problem and then explain their thinking.
7. Monitor students as they work to see how they are approaching the problem. What strategies are they using? Are they sharing the oranges equally among the children in the problem? Do their pictures accurately represent equal parts? What difficulties are they having? What are students doing well? How are they recording to show how many orange pieces one child will get?
8. After students have had time to explore the problem, pull the whole class back together to discuss the strategies students used to determine how many orange pieces each child would get if sharing the orange equally. Ask, “How did you solve the problem? How

many orange pieces did the children have to share? Did you use the whole orange without throwing any of it away? Did the children get equal parts? How do you know? Is there another way to solve this problem? How did you record your thinking? What numbers did you use to show how much one child will get? Does anyone know what the pieces/parts are called?”

9. Record various students’ solutions on chart paper or the board during the whole class discussion. Be sure to discuss the various strategies students used to solve the problem.

Assessment

- **Questions**

- What are we trying to determine with the oranges?
- How many children are sharing?
- How many oranges are they sharing?
- What are some ways you could show your work on this problem?
- How did you solve the problem?
- Did you use the whole orange(s) without throwing any parts away?
- Did each of the children get an equal part? How do you know?
- Is there another way to solve this problem?
- Did anyone have a different picture for your solution?
- How did you record your thinking?
- What numbers did you use to show how much one child will get?
- Does anyone know what the pieces/parts are called?

Variations:

- There are four children who want to share two oranges so that each gets the same amount. Show how many orange pieces one child will get. Explain your thinking using pictures, numbers, and words.
- Use different numbers based on the needs of students.
- Try using numbers that involve each child receiving a whole orange and part of another orange (e.g., four children could be sharing six oranges) to observe strategies students use to solve the problems and share the oranges equally.

FIRST GRADE

Number and Number Sense



Hundred Chart Puzzle

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.19, 1.21

Materials:

- Hundred chart
- Hundred Chart recording sheet
- Pencils
- Overhead projector

Vocabulary

more, less, counting up, counting back, counting words, numerals

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Review the number patterns on the Hundred chart that you have been discussing with students. Ask, “What patterns do you see on the chart?” Point to a row and ask what students notice. Point to a column and ask what students notice. “What else do you see?”
2. Explain that you will be giving students a part of the Hundred chart that has been cut out from the whole.
3. Students need to decide what numbers could go on the puzzle piece cut from the chart.
4. Ask students to explain how they decided which numbers to put on the puzzle piece.
5. Have small groups/sets of partners share their Hundred chart piece with another group. “What do you notice about the other group’s puzzle piece? Do the numbers on the piece make sense? Why or why not?”
6. Pull the groups together to discuss several of the puzzle pieces. “What number did the group put first? How did you figure out what number to write next? Do the numbers on the puzzle piece make sense? Why or why not?”

Assessment

- **Questions:**
 - What patterns do you see on the Hundred chart?
 - What do you notice about the rows?
 - What do you notice about the columns?
 - How did you decide what numbers to place on the Hundred chart?
 - What number did you choose first?
 - How did you figure out which number to write next?

- Do the numbers on the puzzle piece make sense? Why or why not?

Variations:

- Give a more abstract puzzle piece to students in need of more challenge (e.g., 3 x 3 puzzle piece, puzzle piece that resembles a staircase).
- Give students one number to place on the puzzle piece and have them deduce the other numbers.
- Record the thinking of those students who have difficulty expressing themselves on paper.
- Copy a Hundred chart with pre-written numbers on cardstock and laminate. Cut the Hundred chart into pieces and have students put the pieces together like a puzzle.
- Cover numbers on a Hundred chart and have students decide which numbers are missing and write them on the chart.

Name _____

Hundred Chart Puzzle

Here is a piece of a Hundred chart. Fill in the missing numbers that could go on the puzzle piece.

How did you know which numbers to put on the chart? Why did you place those numbers on the chart?

Bears in Caves

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8, 1.9

Materials:

- Bear counters
- Plastic bowls/cups (caves)
- Recording sheet
- Pencils

Vocabulary: *total, part, missing, counting on, counting back, equal, all*

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Tell students which number they will be working on during the activity and have them brainstorm things that they know about that number. For example, the number “8” could tell how many legs a spider has or how many tentacles are on an octopus.
2. Record their ideas on chart paper/board to begin the conversation about the number being discussed.
3. Have the partners count the number of bears they will be working with during the lesson, and let them know that this number indicates how many bears they will have in all.
4. Each set of partners should get a plastic bowl/cup to represent the bear cave.
5. Explain that students will take turns with their partner hiding some of the bears in the cave (under the bowl/cup) and leaving the rest outside the cave.
6. Students will figure out how many bears are hiding in the cave, given the total number of bears and the number of bears outside the cave.
7. Students will continue taking turns hiding bears in the cave until they have found different combinations for the total number.
8. Pull the students back together for a whole-class discussion of the different combinations they found for the number, and the strategies they used to decide how many bears were hiding inside the cave.
9. List all the different combinations on chart paper/board, and discuss what the students notice.

Assessment

- **Questions**

- If ____ bears are outside the cave, how many are inside the cave? How do you know?
- How did you determine how many bears were inside the cave?
- Do you notice any patterns with the different combinations you found?

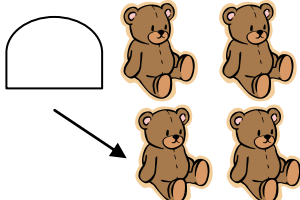
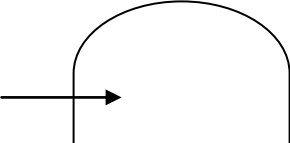

Variations:

- Use numbers that meet individual student needs.
- Struggling students can uncover the bears inside the cave if they are having difficulty figuring out the unknown part.
- Have students write a number sentence to show how they determined the missing part.

Name _____

Bears in Caves

There are _____ bears in all. Write how many bears are outside the cave. Write how many bears are inside the cave.

Outside 	Inside 	Total Bears 

Cube Connections

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	K.5, 1.18, 1.19

Materials

- Cubes
- Recording sheets
- Crayons/pencils

Vocabulary

make, build, add, and, plus, equal, total

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Explain to students that they will be connecting cubes to create a given number, such as 10, and finding ways to make that number with the cubes. (The recording sheets for this activity are to be completed as students discuss a given number—not all in one lesson.)
2. Each partner group needs to select two colors of cubes to use to make the given number.
3. After students have selected the colors, ask them to determine how to build the given number using the two colors of cubes.
4. Show students how to record a picture of what they made, as well as the numbers that represent the quantities of cubes used. (Record the same color first for each cube combination.)
5. Have students continue working to build the given number in different ways and record the solutions on the sheet.
6. Gather students together as a class to discuss the different ways they made the given number.
7. Record their ideas with numbers and pictures on chart paper or the board, and ask them what they notice about the shared ideas.

Assessment

- **Questions:**
 - How did you make ____?
 - How do you know that ____ and ____ make ____?
 - What patterns do you see?
 - Are there other ways to make ____?
 - How do you know we have found all the different ways to make ____?

Variations:

- Use smaller or larger numbers, depending on needs of the students.
- Have students write number sentences using the “+” and “=” signs on the recording sheets.

Name _____

Cube Connections

4

--	--	--	--

_____ and _____ is 4

--	--	--	--

_____ and _____ is 4

--	--	--	--

_____ and _____ is 4

--	--	--	--

_____ and _____ is 4

--	--	--	--

_____ and _____ is 4

Name _____

Cube Connections

5

--	--	--	--	--

____ and ____ is 5

--	--	--	--	--

____ and ____ is 5

--	--	--	--	--

____ and ____ is 5

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____ and ____ is 5

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____ and ____ is 5

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____ and ____ is 5

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____ and ____ is 5

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____ and ____ is 5

Name _____

Cube Connections

6

--	--	--	--	--	--

____ and ____ is 6

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____ and ____ is 6

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____ and ____ is 6

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____ and ____ is 6

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____ and ____ is 6

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____ and ____ is 6

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____ and ____ is 6

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____ and ____ is 6

Name _____

Cube Connections

7

--	--	--	--	--	--	--

_____ and _____ is 7

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_____ and _____ is 7

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_____ and _____ is 7

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_____ and _____ is 7

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_____ and _____ is 7

7

(continued)

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____ and ____ is 7

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____ and ____ is 7

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____ and ____ is 7

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____ and ____ is 7

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____ and ____ is 7

Name _____

Cube Connections

8

--	--	--	--	--	--	--	--

____ and ____ is 8

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____ and ____ is 8

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____ and ____ is 8

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____ and ____ is 8

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____ and ____ is 8

8

(continued)

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____ and ____ is 8

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____ and ____ is 8

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____ and ____ is 8

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____ and ____ is 8

Name _____

Cube Connections

9

--	--	--	--	--	--	--	--	--

_____ and _____ is 9

--	--	--	--	--	--	--	--	--

_____ and _____ is 9

--	--	--	--	--	--	--	--	--

_____ and _____ is 9

--	--	--	--	--	--	--	--	--

_____ and _____ is 9

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_____ and _____ is 9

9

(continued)

--	--	--	--	--	--	--	--	--

____ and ____ is 9

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____ and ____ is 9

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____ and ____ is 9

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____ and ____ is 9

--	--	--	--	--	--	--	--	--

____ and ____ is 9

Name _____

Cube Connections

10

--	--	--	--	--	--	--	--	--	--

_____ and _____ is 10

--	--	--	--	--	--	--	--	--	--

_____ and _____ is 10

--	--	--	--	--	--	--	--	--	--

_____ and _____ is 10

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_____ and _____ is 10

--	--	--	--	--	--	--	--	--	--

_____ and _____ is 10

10

(continued)

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____ and ____ is 10

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____ and ____ is 10

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____ and ____ is 10

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____ and ____ is 10

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____ and ____ is 10

Kids on the Playground

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8, 1.9, 1.18, 1.19

Materials:

- Counters (e.g., cubes, tiles, chips, blocks)
- Crayons/pencils to explain thinking
- Paper

Vocabulary

number combinations, word problems, pictures, numbers, words

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Introduce the activity by asking students to think about fun activities they enjoy on the playground. Ask, “What are some things you do on the playground? Who likes to swing? Who likes to play ball? Who likes to climb on the monkey bars? How many of you like to slide? How many of you like to do more than one thing? Do you do the same activity every day, or do you like to do different things? Why do you like to do different things?” (You could focus on one playground activity, such as swinging, and ask the students to discuss how many girls like to swing and how many boys like to swing. “Could these numbers change from day to day? Why?”)
2. Explain to the students that they will be working with a partner or in a small group to solve the following playground problem: There are 10 children on the playground. How many could be boys? How many could be girls? Instruct students to explain their thinking using pictures, numbers, and words.
3. Discuss the problem with students. “What are we trying to figure out? How many children are on the playground altogether? How could we record our answers?”
4. Students can use materials of their choice to solve the problems, but they must record their solutions (see recording sheet).
5. Allow student groups to work on the problem and find several ways to solve it.
6. Monitor students as they work to see how they are approaching the problem. What strategies are they using? Are they putting objects together randomly? Do they know their number combinations? Does each combination total 10? What difficulties are students having? What are students doing well?
7. After students have had time to explore the problem, pull them back together as a whole class to discuss the various combinations of girls and boys they found to make 10.

8. Record various students' solutions on chart paper or the board during the whole class discussion.

Assessment

- **Questions:**

- What is the problem asking?
- How could you record your thinking?
- How many children are there altogether?
- How did you solve the problem?
- Do you have 10 children on the playground altogether? How do you know?
- Do you need more? Fewer?
- If there are _____ girls, how many boys will there be? How do you know?
- Is there another way to solve this problem?
- How do we know that we have found all the ways to solve this problem?
- What do you notice about the combinations we have found?
- How did you record your thinking?

Variations:

- Use a smaller or larger number for students to explore, depending on student needs.
- Find all of the solutions (number combinations) for the problem.
- Have students write their own word problems to illustrate various combinations totaling 10.

Name _____

Kids on the Playground

There are 10 children on the playground. How many could be boys? How many could be girls? Explain your thinking using pictures, numbers, and words.

Place Value Designs with Pattern Blocks

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.

Materials

- Counters
- Pattern blocks in bags to match the number of groups, with fewer than 99 per bag (Pattern blocks projected on an overhead or magnetized pattern blocks are options for the modeling.)

Vocabulary

tens, sets

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Show students various bags of pattern blocks. Ask students: “How many blocks do you think may be in the bags? How would you know? What can you do to find out?” (Most students will say, “Count them.” You may want to suggest that counting by ones will take a *long* time and that they may make a mistake.) Suggest: “Let’s try another way.”
2. Explain to students that they are going to make as many designs as they can with 10 pattern blocks. Each design will use 10 blocks and may include more than one color or shape. At this point, you should model several designs using 10 blocks. Be sure to comment on each design as it is completed. Have the students note how many squares or how many triangles were used in the design. Have them note which shapes were used more and which were used less, and then find the difference between the two.
3. After modeling several designs, distribute the pattern blocks into small cooperative groups, and have the students continue making different designs using 10 blocks. As you monitor the groups, Ask, “How many different designs have you made? How many blocks did you use? How do you know? How could that be written? Is there another way to write it? How do you know? How is that the same or different?” This information can be recorded and left face down on the table with the cooperative group.
4. Each group should then observe the designs of the other cooperative groups for comparison. The number of designs and blocks used should be recorded at each station.

Assessment

- **Questions:**
 - What did you do in this activity to speed up counting?
 - How does this help you know how many blocks you have in your bag? What are other things you may want to count by tens?

Spill!

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8, 1.18

Materials

- Part-Part-Whole mat, or 9 x 12 sheet of newsprint folded in half, “hamburger style,” to show two parts
- Six two-color counters per student or group of students
- Cups
- Paper to record results

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Explain to students that they will be finding ways to make 6 (or any other number).
2. Spill six two-color counters from the cup and lead the discussion to get students to describe the colors of the counters that they see (e.g., “I see two red counters and four yellow counters”).
3. Have students sort the counters onto the folded paper, according to color. On a chart marked with a “red” column and a “yellow” column, record the numbers to match what spilled from the cup. Do this several times.
4. Arrange the students in pairs. The first student spills the counters from the cup. The second student puts the red counters on the left and the yellow counters on the right. The first student then writes “_____ red and _____yellow” on the recording sheet. Have the partners trade roles and repeat several more times. This should allow each pair of students to see all the possible ways to make 6.
5. Have students rejoin as a class and discuss what they found. Record the different number combinations in order (e.g., 0,6; 1,5; 2,4) on a chart or black/white board for students to see and discuss.

Assessment

- **Questions:**
 - Is it possible for the number of red counters to match the number of yellow counters? When does that happen?
 - Is it possible to have zero red counters? When would that happen?
 - How many ways are there to make 6?
 - How do you know you are finished?

Name: _____

Red	Yellow

Name: _____

I have _____ red and _____ yellow.
I have _____ red and _____ yellow.
I have _____ red and _____ yellow.
I have _____ red and _____ yellow.
I have _____ red and _____ yellow.
I have _____ red and _____ yellow.
I have _____ red and _____ yellow.

I Found It!

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8

Materials

- Two sets of cards, each with one to six sticker
- Two blank cards

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Prepare two sets of numeral cards (you can use the number cards from a deck of cards, with the face cards removed).
2. Have the students place all of the cards face down in a stack, or spread out in a concentration factor.
3. Direct students to work in pairs to find two cards that make 6, or another number you are investigating. (If you are investigating another number, the cards in the stack need to reflect that. If you are looking for combinations to make 8, for example, you will need to add the cards for seven and eight.)
4. Each student turns over two cards at a time.
5. If the card values combine to make 6, the student may keep the cards. Cards that do not make 6 are returned to the bottom of the stack.
6. Play continues until all possible card combinations that make 6 are used.

Assessment

- Questions
 - How many ways are there to make 6?
 - How do you know you are finished?

Domino Math

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8, 1.18

Materials

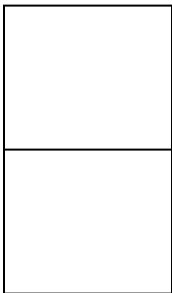
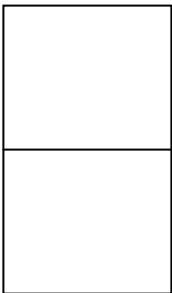
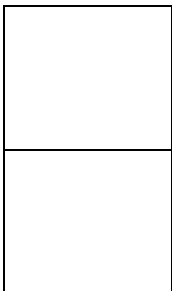
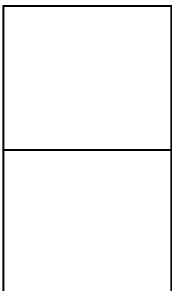
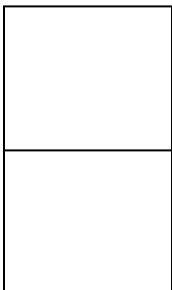

- Set of dominoes
- Paper bag
- Basket, or tub
- Recording sheets

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Put a set of dominoes in a paper bag, basket, or tub—preferably one that obscures students’ view of the dominoes.
2. Select a target number, or have students suggest one.
3. Have a student reach into the bag/basket/tub and draw a domino. If the dots on the domino add up to the target number, then the student should record the number combination that appears on the domino and keep it face up. If the number does not match the target, the student should turn the domino face down in a separate pile and draw again. After two chances, play then moves to the next student.
4. After students have drawn all of the dominoes from the bag, they should have the “set” of number combinations that are possible for the target number.
5. The students’ recording sheets should list all of the possible combinations they found.
6. At another opportunity, the students could investigate another target number.

Name: _____

Domino Recording Sheet

<p>My domino looked like this:</p> 	<p>My domino looked like this:</p> 
<p>My domino looked like this:</p> 	<p>My domino looked like this:</p> 
<p>My domino looked like this:</p> 	<p>My domino looked like this:</p> 

Seven Up

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8, 1.18

Materials

- Part-Part work mat, or folded sheet of newsprint as a substitute
- Colored tiles (each student should have only one color)
- Paper

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Place all seven tiles on the left side of the Part-Part mat (or folded newsprint). Have each student do the same.
2. Count the tiles aloud with the students. Ask, “How many tiles? How did you know?” Show the students that *all* seven tiles are on one side of the work mat and zero tiles are on the other side.
3. On a sheet of paper write, “____ and ____.” Show them how to write in the 7 and the 0.
4. Move one tile from the left to the right. Ask, “How did that change the mat? What do you see now?”
5. Record the change and continue in this manner until all the number combinations for 7 are recorded.

Assessment

- Questions
 - How many ways did you make 7?
 - Was the same number ever on both sides of the Part-Part mat?
 - How do you know you have all the possible combinations? Why or why not?

Part-Part Mat

A large rectangular box divided horizontally into two equal empty sections, intended for a part-part mat.

Name: _____

Seven Up Recording Sheet

I have _____ and _____.

I have _____ and _____.

I have _____ and _____.

I have _____ and _____.

I have _____ and _____.

I have _____ and _____.

More, More!

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will <ul style="list-style-type: none"> a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.18

Materials

- Two-color counters
- 10-frames
- Number cubes or number cards

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Direct students to choose 10 counters and a 10-frame (the 10-frames on the next page can be copied and laminated). If necessary, review 10-frame rules: always fill the top row first; always use red first, then yellow.
2. Place counters and 10-frames in the center of each table, and direct students to choose theirs.
3. Choose random numbers by tossing number cubes or selecting cards. Ask students to place the corresponding number of counters on their 10-frames to match the random number selected.
4. Ask students to place *one more* counter, then *two more* counters for each number.
5. Ask how many counters would there be with *one more* and *two more*. Record those new numbers on the chart/whiteboard (see below).

Number	1 More	2 More
6	7	8

10-Frames

Crazy Eights

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8, 1.18

Materials

- Construction paper or paper plates for spider body and head
- Chenille stems/pipe cleaners (two colors)
- Glue
- Tape
- Roll-paper chart (see example)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Ask students, “How many legs does a spider have?” Explain that each student will be creating a spider with eight legs made from the colorful chenille stems.
2. Place chenille stems in the center of each table, and direct students to each choose eight, making sure to select some of each color.
3. Have each student take two circles—one large circle for the spider’s body, one small circle for its head.
4. Students should attach chenille stems to the spider body, using glue on the paper or by poking the stems through the paper plates.
5. Instruct students to count one color of legs first (as the first addend) and then to count the other color of legs (as the second addend); this will demonstrate the commutative property.
6. Examine the spiders with students as they sort/count the number of legs by color. Have students then attach their spiders to the roll-paper chart in the appropriate place.

Assessment

- Questions
 - How is your spider the same or different from the others?
 - How many of each leg color did you count?
 - Where does your spider go on the chart? How can you tell?

Example of a Chart Made from Roll Paper

0 and 8	1 and 7	2 and 6	3 and 5	4 and 4	5 and 3	6 and 2	7 and 1	8 and 0

Have students place spiders in the column where they belong, based on leg color, making sure to count the same color first for each student's spider.

In or Out

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8

Materials

- Ten two-color counters for each set of student partners
- Newsprint Chenille stems/pipe cleaners (two colors)

Vocabulary

plus, equals, sum

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Model the game by placing newsprint sheets on the floor as a game mat. Explain: “I have 10 counters. I am going to gently toss my counters over the game mat. What do you think will happen? OK, let’s see how many counters land on the mat and how many counters land off the mat.”
2. Record total number of counters at the top of the game grid and the number of counters on and off the grid.
3. Repeat the above procedure, choosing individual students to gently toss the counters (choose students who may need additional practice in gentle tossing) and to record on the grid how many counters land on and off the mat.
4. Have students then join their partners to play the “In or Out” game together.
5. Circulate and monitor the groups. Those students having difficulty can join you in a separate area and use manipulatives to count objects and also to play the “In or Out” game.

The Circle Counting Game

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Direct students to stand in a circle.
2. Designate one student as the starter, who will begin counting to a designated number (e.g., 20). The student to the starter's right will say the next number in the sequence; continue around the circle until the designated number is reached.
3. The student who says the last number of the sequence sits down, and the sequence begins again skipping over those who are sitting down until only one student is left standing.
4. Repeat the game, starting with the same student, in the same direction, using the same sequence and have students predict who will be left standing. This can be played in any length sequence and with any number of students. Skip counting may be used as well.

The Hidden Hand Game

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8

Materials

- Small manipulatives, such as beans, two-color counters, or teddy bear counters that fit in your hand
- Ten two-color counters for each set of student partners

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Select a certain number of items (e.g., 10), and put some in each hand.
2. Open one hand to reveal the items. Have the other player count those items.
3. Then ask, “Knowing that there were 10 items total, how many remain in the closed hand?”
4. Demonstrate this several times.
5. When students are comfortable with how to play the game, break them into small groups or pairs to play together.

Count On

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.3, 1.8

Materials

- One number cube and one dot cube per group

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Model the exercise for students by rolling the number and dot cubes. Record the numeral first and the dot second. If you roll a “5” on the numeral cube, and “3 dots” on the second cube, announce “5” and then count forward, using the dots on the second cube: “6, 7, 8.” (Some students will need to touch the dots to count on.) Demonstrate this several times showing students how to use the numeral first and to “count on” using the corresponding number of dots from the second cube.
2. Divide students into pairs or small groups. To keep as many students playing as possible, instruct students that when one rolls the cubes, the other can count the numerals; and then the students switch roles.
3. After having played the game for a while, students can use a small whiteboard, or paper on a clipboard, to write the numbers that were counted on, or the addition sentence that was generated on the cubes.

How Many of Each?

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.8, 1.9

Materials

- Blank paper
- Counters or cubes

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Tell students that they are going to make a picture of two kinds of things that add up to 10. They can draw two kinds of animals, two kinds of food, two kinds of toys—anything they want, but the total must equal 10.
2. Demonstrate by illustrating two kinds of things that equal 10.
3. Tell students to decide which two kinds of things they want in their picture and how many of each type they want to have.
4. Distribute blank paper to students for their illustrations. They can talk with each other about possibilities but encourage them to think of their own ideas.
5. Students' illustrations should have 10 total things and include the number of each thing they've drawn. Alternatively, students can verbalize their picture using numbers and/or words.

Variations:

- Use a number larger than 10, or combine solutions of two students to make 20 things.

Me!

Reporting Category	Number and Number Sense
Topic	Count and write numerals to 100
Primary SOL	1.1 The student will a) count from 0 to 100 and write the corresponding numerals.
Related SOL	1.18

Materials

- Number cards (can be a regular card deck with face cards removed), one set per pair of students

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. To model how to play the game, pick a student to play with you.
2. Mix the cards and distribute them evenly between the two players, placing the stack of cards face down in front of each player.
3. Both players turn over the top card in their stacks.
4. The player with the larger number says, “Me!” (Should both cards be the same value, each player turns over another card.)
5. The game is over when all cards have been turned over.
6. Following the demonstration, distribute card sets to each team for play.

Variations:

- Turn over two cards each, combine the numbers, and call “Me!” if the student’s number is larger.
- Look for the smaller number instead of the larger number.
- Play with three players.

Constructing Numbers

Reporting Category	Number and Number Sense
Topic	Count and group objects into tens and ones (place value)
Primary SOL	1.1 The student will <ol style="list-style-type: none">count from 0 to 100 and write the corresponding numerals; andgroup a collection of up to 100 objects into tens and ones and write the corresponding numeral to develop an understanding of place value.

Materials

- Objects for constructing numbers (cubes, beans, cups, base-ten blocks, 10-frames)
- Number cards 11–100
- Recording sheet
- Pencils

Vocabulary

how many, groups of tens, ones, number word, pictures/representation, counting, collection, total

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Before the activity, construct number cards 11–20. You can use index cards or enlarge a Hundred chart and cut out the boxes.
2. Introduce the activity by having a student choose a number card from the set of cards. Write the number on the board/chart paper and ask students to identify the number you wrote.
3. Have students brainstorm different ways they could use counters to make the number. Using the number 46 as an example, the students may represent the number using 46 counters organized randomly, 46 counters in groups of two, four groups of ten and six ones, or two groups of ten and 26 ones. Ask students: “How could you show 46? How did you count the objects to make sure that you have a total of 46? Were any of the ways that you counted faster than other ways? Why did it seem that way? Were any of the ways that you counted slower than other ways? Why did it seem that way?”
4. Explain to the students that you would like them to make 46 using as many groups of ten as they can. Before they begin, pose the following questions: “How many groups of ten do you think you will have? How many will be left over? How do you know?” As students are working, walk around and observe the strategies they are using to group the counters using tens. When students have completed this task, discuss the strategies they used to make 46. Ask, “How many groups of ten did you make? How many were left over? What does this have to do with how many counters we have in all?”

5. Explain to students that they will be working in small groups to construct numbers using as many groups of ten as they can. They will use a recording sheet to record the number they choose from the set of number cards.
6. Next, they should use counters to determine how many groups of ten and ones (leftovers) they will have. To show their work on their recording sheets, they may use 10-frames, pictures of base-ten blocks, drawings of sticks (groups of ten) and dots (ones), or connecting cubes.
7. Students should record how many groups of ten and ones they have and the number word that tells how many.
8. Set the students to work on constructing numbers. Observe how they are constructing the number using counters and how they are determining how many groups of ten and ones are in their number.
9. After students have had time to work on several numbers, pull the students together to discuss a number and how many groups of ten and ones are in this number. Ask, “How did you make ____? How did you count the objects to make sure that you have a total of ____? How many groups of ten did you make? How many were left over? What does this have to do with how many counters you had in all?”

Assessment

- **Questions**
 - How could you show ____?
 - How did you count the objects to make sure that you have a total of ____?
 - Were any of the ways that you counted faster than other ways? Why did it seem that way?
 - Were any of the ways that you counted slower than other ways? Why did it seem that way?
 - How many groups of ten do you think you will have?
 - How many will be left over? How do you know?
 - How many groups of ten did you make?
 - How many were left over?
 - What does this have to do with how many counters we have in all?

Variations:

- Give students the picture of the number. Ask, “How many are in the picture? How many groups of ten do you see, and how many ones are left over? What is the number word?”
- Give students the number word and have them determine the number, as well as how many groups of ten and ones are in the number. Have students create a representation/picture of how many.
- Use larger or smaller numbers, depending on student needs.
- Give students a bag of objects to count. Ask students to write how many, draw a picture to represent how many, tell how many groups of ten and ones are used in the numbers,

and write the number word. Be sure to count the objects in the bags and make note of the number before students complete this variation of the activity.

Name _____

Constructing Numbers

How many?

Make a picture/representation to show how many.

_____ groups of ten _____ ones

_____ number word

Largest Number

Reporting Category	Number and Number Sense
Topic	Count and group objects into tens and ones (place value)
Primary SOL	1.1 The student will <ol style="list-style-type: none">count from 0 to 100 and write the corresponding numerals; andgroup a collection of up to 100 objects into tens and ones and write the corresponding numeral to develop an understanding of place value.

Materials

- Cubes
- Number cards 0–9
- Hundred chart
- Recording sheets
- Pencils

Vocabulary

more, less, counting up, counting back, number words, ten less, ten more, numerals, Hundred chart

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Begin the activity by having students compare two numbers, such as 24 and 32. Ask, “How could you build 24 using cubes? How do you know you have the correct amount of cubes to show 24? How could you build 32 using cubes? How do you know you have the correct amount of cubes to show 32? Which number is larger? How do you know? Which number is smaller? How do you know?”
2. After students determine which number is larger and why, ask them to assess which number would be *ten more*. Students can use materials of their choice (e.g., cubes, Hundred chart, 10-frames).
3. Walk around and monitor students’ strategies for solving the problem.
4. After they have explored what *ten more* would be, discuss the strategies they used. Ask, “How did you know which number was *ten more*? What did you do to figure this out?” Record student strategies on chart paper/board. Compare the various strategies. Ask, “What is similar? What is different?”
5. Ask students to determine which number would be *ten less*. Students can use materials of their choice (e.g., cubes, Hundred chart, 10-frames).
6. Walk around and monitor students’ strategies for solving the problem.
7. After they have explored what *ten less* would be, discuss the strategies they used. Ask, “How did you know which number was *ten less*? What did you do to figure this out?”

Record student strategies on chart paper/board. Compare the various strategies. Ask, “What is similar? What is different?”

8. Next, have students work with a partner or in small groups. Each group needs a set of number cards.
9. Have each group choose two number cards and record the two numbers they selected on the recording sheet.
10. Students then need to use the two cards they chose to make the largest two-digit number they can.
11. Have students construct their number using cubes and record a picture of their number.
12. Next, they should write the number word for the number they made.
13. On the recording sheet, have students use pictures, numbers, and words to explain how they know they’ve made the largest number they could with the cards selected.
14. Have students construct and write the number that would be *ten less* than the number they have made. Have them record a picture of the number that is *ten less* and also write the number word on the recording sheet.
15. Pull students together as a class to discuss the strategies they used to construct the largest number from the cards. Ask, “How did you decide which number is *ten less*?”

Assessment

- **Questions**
 - How could you build the number _____ using cubes?
 - How do you know you used the correct number of cubes to show the number?
 - Which number is larger? Smaller? How do you know?
 - What is the largest number you can make with the two cards? How do you know?
 - What strategies did you use to figure this out?
 - Which number would be *ten more* than the number? How do you know?
 - Which number would be *ten less* than the number? How do you know?
 - What did your representation of the number look like? How does it relate to the number word that you wrote to tell how many?

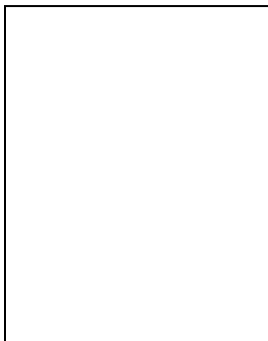
Variations:

- Students could use three cards to make the largest three-digit number from the cards.
- Students could find which number is *20 more*, *20 less*, *15 more*, and *15 less*.

Name _____

Largest Number

Pick two cards and write the numbers you chose on each rectangle below. Then, use the cards for the following problems.



Make the largest two-digit number you can using the number cards. Draw a picture of the number and write the number word for it.

largest number

Picture of largest number

number word

How do you know it is the largest number you can make with the cards?

Draw a picture and write the number that is *ten less* than the number you made with the number cards.

Picture of Number



number word

Smallest Number

Reporting Category	Number and Number Sense
Topic	Count and group objects into tens and ones (place value)
Primary SOL	1.1 The student will <ol style="list-style-type: none">count from 0 to 100 and write the corresponding numerals; andgroup a collection of up to 100 objects into tens and ones and write the corresponding numeral to develop an understanding of place value.
Related SOL	1.18

Materials

- Cubes
- Number cards 0–9
- Hundred chart
- Recording sheets
- Pencils

Vocabulary

more, less, counting up, counting back, number words, ten less, ten more, numerals, Hundred chart

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Begin the activity by having the students compare two numbers, such as 16 and 61. Ask, “How could you build 16 using cubes? How do you know you have the correct amount of cubes to show 16? How could you build 61 using cubes? How do you know you have the correct amount of cubes to show 61? Which number is larger? How do you know? Which number is smaller? How do you know?”
2. After students determine which number is smaller and why, ask them to assess what number would be *ten more*. Students can use materials of their choice (e.g., cubes, Hundred chart, 10-frames).
3. Walk around and monitor students’ strategies for solving the problem.
4. After they have explored what *ten more* would be, discuss the strategies they used. Ask, “How did you know what number was *ten more*? What did you do to figure this out?” Record student strategies on chart paper/board. Compare the various strategies. Ask, “What is similar? What is different?”
5. Ask students to determine which number would be *ten less*. Students can use materials of their choice (e.g., cubes, Hundred chart, 10-frames).
6. Walk around and monitor students’ strategies for solving the problem.
7. After they have explored what *ten less* would be, discuss the strategies they used. Ask, “How did you know what number was *ten less*? What did you do to figure this out?”

Record student strategies on chart paper/board. Compare the various strategies. Ask, “What is similar? What is different?”

8. Next, have students work with a partner or in small groups. Each group needs a set of number cards.
9. Have each group choose two number cards and record the two numbers they selected on the recording sheet.
10. Students then need to use the two cards they chose to make the smallest two-digit number they can.
11. Have students construct their number using cubes and record a picture of their number.
12. Next, they should write the number word for the number they made.
13. On the recording sheet, have students use pictures, numbers, and words to explain how they know they’ve made the smallest number they could with the cards selected.
14. Have students construct and write the number that would be *ten more* than the number they have made. Have them record a picture of the number that is *ten more* and write the number on the record sheet.
15. Pull students together as a class to discuss the strategies they used to construct the smallest number from the cards. Ask, “How did you decide which number is *ten more*?”

Assessment

- **Questions**
 - How could you build the number _____ using cubes?
 - How do you know you used the correct number of cubes to show the number?
 - Which number is larger? Smaller? How do you know?
 - What is the smallest number you can make with the two cards? How do you know?
 - What strategies did you use to figure this out?
 - Which number would be *ten more* than the number? How do you know?
 - Which number would be *ten less* than the number? How do you know?
 - What did your representation of the number look like? How does it relate to the number word that you wrote to tell how many?


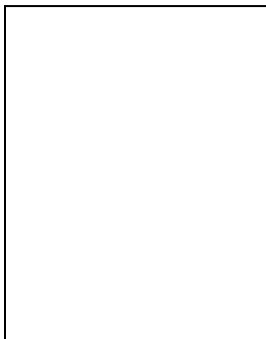
Variations:

- Students could use three cards to make the smallest three-digit number from the cards.
- Students could find what number is *20 more*, *20 less*, *15 more*, and *15 less*

Name _____

Smallest Number

Pick two cards and write the numbers you chose on each rectangle below. Then use the cards for the following problems.



Make the smallest two-digit number you can using the number cards. Draw a picture of the number and write the number word for it.

smallest number

Picture of smallest number

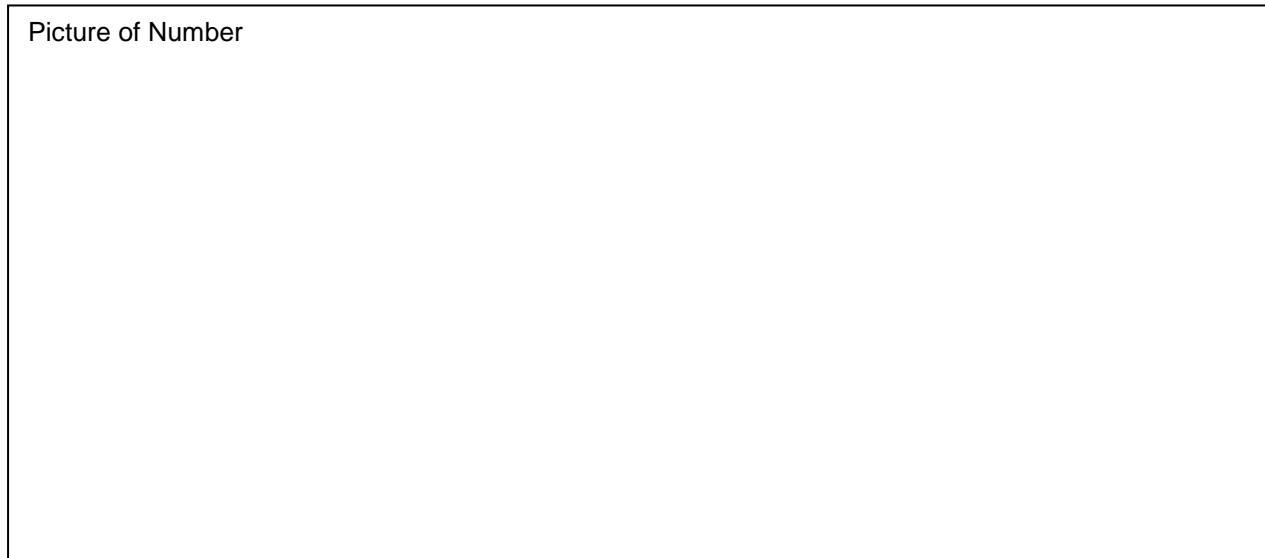


number word

How do you know it is the smallest number you can make with the cards?

Draw a picture and write the number that is *ten more* than the number you made with the number cards.

Picture of Number



number word

About How Many?

Reporting Category	Number and Number Sense
Topic	Group objects into tens and ones (place value) and count by ones, twos, fives, and tens
Primary SOL	1.1 The student will b) group a collection of up to 100 objects into tens and ones and write the corresponding numeral to develop an understanding of place value. 1.2 The student will count forward by ones, twos, fives, and tens to 100 and backward by ones from 30.
Related SOL	1.18, 1.19

Materials

- Objects to count (e.g., bears, cubes, golf balls, beans, pom-pom balls, cotton balls)
- Number cards 0–9
- Clear container
- Chart with headings “too small,” “about right,” and “too large”
- Markers for recording
- Sticky notes

Vocabulary

counting, estimate, group, objects, size, small, large, about, how many, most, least, benchmark

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. In preparation for this lesson, fill a clear container with objects to count, such as bears, cubes, or pom-pom balls. Count the objects as you place them in the container so you know how many objects are in the container.
2. Show students the container and explain that you need their help in figuring out how many objects are in it. “About how many _____ are in the container? Do you think there are more/fewer than 10? How do you know? Do you think there are more/fewer than 100? How do you know? How could we figure out how many _____ are actually in the container?” Record student ideas on chart paper or the board.
3. Show the students a group of 10 objects as a reference for estimating how many objects are in the container. Have them write on a sticky note about how many objects they think are in the container based on the group of 10 that you’ve shown them.
4. Have students refer to the chart of ideas recorded in Step 2 and try several. (If they suggest counting by ones, then have students count the objects by ones. If they suggest other ways of counting, have them try a few of their ideas.)
5. After they have determined how many objects are in the container, discuss the various ways that they counted the objects. “How did you count the objects? Were any of the

ways that you counted the objects easier? Why did it seem that way? Were any of the ways that you tried to count the objects hard? Why did it seem that way?”

6. Have students refer back to their original estimates. Construct the following chart:

Too Small	About Right	Too Large

Ask the following questions: “What makes an estimate too small? What makes an estimate too large? What makes an estimate about right? How do you know?”

7. After discussion of the chart, have students post their original estimates according to the parameters that they as a class agreed would constitute an estimate for each category.
8. Review the information on the estimate chart and have students discuss it. Ask, “What do you notice about our estimates? Which category/group has the most? Which category/group has the least? Were any of our estimates about right? Why is estimation important? How could we make better estimates?”

Assessment

• Questions

- About how many _____ are in the container?
- Do you think there are more/fewer than 10? How do you know?
- Do you think there are more/fewer than 100? How do you know?
- How could we figure out how many _____ are actually in the container?
- How did we count the objects?
- Were any of the ways that we counted the objects easier? Why did it seem that way?
- Were any of the ways that we tried to count the objects harder than others? Why did it seem that way?
- What makes an estimate too small?
- What makes an estimate too large?
- What makes an estimate about right? How do you know?
- What do you notice about our estimates?
- Which category/group has the most?
- Which category/group has the least?
- Were any of our estimates about right?
- Why is estimation important?
- How could we make better estimates?

Variations:

- Use fewer or more objects in the container, depending on student needs.
- Each group could have a container with the same number of objects but different objects in each. (For example, Group 1: pom-pom balls, Group 2: cotton balls, Group 3:

cubes). The groups could then compare the similarities and differences among the objects in their containers.

Fractions to Share and Fractions to Spare

Reporting Category

Number and Number Sense

Topic

Identify halves, thirds and fourths

Primary SOL

1.3 The student will identify the parts of a set and/or region that represent fractions for halves, thirds, and fourths and write the fractions.

Materials

- Oranges, cookies, brownie, or candy bar pieces
- Recording sheet
- Pencil

Vocabulary

equal, fair shares, parts, whole, total, fraction

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Introduce the activity by dividing the orange, cookie, brownie, or candy bar into different sized parts so the students can see. Pose the question, “If I give everyone a piece of the _____, will this be an equal way of sharing the _____? Why or why not? How could the _____ be shared equally?” Have students brainstorm and discuss their ideas. (Students should realize that the parts are not equal-sized and thus not an equal way of sharing.)
2. Divide a second orange, cookie, brownie, or candy bar into equal shares using one of the student’s strategies for division, and let the students enjoy the treat while you begin the next part of the activity.
3. Next, explain to the students that they will be working with a partner or in a small group to solve the following problem: *There are two children who want to share one orange so that each child gets the same amount. Show how many orange pieces each child can have. Explain your thinking using pictures, numbers, and words.*
4. Discuss the problem with students. Ask, “What are we trying to figure out? How many children are sharing? How many oranges are they sharing? What are some ways we could show our work on this problem?”
5. Set the small groups to work and remind students that they need to draw pictures to show how many parts one child will get if they share the orange equally.
6. Allow students to work on the problem and then explain their thinking.
7. Monitor students as they work to see how they are approaching the problem. What strategies are they using? Are they sharing the oranges equally among the children in the problem? Do their pictures accurately represent equal parts? What difficulties are they having? What are students doing well? How are they recording to show how many orange pieces one child will get?
8. After students have had time to explore the problem, pull the whole class back together to discuss the strategies students used to determine how many orange pieces each child

would get if sharing the orange equally. Ask, “How did you solve the problem? How many orange pieces did the children have to share? Did you use the whole orange without throwing any of it away? Did the children get equal parts? How do you know? Is there another way to solve this problem? How did you record your thinking? What numbers did you use to show how much one child will get? Does anyone know what the pieces/parts are called?”

9. Record various students’ solutions on chart paper or the board during the whole class discussion. Be sure to discuss the various strategies students used to solve the problem.

Assessment

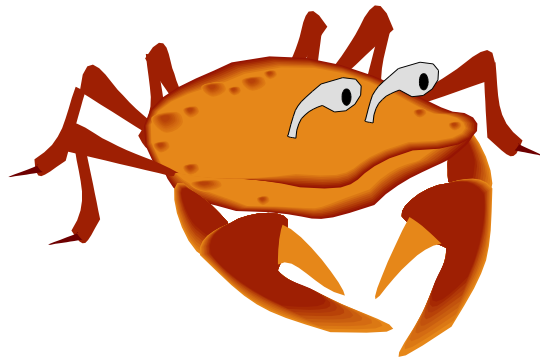
- **Questions**
 - What are we trying to determine with the oranges?
 - How many children are sharing?
 - How many oranges are they sharing?
 - What are some ways you could show your work on this problem?
 - How did you solve the problem?
 - Did you use the whole orange(s) without throwing any parts away?
 - Did each of the children get an equal part? How do you know?
 - Is there another way to solve this problem?
 - Did anyone have a different picture for your solution?
 - How did you record your thinking?
 - What numbers did you use to show how much one child will get?
 - Does anyone know what the pieces/parts are called?

Variations:

- There are four children who want to share two oranges so that each gets the same amount. Show how many orange pieces one child will get. Explain your thinking using pictures, numbers, and words.
- Use different numbers based on the needs of students.
- Try using numbers that involve each child receiving a whole orange and part of another orange (e.g., four children could be sharing six oranges) to observe strategies students use to solve the problems and share the oranges equally.

SECOND GRADE

Number and Number Sense



Comparing Numbers with Base-10 Blocks

Reporting Category	Number and Number Sense
Topic	Place value and compare numbers using symbols and words
Primary SOL	2.1 The student will <ol style="list-style-type: none">read, write, and identify the place value of each digit in a three-digit numeral, using numeration models; andcompare two whole numbers between 0 and 999, using symbols ($>$, $<$, or $=$) and words (<i>greater than</i>, <i>less than</i>, or <i>equal to</i>).

Materials

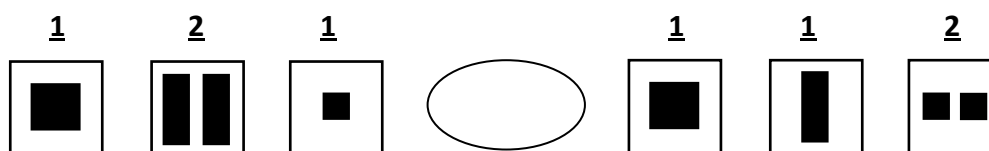
- Base-10 blocks
- Number cards (or number cube) and recording sheet
- Overhead transparency of the recording sheet

Vocabulary

greater than, less than, equal to

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Begin by modeling this activity with a student. As Player One, you will draw a number card and record the number in the hundreds place on the overhead recording sheet. Next, build the number using base-10 blocks. The student (Player Two) will do the same.
2. Play continues with the tens and ones place until two three-digit numbers have been built.



3. Ask, "Which number is greater and how do you know?" Review the symbols for *greater than*, *less than* and *equal to*. Place the correct symbol in the circle, then, with input from the class, develop a written explanation.
4. Repeat the activity and ask, "Which number is less and how do you know?"
5. Remove the base-10 blocks and number from Player Two's side of the recording sheet, and replace with the same base-10 blocks and number as on Player One's side. Ask, "Which number is greater?" Use student responses to reinforce the concept of equality.
6. Divide the class into groups of two. Give each group a recording sheet, base-10 blocks, and number cards.
7. The students will continue this activity as partners.

8. As a closing activity, write a three-digit number on the overhead projector. Each group will build a number that is *greater than*, *less than*, or *equal to* the number on the overhead projector.
9. As an additional activity, introduce the “Fill-in-the-Blank” game. Have students draw three blank spaces on a sheet of paper to represent a three-digit number. You will generate numbers by using either number cards or a number cube. The object of the game is to create the largest number. When you announce the number, each student must decide which place to record the number. Once the student places the number in a blank, it cannot be moved. Ask, “Who has the largest number? Does anyone have a number greater than ____? How do you know?”

Number Cards

0	1	2	3	4
5	6	7	8	9

0	1	2	3	4
5	6	7	8	9

0	1	2	3	4
5	6	7	8	9

Which Number Is Less? How Do You Know?

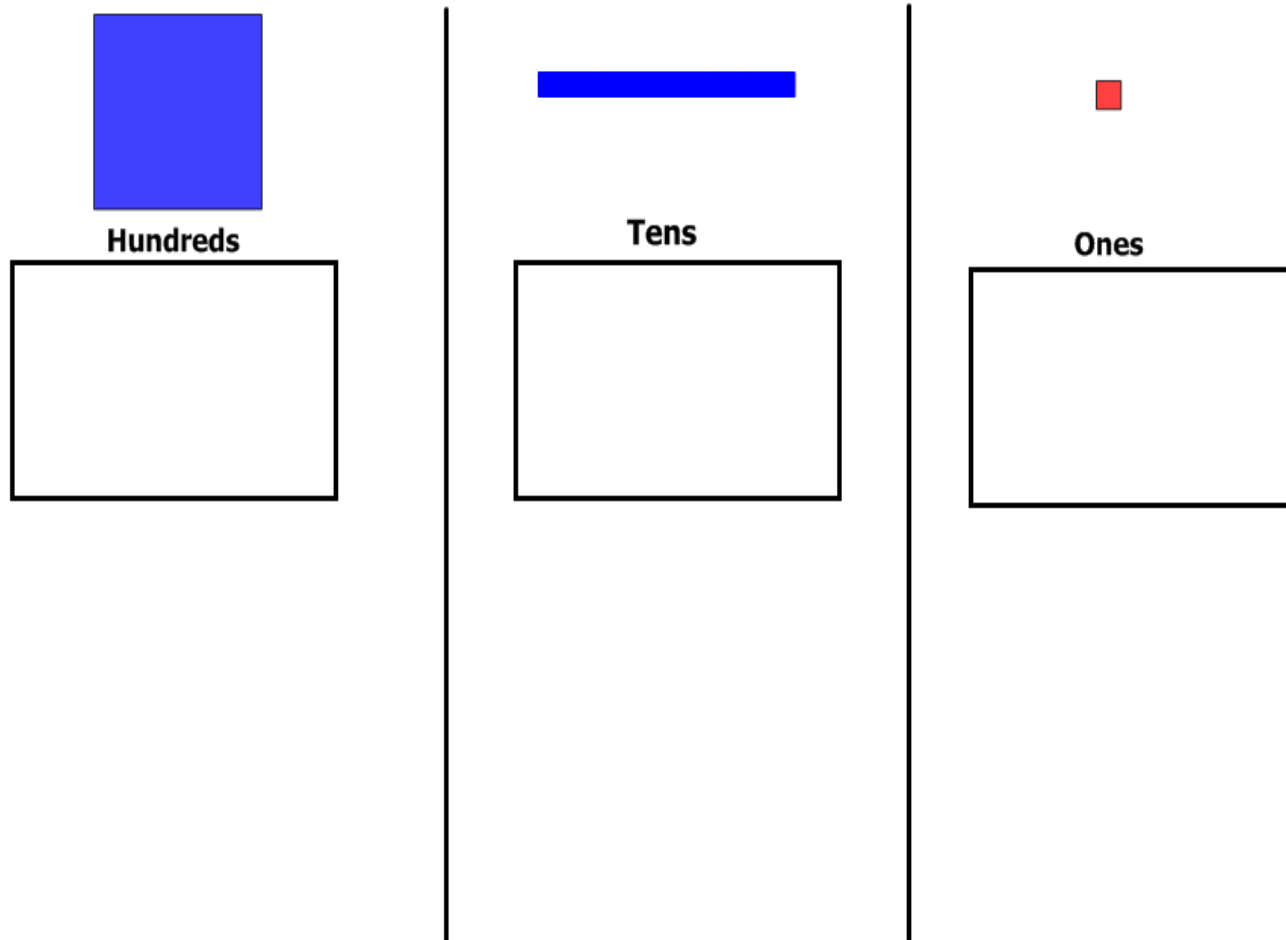
_____	_____	_____		_____	_____	_____
<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>

I know that _____, because
_____.

_____	_____	_____		_____	_____	_____
<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>

I know that _____, because
_____.

Base-10 Blocks



Rounding with Base-10 Blocks

Reporting Category	Number and Number Sense
Topic	Round two-digit numbers
Primary SOL	2.1 The student will b) round two-digit numbers to the nearest ten.

Materials

- Base-10 blocks
- T-table
- Overhead projector

Vocabulary

rounding

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Using Base-10 blocks, model the concept of rounding. First, build the number 23. Next, have the students identify the ten that comes before 23, or the smaller ten, and represent it with the Base-10 blocks.
2. Have students identify the ten that comes after 23, or the larger ten. Show students how that ten is represented using the Base-10 blocks.

II 20	II... 23	III 30
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3. Working with a partner, or in a small group, ask the students to decide if 23 is closer to 20 or 30. Have the groups share their answers and explain the reasoning.
4. Explain why 23 is closer to 20 than to 30. For example, you could compare the difference between 20 and 23, and 23 and 30 to show that 23 is closer to 20.
5. Record 23 on a T-table with the categories “Smaller Ten” and “Larger Ten” labeled.

Smaller Ten	Larger Ten
23	46
51	68

6. Model another example of rounding with Base-10 blocks using the number 46.
7. Choose numbers to be rounded to the nearest ten and have the students use the Base-10 blocks to round the number, following steps one and two above.
8. Continue to record the numbers on the T-table until all digits are represented in the ones place except five.
9. The students will use the numbers on the T-table to look for similarities and differences in order to identify the pattern used to round numbers.

10. Have each group write a response to “How to Round a Number” and share with the class. The class will test each group’s method for accuracy.
11. Ask, “What about a number with a 5 in the ones place?” After student discussion, tell the students that any number with a 5 in the ones place belongs in the larger group.
12. Give each group the opportunity to revise its version of “How to Round a Number.” Post accurate methods in the classroom.

Smaller Ten	Larger Ten

Rounding with Number Lines

Reporting Category	Number and Number Sense
Topic	Round two-digit numbers
Primary SOL	2.1 The student will b) round two-digit numbers to the nearest ten.

Materials

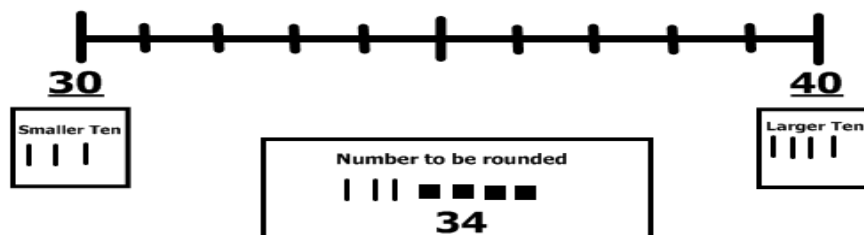
- Base-10 blocks
- Overhead projector
- Blank number lines
- Colored pencils or crayons

Vocabulary

rounding

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

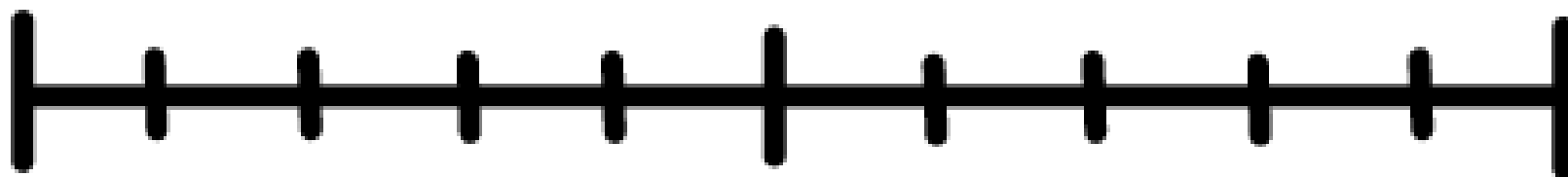
1. To review rounding using Base-10 blocks, you should model an example from the previous lesson.



2. Ask, “What could we do if we did not have Base-10 blocks to help us round numbers?” Have students share their ideas and discuss the advantages and disadvantages of the different strategies.
3. Use the strategy of drawing Base-10 blocks to assist with rounding. For example, demonstrate how to draw Base-10 blocks to illustrate 34. Next, have students identify the smaller ten and larger ten, as you illustrate.
4. Introduce the idea of using a number line to help with rounding numbers.
5. Using the example of “Round 34 to the nearest ten,” first, draw Base-10 blocks to represent 34, then write the numeral. Identify the smaller ten and larger ten. Represent those values with Base-10 blocks and write the numbers. Then, locate 34 on the number line. Using a colored pencil or crayon, begin at 34 and draw an arc to 30. Then, using a different colored pencil or crayon, begin at 34 and draw an arc to 40. Have the students compare the difference to understand that 34 is closer to 30 than to 40.
6. Give each student a blank number line and have the students work through several examples as you model the technique on the overhead.
7. Introduce students to the “Heads Together Rounding” activity.

8. Divide the class into groups of four, and assign a letter to each group (e.g., group A, group B).
9. Groups will record their letter on a sheet of paper, then decide who within their group will be number 1, 2, 3, and 4. Have each group post its recording sheet on the wall.
10. Choose a number to be rounded to the nearest ten. The groups should “put their heads together” to reach consensus on the answer. Each group member must understand the correct answer.
11. Randomly pick a number (1–4) and only that member of each group may go to their group’s sheet and record the answer.
12. After all answers have been recorded, review the questions with students.

Number Line



Smaller Ten

Number to be rounded

Larger Ten

Comparing Numbers with Linking Cubes

Reporting Category	Number and Number Sense
Topic	Compare numbers using symbols and words
Primary SOL	2.1 The student will <ol style="list-style-type: none">compare two whole numbers between 0 and 999, using symbols ($>$, $<$, or $=$) and words (<i>greater than</i>, <i>less than</i>, or <i>equal to</i>).

Materials

- Linking cubes

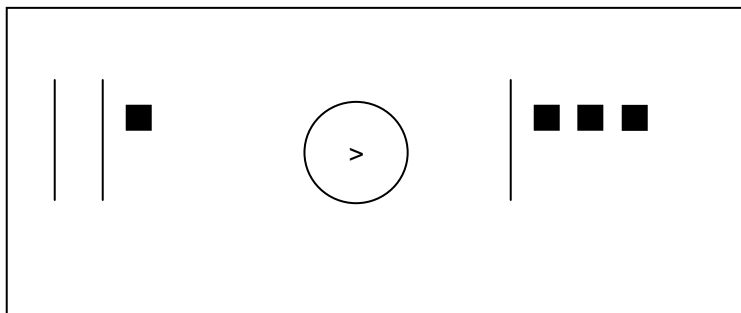
Vocabulary

greater than, less than, equal to

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. To model this activity, place seven linking cubes in one circle and two cubes in another circle. Compare the two sets by asking, “Which set has more? How do you know?”
2. Place six linking cubes in one circle and three cubes in another circle. Compare the two sets by asking, “Which set has less? How do you know?”
3. Place four linking cubes in one circle and four cubes in another circle. Ask questions such as, “Is the number of cubes in circle one greater than the number of cubes in circle two? Is the number of cubes in circle one less than the number of cubes in circle two? How can we compare the two circles?” Discuss the concept of equality.
4. Place nine cubes in one circle and five cubes in circle two. Ask students to think of ways to compare the linking cubes. If no student suggests putting the cubes together to form a tower, then ask, “Could we compare the linking cubes if we put the cubes together to make a tower?” Build the towers, then compare the two numbers using the terms *greater than*, *less than*, or *equal to*. Build several towers using different numbers.
5. Ask, “What if I had two larger numbers, such as 12 and 18? Is there a better way to stack the cubes so that I do not have two tall towers?” Discuss place value and stacking the cubes into groups of tens and ones.
6. Have the students build 12 and 18 by stacking cubes into groups of tens and ones. Using the place value representation, Ask, “Which number is greater/less than? How do you know?” Repeat several times using different numbers.

7. Model building 21 and 13. Ask the students to compare the two numbers. Show them how to represent these two numbers by drawing a picture of 21 and 13, using sticks and dots to represent the tens and ones place.



8. Give the students examples to build and record.

Ordinal Numbers: Crab House

Reporting Category	Number and Number Sense
Topic	Identify and write ordinal numbers
Primary SOL	2.2 The student will <ul style="list-style-type: none">a) identify the ordinal positions first through twentieth, using an ordered set of objects; andb) write the ordinal numbers.
Related SOL	1.5

Materials

- Book about a Hermit crab and his adventures every month
- Drawing paper
- Crayons
- Shell or pattern of a shell to be decorated
- Items to decorate the shell
- Cards with ordinal positions first through fifth
- Hula-Hoop
- Paper cups (20)
- Paper crab to hide under the cup

Vocabulary

ordinal positions first through twentieth

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Divide the class into 12 groups, giving each group a card with a month of the year listed on it.
2. Before reading the story about a *Hermit Crab*, explain to the students that they will need to listen carefully because they will be drawing and recounting the events that happened to the hermit crab during their group's assigned month.
3. Read the book, taking time to discuss with students the events that occurred during each month.
4. After hearing the book read, each group will draw a picture representing the events that happened during their assigned month.
5. Line up the students in the order of their months by asking questions such as, "Which group has the *first* month of the year?" A member of the group should answer in a complete sentence, "I have January, the first month of the year." Continue in this manner until all 12 months have been represented. Emphasize ordinal numbers in the directions.
6. Beginning with January, have a member of each group tell what happened to the hermit crab during the assigned month.

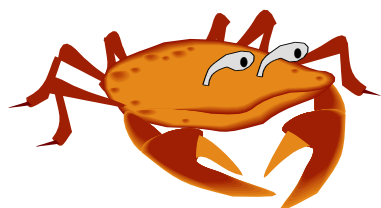
7. After retelling their stories, have all students sit down, except for the students holding the drawings. Have those students sit in a row on the floor.
8. Ask students questions related to the story that involve ordinal numbers. The student answering the question should place a Hula-Hoop over the student holding the correct drawing, then orally tell the answer. Examples of questions may include
 - What happened to the hermit crab during the *third* month of the year?
 - Which month is the *tenth* month of the year?
 - During which month did the hermit crab decorate his shell with coral?
 - During which month did the hermit crab and his friends enter the forest of seaweed?
9. When a student answers the question using ordinal numbers, then he/she will take the place of the student holding the drawing. This will ensure that each student will be questioned about ordinal numbers.
10. Either purchase a bag of shells or use the pattern provided as a model for students to decorate their shells. Give each student a card with the ordinal numbers *first* through *fifth* printed on it. Have the students record the order in which each item was attached to the shell. Display the shells and cards.
11. Play the game, “Where’s the Crab?” The object of the game is to guess the location of the crab in three or fewer guesses. The person guessing must use an ordinal number in the guess.
 - Have a set of 20 small paper cups or shells turned upside down in a row.
 - A student will hide a paper crab under one of the cups.
 - Choose a student to guess the position of the crab using an ordinal number. If the guess is incorrect, turn the cup upright to help the students narrow the choices.
 - Then the student who hid the crab must give a hint by responding that the crab is either further from the guess or closer to the guess.
 - Play continues until the crab is discovered.
 - Game variations: The set of cups could be presented in lines or rows from left to right, right to left, top to bottom, or bottom to top.

Hermit Crab's House

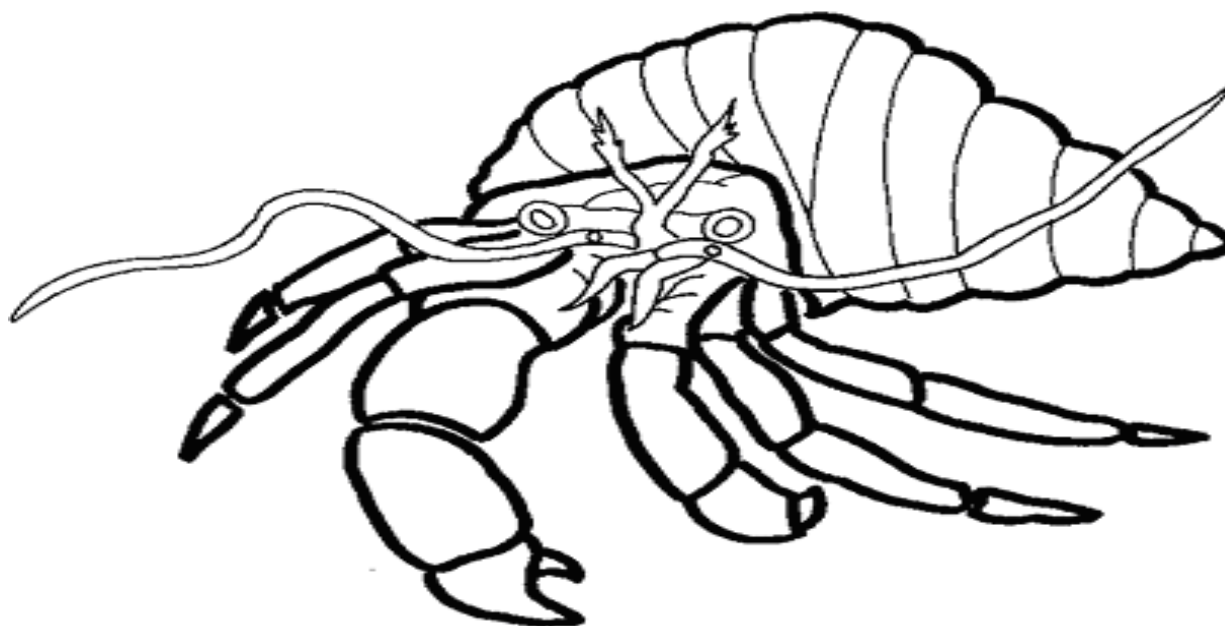
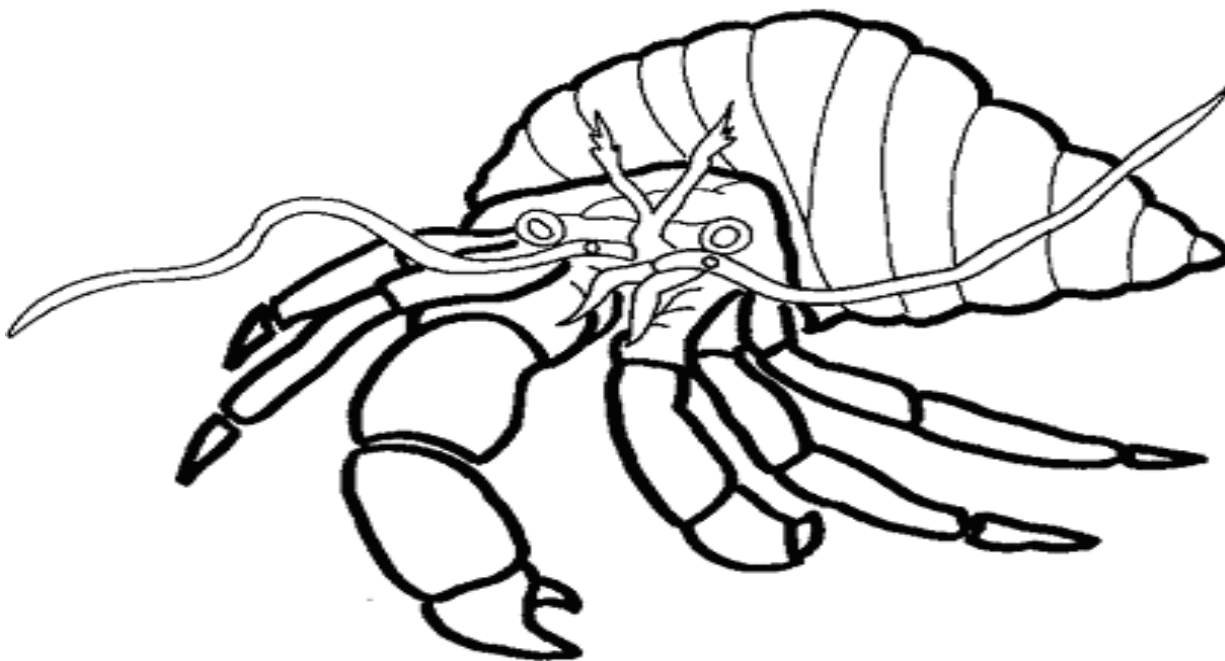
1st
2nd
3rd
4th
5th

First
Second
Third
Fourth
Fifth

Hermit Crab's House



Crab Pattern



Ordinal Numbers

Reporting Category	Number and Number Sense
Topic	Identify and write ordinal numbers
Primary SOL	2.2 The student will <ul style="list-style-type: none">a) identify the ordinal positions first through twentieth, using an ordered set of objects; andb) write the ordinal numbers.

Materials

- Overhead projector
- Transparency
- Dry-erase marker
- Colored counters (at least six)
- Sets of 20 objects
- Ordinal numbers written on self-adhesive notes

Vocabulary

ordinal positions first through twentieth

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Have students do some activities in which there will be a first, second, and third place. For example, have the entire class line up and count off using ordinal terminology. It may be necessary for you to begin by saying, “I am first,” so that students understand the process. Have a group of six students run a short race, and have the others say who finished first, second, and third. Using small toy cars and a predetermined raceway, allow six students to race the cars and determine which one finished first, second, and third. Take an ordinal field trip: Take your class into the hall and send an individual or pair of students to the third door on the right. Send two others to the second door to the left. Be sure that each student participates in at least one of the activities.
2. Ask students what all of these activities have in common. Explain that today they will be talking about numbers that indicate a position in a series or order. Ask the students to explain how ordinals were used in each activity earlier.
3. Select 20 items from around the room and place them in a row. Pass out self-adhesive notes with ordinal numbers written on them. Select students to come up and label the items by placing the notes on the actual items so that the entire class can see. Once one direction has been started (e.g., left to right), make sure students follow that same order. Then remove the ordinal notes, pass them out again, and have students label the positions of the items but in the opposite direction (right to left).
4. Place six colored counters on an overhead transparency. Arrange the counters horizontally. Have students come up and label the ordinal positions from left to right using a dry-erase marker. Ask them to predict what would happen if you turned the transparency from horizontal to vertical. Then turn the transparency clockwise and have

students discuss what has changed and what has not changed. Students should realize that the ordinal position has not changed as long as you are going from bottom to top. Erase the ordinal positions. Ask other students to come up to the overhead and label the six counters with ordinals from top to bottom. Ask them to predict what will happen when you change it back to a horizontal orientation (counter-clockwise). Change it back to a horizontal orientation and have them discuss what has changed or what has not changed.

5. Place students in groups of four to six. Have one student from each group select 20 items from around the room to bring back to the group. Each student in the group will draw a pictorial representation of those 20 items and label the pictured objects with ordinal numbers. They will then add a written explanation of what will happen if the orientation changes from horizontal to vertical. Allow the students to physically change their vantage point (get up and move so that the row becomes a column) and then write their explanations. If students need further guidance, refer to the rotation of the counters on the overhead transparency.
6. When the class period is almost over, regroup as a whole class and review what students did that day. Have students share their pictorial representations and written explanations.

Variations:

- Have students draw all students in class in a line going from the classroom door to the teacher desk. Have them choose and denote their place in line using an ordinal number. Have them explain their rationale for picking that location. Ask if their preferred place would change depending on the activity (e.g., getting ready to go outside or having the teacher check your work before going to learning centers). Ask, “Would you choose to be in a different spot if the order was always going to be the same?”
- Have students write in their journals about real-life applications of ordinals.
- Have students explain how sports would be different in a world without ordinals.
- Have students try to write directions for how to make an art project or how to solve a problem that requires sequencing—without using ordinals. Then have the students write the directions using ordinals. Discuss the impact, and have students explain why ordinals were invented.
- Have students ask an adult family member for directions to his or her house and tally the number of ordinals that are used in the explanation.
- Have students create a collage of pictures (using their own drawings or images cut from magazines and newspapers) of instances where ordinals are used (e.g., calendar, sports, floors of buildings, rooms in long hallways).

Don't Answer the Door

Reporting Category	Number and Number Sense
Topic	Identify and write halves, thirds, fourths, sixths, eighths, and tenths Compare unit fractions for halves, thirds, fourths, sixths, eighths, and tenths
Primary SOL	2.3 The student will <ol style="list-style-type: none">identify the parts of a set and/or region that represent fractions for halves, thirds, fourths, sixths, eighths, and tenths;write the fractionscompare the unit fractions for halves, thirds, fourths, sixths, eighths, and tenths.
Related SOL	1.3

Materials

- Book about a doorbell ringing and sharing cookies
- Four copies of the large cookies (cut-out images)
- Student page
- Cookies (optional)
- Paper
- Scissors
- Fraction pieces for projecting

Vocabulary

one-half, one-third, one-fourth, one-eighth, one-tenth, equal-sized parts, halves, thirds, fourths, sixths, eighths, and tenths

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Divide the class into groups of four. Give each student a copy of the student page, and have students cut out each box. Ask for two volunteers to role-play the fraction story as you read it.
2. Tape the large cookies on the board. Read the first page and discuss how many cookies are in the whole set (12) and how the two students will share them equally (halves). Ask one student in each group to show this with his or her cookies. Then use the large cookies to model it on the board, and write the fractional notation below it. Have the student find that fraction and place it with his or her cookies.
3. Read the next two pages, then stop and have students predict how the characters will solve the dilemma. Ask, "What should they do if more people arrive to share?"
4. Read the next section to see if their predictions were correct. Have students use role-play to mimic what characters do in the story. Continue reading the story, adding more volunteers as needed. Have a different student in each group show the fraction with his











- or her cookies and then find the correct fraction card. Discuss what is happening to the whole set (i.e., first the cookies get divided into halves, then thirds, and so forth).
5. After finishing the story, discuss what happened to the set of cookies being shared in the story. (The set was divided again and again as more people came.) Discuss the fair shares (equal-sized portions) that each person received. Explain that fractions are shares of a whole or a set. Relate it to how the students would feel if their parents gave them a treat and they had to share it with a brother or sister. The parent would expect them to be fair and divide it equally (fair shares).
 6. Ask the students, “What do you notice happening to the fair shares that each person receives as the number on the bottom of the fraction gets larger?” When the set of 12 cookies was divided in half, each child got $\frac{1}{2}$ of 12 cookies or a total of 6 cookies. When the set of 12 cookies was divided in sixths, each child got $\frac{1}{6}$ of the 12 cookies or a total of two cookies. Have students look for the pattern and ask them to think about the patterns they see, talk with their group, and then share as a whole class what they have discovered: the larger the denominator, the smaller the fair share. Compare this with what they know about the region/area model (fraction circles) of fractions. Ask, “Does the conclusion still fit?” Ask students to use the fraction pieces projected on the overhead to justify their conclusions and explain their rationale.
 7. As a review and summary of the activity, have students complete a written and pictorial retelling of the fraction story that was shared at the beginning of class. Key components that should be included are the title, author, correct sequence of events, pictorial representations with the fractional notations of what happens each time new people join the original characters, and at least one sentence telling about each picture. Encourage students to use correct capitalization and punctuation.

Variations:

- Students can create their own variations of the fraction story as a dramatic presentation activity. The plays can then be presented to the class, with the fractional parts and fractional notation being drawn on the board, or by having group members present them on posters as props during the presentations.
- Model and create fractions using different set models (e.g., counters, cubes, fruit, six-packs of juice boxes, snack-sized packages of raisins). Set up learning centers so students can rotate and model the fractions, then trace or draw the representations (e.g., if 10 chips is the whole, show $\frac{1}{2}$ by dividing the chips into two equal piles encircling each group with yarn). A pictorial representation of the set model can be made by drawing or by stamping with Bingo markers and then circling the fractional parts.

Large Cookies



			
			
			
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{12}$

Fractions with Pattern Blocks

Reporting Category	Number and Number Sense
Topic	Identify and write halves, thirds, fourths, sixths, eighths, and tenths and compare unit fractions for halves, thirds, fourths, sixths, eighths, and tenths
Primary SOL	2.3 The student will <ol style="list-style-type: none">identify the parts of a set and/or region that represent fractions for halves, thirds, fourths, sixths, eighths, and tenths;write the fractions; andcompare the unit fractions for halves, thirds, fourths, sixths, eighths, and tenths.

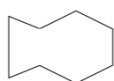
Materials

- Paper
- Scissors
- Glue
- Pattern blocks for teacher and each group
- Fraction fish and peanut outlines for each student. *(Before the lesson begins, use pattern blocks to create the outline of the fraction fish and peanut on a projector.)*

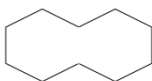
Vocabulary

one-half, one-third, one-fourth, one-eighth, one-tenth, equal-sized parts, halves, thirds, fourths, sixths, eighths, and tenths

Fraction Fish



Peanut



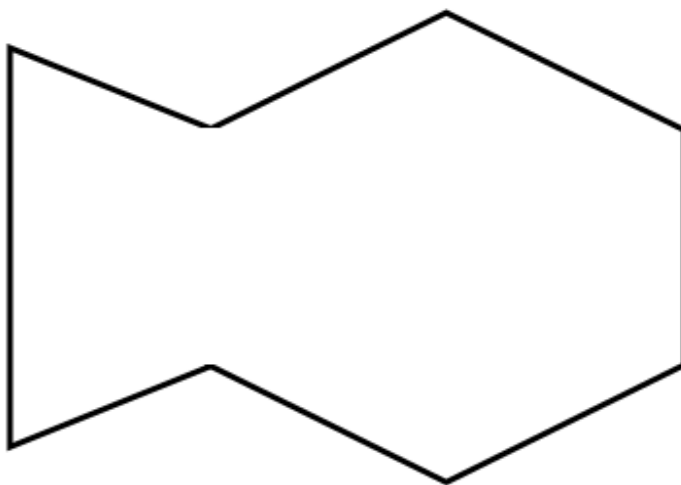
Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Group students in fours, placing a set of pattern blocks in the middle of each group.
2. Tell students that you found a picture of a fish (place outline on overhead), and you're curious as to how it was made. Ask them to help you determine how to make the fish using the pattern blocks. Give students a few minutes to come up with different solutions, using whatever strategies they choose.
3. As a class, discuss several of the students' strategies. Have students come up to the overhead and model the different solutions. As each solution is modeled, stick tape to the back of the pattern blocks to recreate the solution on the board, thereby keeping a record of the different solutions. If students use more than one type of pattern block (e.g., two trapezoids and three triangles), accept the answer, but ask if they can now make the fish using only one type of pattern block (e.g., all trapezoids or all triangles).

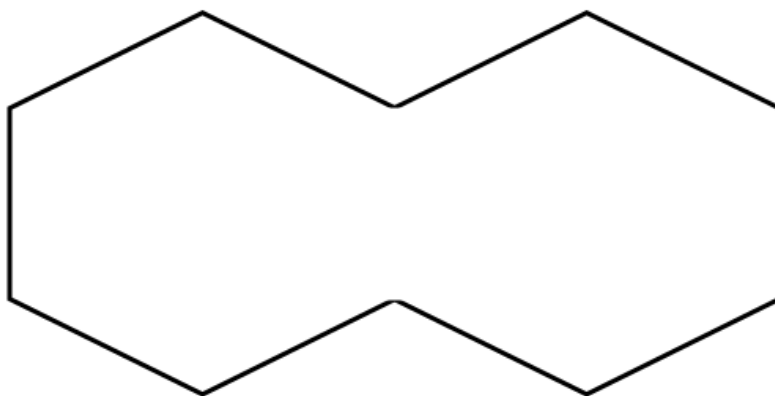
Students will be trading in/making equivalent fractions to achieve this. Only record those solutions that use one type of pattern block (e.g., three trapezoids or nine triangles).

4. Using the patterns stuck on the board, discuss the fractional parts of the fish. Discuss the importance of fair shares, or equal-sized parts, of a whole. Model the fractional notation for each piece. On the overhead, trace the trapezoids inside the fish shape. As you remove each piece, write $\frac{1}{3}$, explaining that the fraction represents one of three equal-sized pieces that make up the fish.
5. Repeat step four using nine triangles.
6. Model the strategy and steps again, as you have the students make the peanut outline shape. Repeat steps two through four.
7. Pass out blank white paper. Have students fold the sheet in half, open it, and draw a line on the fold. Discuss how they started out with one whole sheet of paper and now they have folded it to create two halves. Draw a pictorial representation on the board and write the fractional notation: one-half and $\frac{1}{2}$ on each half of the paper.
8. Explain to students that they will now create their own picture shapes using two blue rhombuses. They must follow one guideline: the rhombuses must touch on at least one side. Review the geometry terminology of sides. (The step is important to keep the activity a region/area model; otherwise, it could become the set model.) Students should trace the outline of the completed shape, then use the provided sheet of pattern blocks to cut and color the two rhombuses. On the opposite side of their papers, the students should recreate the picture with the paper pattern blocks, writing the fractional notation as they glue each block. Each student will then pass the paper to his or her partner, who will fill in the outline with other equal-sized pattern blocks. The partners will cut, color, and glue their paper pattern blocks on the outline, writing the fractional notation as they remove each piece. (Four green triangles will fit in the shape, so each traced piece should be marked as $\frac{1}{4}$.) When the puzzle is solved, have students pass back their pictures and explain what they did. Allow students to discuss, explain, and verify their solutions.
9. Have students create another shape on the back of their papers using four blue rhombuses. Repeat step eight.
10. Have students share their creations, solutions, and fractional notations.
11. Summarize the lesson by having students explain that the whole can be made up of more than one piece. It does not need to be one hexagon or one fraction circle. Fractions are equal-sized pieces of a whole. Have students quickly identify and write the fractional parts of a whole for $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{8}$, and $\frac{1}{10}$.

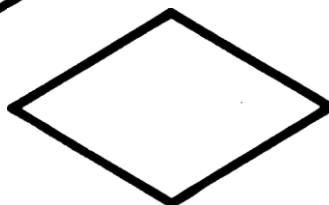
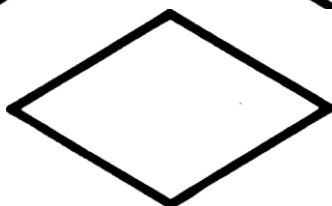
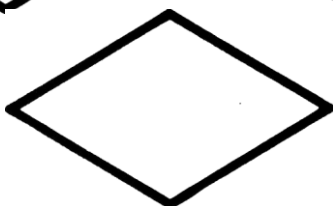
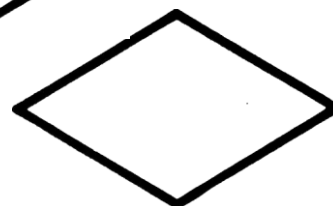
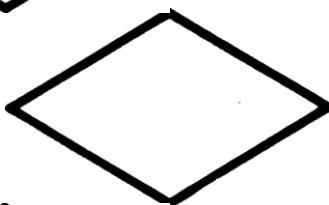
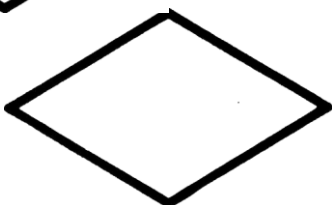
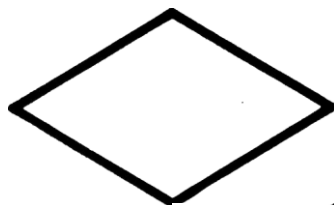
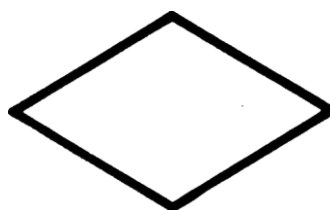
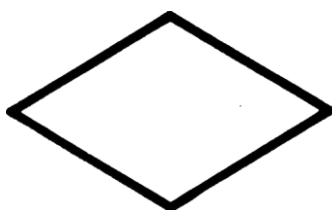
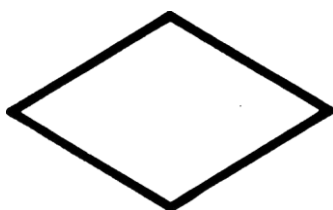
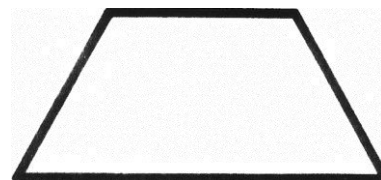
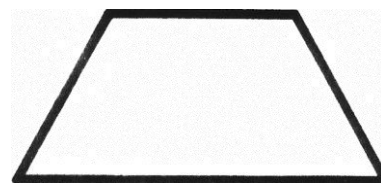
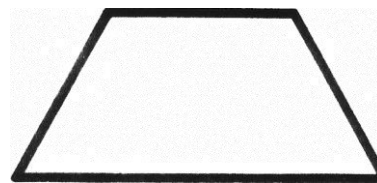
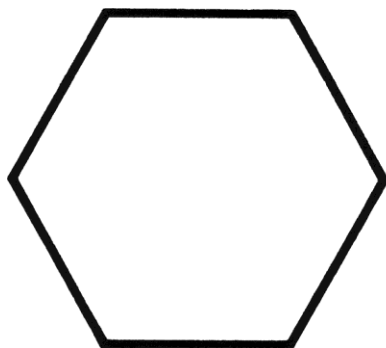
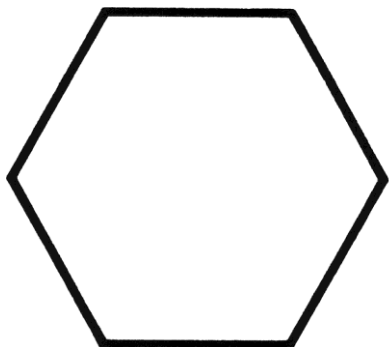
Fraction Fish



Fraction Peanut



Pattern Blocks



Magic Number Machine

Reporting Category	Number and Number Sense
Topic	Count by twos, fives, tens, count backwards, and recognize even and odd numbers
Primary SOL	2.4 The student will <ol style="list-style-type: none"> count forward by twos, fives, and tens to 100, starting at various multiples of 2, 5, or 10; count backward by tens from 100; and recognize even and odd numbers.
Related SOL	2.20, 2.21

Materials

- Magic Number Machine (see explanation)
- Square inch tiles or linking cubes
- Paper and pencil for each student

Vocabulary

input, output, pattern, skip count, even, odd

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Show students the Magic Number Machine and explain that we will be using it to discover some patterns. Explain how it works. Some cubes will be put in the “In” flap, the machine will do its magic, and then some cubes will come out of the “Out” flap. Our job is to figure out how the machine works (what pattern it is following). The teacher will be the machine operator at first, but as the students get accustomed to the activity they will become the operators and recorders of the data.
2. Draw a T-table and label it with “In” and “Out.” Compare with the “In” and “Out” flaps on the Magic Number Machine.

In	Out

3. Select a student to come up and place three cubes in the top flap of the machine. Record the three on the “In” section of the T-table. Go behind the box, make whirring noises, and then make five cubes come out from the bottom flap. Record the five on the “Out” section of the T-table. Ask students to think about what has happened.

In	Out
3	5

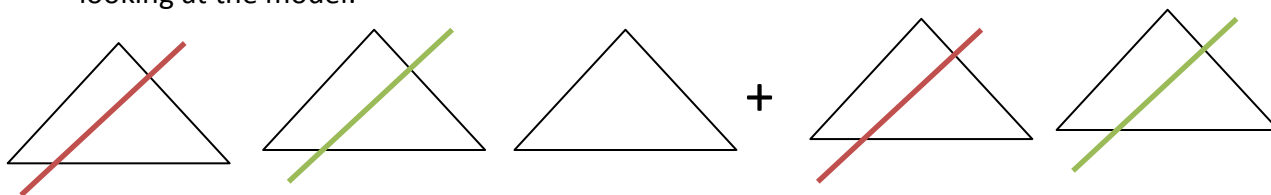
4. Select another student to come up and place five cubes in the top flap of the machine. Record the 5 on the “In” section of the T-table. Go behind the box, make whirring noises, and then make seven cubes come out from the bottom flap. Record the 7 on the “Out” section of the T-table. Ask students to think independently and then discuss with a partner what happened.

In	Out
3	5
5	7

5. Ask students what is happening to the “In” number? (It’s getting bigger so we know the machine is adding cubes each time.) Is there a pattern to how many cubes the machine is adding each time? What do you think that pattern is?
6. Select a student to come up and place one cube in the top flap of the machine. Record the 1 on the “In” section of the T-table. Ask students to predict what will come out. Go behind the box, make whirring noises, and then make three cubes come out from the bottom flap. Record the 3 on the “Out” section of the T-table. Ask students to think about what has happened and compare with their predictions. Discuss. Write the following:

In	Out	
3	5	$3 + \underline{\quad} = 5$
5	7	$5 + \underline{\quad} = 7$
1	3	$1 + \underline{\quad} = 3$

7. Select another student to come up. Allow them to place any number they want, record it in the T-table, and place them in the top flap. Students are to predict what will come out. The machine will do its thing, and then the output needs to be recorded on the T-table. Add the missing addend equation to the T-table as well. Students should be able to verbalize and explain the +2 pattern. They can model the pattern with manipulatives and determine which number is even and which number is odd by looking at the model:

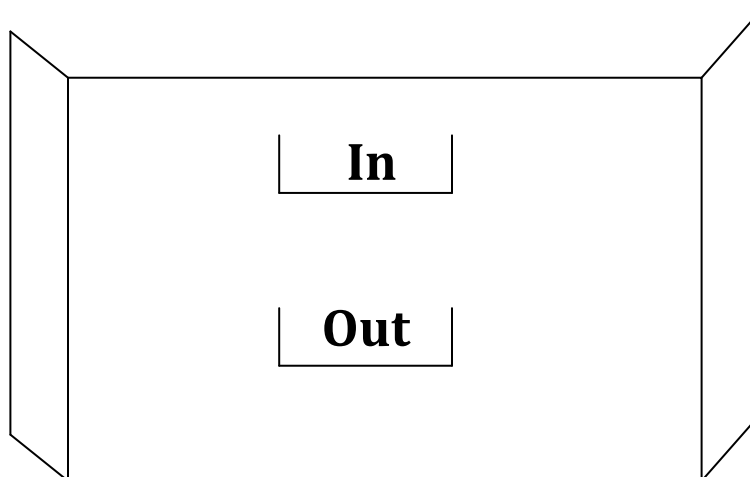


Students will observe that there is a triangle that does not have a match, so that makes the sum of 5 an odd number. They may also notice that the set of 3 is odd and the set of 2 is even and infer that an odd number plus an even number results in an odd number.

8. Repeat this sequence with other patterns on new T-tables. (e.g., +3, +4). Change this lesson from being teacher-led to being student-led. Students should be able to take charge of creating and recording in the T-tables, creating and implementing the pattern behind the Magic Number Machine, and writing and solving the missing addend/subtrahend problems.
9. Stop the activity when the class period is almost over, regroup as a whole class, and review what they did that day.

Magic Number Machine

A Magic Number Machine can be made by using a science project board or an empty box. A flap needs to be cut in the top third of the box and labeled “In.” A flap needs to be cut in the bottom third of the box and labeled “Out.” Decorate as “magically” as you would like.



Magic Number Machine

Rule +3	
In	Out
3	
6	
15	

<p>Explain how your last two numbers fit the pattern.</p>

Rule -10	
In	Out
100	
90	
80	
40	

<p>Explain how your last two numbers fit the pattern.</p>

Rule +2	
In	Out
1	
3	
5	
13	

<p>Explain how your last two numbers fit the pattern.</p>

Rule ____	
In	Out
0	5
5	10
10	
15	

Write the equation showing how you determined the missing number.
$0 + \underline{\quad} = 5$

Recreate the pattern above by coloring in the same numbers on the hundred chart below. Continue the pattern.

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Describe what you have discovered.

Estimation Jar

Reporting Category	Number and Number Sense
Topic	Count by twos, fives, tens and recognize even and odd numbers
Primary SOL	2.4 The student will <ul style="list-style-type: none"> a) count forward by twos, fives, and tens to 100, starting at various multiples of 2, 5, or 10; c) recognize even and odd numbers.

Materials

- A jar filled with 100 or fewer items of the same size and shape (e.g., wrapped candy, pencil erasers)
- One small piece of paper (approximately 3" by 3") for each student

Vocabulary

estimate, even, odd

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Have students gather in a circle. Place the Estimation Jar in the center. Explain that they will be writing down an estimate of the number of items in the jar. The person that comes the closest will win half the contents in the jar. The rest of the class will share the remaining half. Allow students a few minutes to write their names and estimates on the slips of paper. When finished, students will place folded estimates in the circle next to the jar.
2. Allow one person to select an estimate. This person will read the name and the estimate aloud. That student will then select the next estimate, read the name and estimate and then place it on the floor in the correct sequence using an appropriate distance from the first one. This will continue until all estimates have been read and placed accordingly. A sample is shown.



3. Ask students to determine what the smallest estimate was. Ask students to determine what the largest estimate was. Ask students to determine what the most popular and least popular estimates were. Always have the students explain how they determined their answers. Ask students to compare the estimates, e.g., "How many more people picked 54 than 65? How many more people picked 44 than 42? How many more people picked 36 than 17? How do you know?"
4. Empty the contents of the jar. Allow students to discuss and model several ways of sorting/classifying the items. Select one way and have students count the items

together. Practice having students group and count by twos, threes, fours, fives, and tens. Leave the items in groups of tens and ones.

5. Have a student write the actual number of items on the board. Have another label the place value and compare it to the piles of tens and ones on the floor.
6. Have another student write the actual number on a slip of paper and then sequence it in the row of estimates. Have students select the two estimates on either side of the actual number. Have students discuss the process to find the difference. Have students estimate and then actually determine the difference between the estimate and the actual number. Have students determine who the winner is.
7. Have students look at the actual number again. Have them discuss if the number is even or odd and their rationale.
8. Divide the items in half. Ask for strategies about how to make it fair. (For example, give one pile of ten to the winner and one pile to the class until you have run out of piles of tens. Then figure out what would be a fair way to divide up the ones.) Discuss if the number is even or odd by determining if there is anything left over after dividing the items into two equal piles.
9. Have the winner take home his/her goodies, while the rest of the class divides the remaining half equally.

Variations:

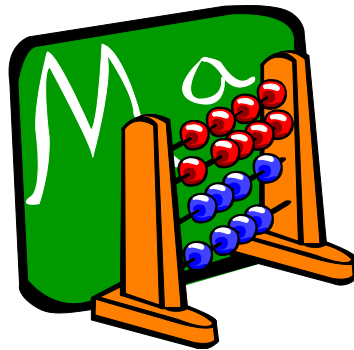
- Have students write in a journal about how to determine if a number is even or odd.
- This activity can be redone the following week. The items can be the same size or smaller/larger. Students should be reminded to take that factor into consideration when making their estimates.
- This activity might also be done as a learning center activity in the room using other objects. However, you may not want the students to “win” these items. The students could keep a record in their journals naming the item of the week, their estimate, the actual number, and the difference. Over time their estimation skills should improve if they look back at their previous data and use that to guide them in making their new estimates. See the recording chart attached.
- Have students write their numbers, counting by twos, threes, fours, fives, and tens to 100.

Estimation Jar Recording Sheet

Date	Item	My Estimate	Actual Number	Difference

THIRD GRADE

Number and Number Sense



Place Value Hula Hoop Race

Reporting Category

Number and Number Sense

Topic

Identify place value for a six-digit numeral

Primary SOL

3.1 The student will

- a) read and write six-digit numerals and identify the place value for each digit.

Materials

- Number cards (15 to 20 cards written numerically and 15 to 20 cards written with word names)
- Two Hula Hoops

Vocabulary

ones, tens, hundreds, thousands, ten thousands, hundred thousands, place value, whole number, digits, period

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Place Hula Hoops on the floor on one side of the room.
2. Spread half of the numeric cards and their corresponding word name cards in one hoop. Place second set in the other hoop.
3. Divide students into two teams lined up at the opposite end of the classroom from the Hula Hoops.
4. On your signal, the first student in each line races down to the Hula Hoops and finds a set of matching cards (one number card and its corresponding word name card). The students race back with the cards and place them on the floor near their line.
5. Quickly check to see if the card set is correctly matched. If it is, allow the next student in line to go. If it's not correct, quickly place the card set back in the Hula Hoop, as you signal the next student in that line to go.
6. Play continues until one team's Hula Hoop is empty, and the team has successfully matched all of its numeric cards with the corresponding word name cards.

Sample Number Cards

135	One hundred thirty-five
204	Two hundred four
35	Thirty-five
44,651	Forty-four thousand, six hundred fifty-one
12,044	Twelve thousand, forty-four
990	Nine hundred ninety
635,002	Six hundred thirty-five thousand, two
18,405	Eighteen thousand, four hundred five
62,091	Sixty-two thousand, ninety-one

Place Value Paths

Reporting Category	Number and Number Sense
Topic	Identify place value for a six-digit numeral
Primary SOL	3.1 The student will a) read and write six-digit numerals and identify the place value for each digit.
Related SOL	4.1

Materials

- Hundreds board
- Two sets of digit cards

Vocabulary

more than, less than, add, sum, subtract, difference, ones, tens, digits, double, multiple of

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Mix the two sets of digit cards together and stack them facedown.
2. Draw two cards and announce the digits to the class. Ask, “What numbers can be formed using these digits?” (*Example: 5 and 6 are drawn, thus the number choices are 56 and 65.*)
3. Each player selects one of the digits. Remind students that their place value paths ultimately must contain six two-digit numbers, ordered from smallest to greatest. The six two-digit numbers need to touch. After six numbers, continue drawing numbers to reach both ends of chart.
4. Instruct students to independently record their number choices in one of the cells along the place value path. If students cannot place either of the possible numbers in any of their remaining cells, nothing is recorded.
5. After six draws, ask whether any students have completed their entire place value path. Draws continue until the majority of students have completed paths. Ask the students to compare their results.

Assessment

- **Questions:**
 - How did you decide where to place your numbers?
 - How do your paths differ from others in class?

Variations:

- Use three cards per draw.
- Use a two hundreds board.

Hundreds Board

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Digit Cards (copy and cut apart)

0	1	2	3	4
5	6	7	8	9

0	1	2	3	4
5	6	7	8	9

0	1	2	3	4
5	6	7	8	9

0	1	2	3	4
5	6	7	8	9

0	1	2	3	4
5	6	7	8	9

0	1	2	3	4
5	6	7	8	9

Place Value Roll

Reporting Category	Number and Number Sense and Computation and Estimation
Topic	Identify place value for a six-digit numeral Estimate and solve single-step and multistep problems
Primary SOL	3.1 The student will a) read and write six-digit numerals and identify the place value for each digit. 3.4 The student will estimate solutions to and solve single-step and multistep problems involving the sum or difference of two whole numbers, each 9,999 or less, with or without regrouping.

Materials

- Place value roll chart (Hundreds board, 99 board or 200 Hundreds board)
- Number cubes
- Cover disks (Bingo Chip, etc.)

Vocabulary

ones, tens, place value, digit, whole number, period, adding, subtracting, sum, difference

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Instruct the starting player to roll the number cubes and add the numbers on the top faces. Students should then cover that number on the chart. *(Example: If one cube is 3, and the other cube is 4, students would then cover the number 7.)*
2. The next player rolls the number cubes, and the process repeats.
3. On the starting player's second turn, he or she rolls the number cubes and adds the total to the sum rolled on the first turn. (To score totals greater than 10, the player can use two number cubes.)
4. Have players alternate turns until one player reaches 99 or higher.

Assessment

- **Questions**
 - What methods did you use to add? *(add on, double, estimate, paper and pencil)*
 - How could you check your answers? *(paper and pencil, calculator, subtraction)*

Variations:

- Give each pair a calculator to check answers in the beginning. Or, assign a third student to check answers.
- Start at 99, and subtract the roll value of the number cubes instead of adding. The first player to reach zero wins.
- Use a six- or 12-sided number generator.
- Use three number cubes on a 200s chart

Hundreds Board

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Hundreds Board 0-99

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	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Two-hundreds Board

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200

Hundred Chart Activities

Reporting Category	Number and Number Sense and Computation and Estimation
Topic	Identify and write ordinal numbers
Primary SOL	3.1 The student will a) read and write six-digit numerals and identify the place value for each digit. 3.4 The student will estimate solutions to and solve single-step and multistep problems involving the sum or difference of two whole numbers, each 9,999 or less, with or without regrouping.
Related SOL	4.1a, 4.1c

Materials

- Hundred charts (1 to 100 board and 0 to 99 board)
- Counters for Hundred chart

Vocabulary

ones, tens, hundreds, thousands, ten thousands, hundred thousands, place value, rounding, digit, whole number, period, product, one more, ten more, one less, ten less, descending order

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Give each student a Hundred chart and a counter.
2. Practice by having students put a counter (or a finger) on a number on the Hundred chart (34, for example). Tell them to add 10. Ask, “What is the sum?” (44) Make sure students understand that adding 10 to 34 requires moving down one space on the Hundred chart. *(Students usually will learn that they just need to move down one space when adding 10, instead of counting one by one.)*
3. Try another example (56). Ask students to add 10 (66). Again, students should move their counters down one space on the Hundred chart. Do as many examples as necessary until all students can successfully complete the task.
4. Next, have students place a counter on 72, and then subtract 10. Tell students to note that their counters move up one space because they are subtracting, not adding. Practice several subtraction examples.
5. Try adding 11. Tell students to place a counter on 24, and then add 11. Students should move finger down one space to make 10 and then one space to the right, indicating that 11 is the same as 10 + 1. Try more examples until students grasp the concept.
6. Move to a subtraction example. Ask students to put a counter on 89, and then subtract 11. Students should move up one space to represent minus 10, and then move one to the left to subtract 1, arriving at the answer of 78.
7. Students should now be ready to play the following games. As you play each game, you’ll see students getting faster at adding and subtracting once they understand how to manipulate (decompose numbers on) the Hundred chart.

Game One

1. Tell students that you're thinking of a number on the Hundred chart. Offer clues to help students identify the number.
2. Ask students to place their counters on the *sum* of 11 and 7. Have them check with a neighbor to make sure everyone is starting on the same number (18).
3. Add 20. (*Monitor students to check if they move their counters down two spaces to add 20, arriving at the sum of 38.*)
4. Subtract 2. Ask, "Where are you now? Are you on a multiple of 6?"
5. Subtract 10, and then subtract 1. Ask, "Is your number the same as the number of pennies in a quarter?" (yes, 25)
6. Add 9. (*You may notice students adding 10 and then subtracting 1.*)
7. Add 11. Ask, "Are you on a *multiple* of 5?" (yes, 45)
8. Subtract 2, and add 21. Ask, "Is the *sum* of the digits 10?" (yes, 64)
9. Add 31, and then subtract 10.
10. Add 1, and then subtract 20. Ask, "Are both *digits* the same?" (yes)
11. Ask students: "What's my number?" (66)

Game Two

1. Instruct students to place a counter on the *product* of 11 and 7. Have them check with a neighbor to make sure everyone is starting on the same number (77).
2. Add 20, and then subtract 2. Ask, "Are you on a *multiple* of 5?" (yes, 95)
3. Subtract 10, and then subtract 1. Ask, "Is the tens place *double* the ones place?" (yes, 84)
4. Add 9, and then subtract 30. Ask, "Is the number a *multiple* of 3?" (yes, 63)
5. Subtract 2, and then add 21. Ask, "Is the *sum* of the digits 10?" (yes, 82)
6. Subtract 31 and add 10.
7. Add 1 and then subtract 18. Ask, "Are both *digits* the same?" (yes)
8. Ask, "What's my number?" (44)

Game Three

1. Instruct students to place a counter on the *product* of 5 and 7. (Ask students to answer aloud, so that everyone starts on the same number, 35.)
2. Subtract 3. Add 11. Ask, “Are the digits in consecutive *descending order*?” (yes, 43)
3. Add 12, and then add 9.
4. Subtract 1. Ask, “Is the tens place double the ones place?” (yes, 63)
5. Subtract 9, and then add 1.
6. Add 20. Ask, “Is this the amount of change you would get from \$1, after making a 25-cent purchase?” (yes, 75 cents)
7. Subtract 3, and then add 9. Ask, “Is this number a *multiple* of 9?” (yes, 81)
8. Subtract 29. Ask, “Is the *sum* of the digits 7?” (yes)
9. Ask, “What’s my number?” (52)

Assessment

- **Questions**

- What happens to a number when you go up one space? (*increases by 10*)
- What happens to a number when you go down one space? (*decreases by 10*)
- How can you write 11? ($10 + 1$) How do you show that number on the Hundred chart? (*move up one and over one*)
- What other patterns did you notice when using the chart?

Variations:

- Use a Two Hundreds Board

Hundreds Board

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Hundreds Board 0-99

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	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Build the Number

Reporting Category	Number and Number Sense
Topic	Identify place value for a six-digit numeral and round
Primary SOL	3.1 The student will <ul style="list-style-type: none">a) read and write six-digit numerals and identify the place value and value of each digit;b) round whole numbers, 9,999 or less, to the nearest ten, hundred, and thousand.

Materials

- Place-value mat
- Cards 0–9
- Overhead projector
- Overhead transparency with number word written on it
- White boards or paper for each student
- Wooden board with nails and beads to serve as abacus

Vocabulary

ones, tens, hundreds, thousands, ten thousands, hundred thousands, place value, rounding, digit, whole number, period

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Introduce activity by reviewing place-value mat and the terms of each period (i.e., ones, tens, hundreds).
2. Write a number word (e.g., three hundred fifty-two) on the overhead transparency.
3. Students should use their cards to show the numerical value of the number word.
4. Circulate around the room, monitoring student answers.
5. After giving students several examples, increase number values to include numbers up to the hundred thousands place. For example, have students write “nine hundred forty-five thousand, sixty-one.”
6. You may substitute place-value mat and cards 0–9 with place value cards.

Assessment

- **Questions**
 - What happens when there is not a number written for the hundreds place? How do you write that? Give the example, “nine hundred forty-five thousand, sixty-one” (945,061). Remind students that they will put a zero in the hundreds place to represent no hundreds in this number.

Number Cards

0	1	2	3	4
5	6	7	8	9

Place Value Chart – Whole Numbers

Thousands	,	Hundreds	Tens	Ones

Rounding It

Reporting Category	Number and Number Sense and Computation and Estimation
Topic	Identify place value for a six-digit numeral and round
Primary SOL	3.1 The student will <ol style="list-style-type: none">read and write six-digit numerals and identify the place value for each digit;round whole numbers, 9,999 or less, to the nearest ten, hundred, and thousand.

Materials

- Spinner board and spinner (e.g., pencil or paper clip)
- Recording sheet for each student
- Base-10 blocks

Vocabulary

ones, tens, hundreds, thousands, ten thousands, hundred thousands, place value, rounding, whole number, digits, period

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Practice instructions: Have students practice rounding numbers by building a given number with base-10 blocks and then rounding that number to the nearest ten, hundred, or thousand. Have students use the physical models (base-10 blocks or a number line) to explain the rounding process.

1. Instruct students to take turns spinning the spinner to create a two-, three-, or four-digit number, according to the instructions on the recording sheet.
2. Have students write each number on the recording sheet as they spin it. It will take two, three, or four spins to create the numbers.
3. After students complete the number, ask them to round it to the nearest ten, hundred, or thousand, following the recording sheet instructions.
4. Students should write the rounded number on the recording sheet.

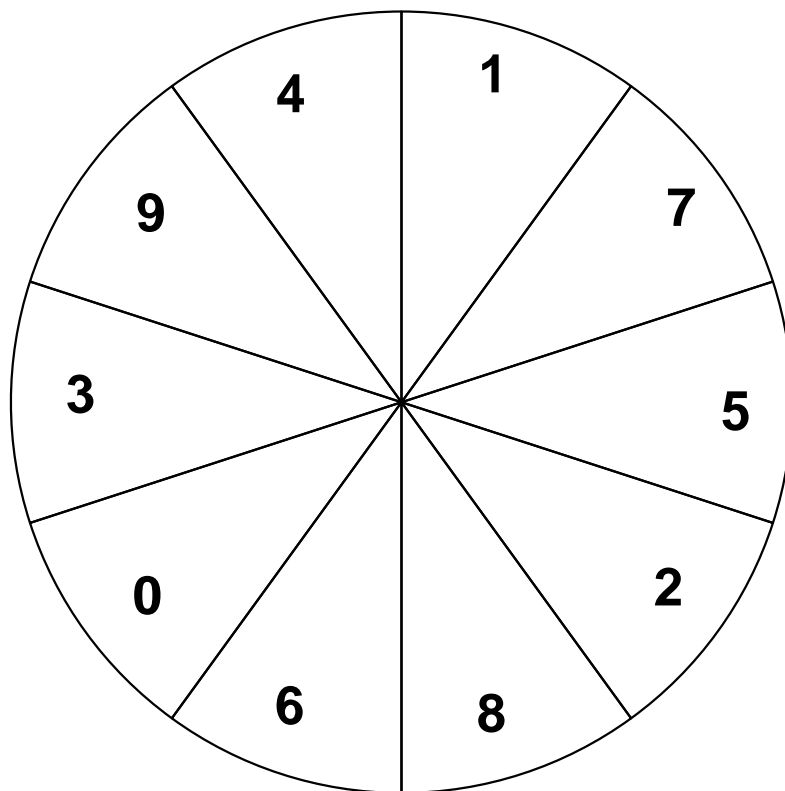
Assessment

- **Questions:**
 - What is the value of a digit in a particular place?
 - What happens when there isn't a number in a place? How do you write that number? Are you including the zero in the number?

Variations:

- Have students work with the number 2,549, exploring what happens when it's rounded to the nearest ten, hundred, and thousand. Students should compare their answers.

Spinner



Rounding It Recording Sheet

Name: _____

Number of Digits	Number Made	Round to the Nearest ____	Rounded Number
<i>Sample</i> 3	247	Ten	250
2		Ten	
2		Ten	
2		Ten	
3		Ten	
3		Hundred	
3		Hundred	
4		Thousand	
4		Hundred	
4		Hundred	
4		Thousand	

Yes or No, What's My Number?

Reporting Category	Number and Number Sense
Topic	Compare numbers using symbols and words
Primary SOL	3.1 The student will c) compare two whole numbers between 0 and 9,999, using symbols ($>$, $<$, or $=$) and words (<i>greater than</i> , <i>less than</i> , or <i>equal to</i>).
Related SOL	4.1, 5.1

Materials

- A sticker for each student with a number on it between 0 and 9,999

Vocabulary

greater than, less than or equal

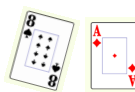
Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Put a number between 0 and 9,999 on the back of each student's shirt, using a sticker. Have students walk around the room and ask a classmate one question: "Is my number greater than, less than, or equal to number _____?" Students will need to continue walking around the room and asking other classmates the question (varying the number) until determining the number on the sticker. Students have the option of carrying a folder or clipboard with a piece of paper to write down their questions, and answers received. Check to see their notations.
2. When a student deduces his/her number, he/she can move the sticker to the front of his/her shirt. She/he can continue to answer questions for other students who have not figured out their numbers. Play continues until everyone knows their numbers.
3. Next, ask the students to line up around the room from least to greatest, based on their numbers.
4. At the end of the lesson, ask the students to explain their methods for eliminating choices and arriving at their numbers. Did they have a strategy?

Variations:

- Check to see what types of notations the students are using on their papers as they circulate. If they use words, ask if they can use symbols; if they use symbols, ask if they can put their notation in words.
- Evaluate the questions that they ask. Are they just guessing, or are they using some type of strategy to eliminate certain choices?
- Have the students share their ideas as a group.

If I Know...Then I Know...



Reporting Category	Number and Number Sense
Topic	Recognize and use inverse relationships to solve problems
Primary SOL	3.2 The student will recognize and use the inverse relationships between addition/subtraction and multiplication/division to complete basic fact sentences. The student will use these relationships to solve problems.
Related SOL	2.9, 3.5

Materials

- If I Know...Then I Know...recording sheet
- One deck of cards (number cards only, no face cards) per team

Vocabulary

inverse relationship

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Students will reflect on the related facts they learned in second grade for addition and subtraction to develop the concept of addition and subtraction as inverse operations. We play the game If I Know...Then I Know...

1. Students will explore inverse relationships between addition and subtraction number sentences and between multiplication and division number sentences. Model a related fact, using the numbers 8, 6, and 14. Hold a discussion about what different addition and subtraction number sentences could be made using the given numbers. Have students discuss the possibilities with partners or in small groups, and then have a representative from each group share suggestions with the class.
2. Discuss how subtraction number sentences use the same three numbers as addition number sentences but are represented in an inverse fashion.
3. Repeat the process, using the numbers 4, 6, and 24, and have students discuss what different multiplication and division number sentences could be made. Discuss the inverse relationship between multiplication and division.
4. Have students practice creating related facts, showing the inverse relationship between facts. Distribute copies of the If I Know...Then I Know... recording sheet and decks of number cards.
5. Have students select two number cards from a deck and use the two number cards drawn to come up with a third number by adding or multiplying them. Then, have the students use the three numbers to create facts with their inverses (related facts) and record them on the recording sheet.

Variations:

- Have students repeat the activity by drawing dominoes from a bag or roll two number cubes to generate the first two of three numbers.
- Provide students with three numbers, and have them determine whether or not the numbers can be used to create addition/subtraction related facts or multiplication/division related facts. If they determine that the numbers can create related facts, have students write the related facts.
- Provide to students three numbers using subtraction or division and have them generate the related facts using the inverse operation.

If I Know...Then I Know...



Name: _____ Date: _____

Pull two number cards from a deck and record the two numbers drawn. Add (+) or multiply (×) the two numbers to come up with a third number, and record it. Complete the related fact using addition/subtraction or multiplication/division. Record the number sentences for each related fact on the lines provided.

1. _____

2. _____

3. _____

4
6
24

People Fractions

Reporting Category	Number and Number Sense
Topic	Name, write, and model fractions including mixed numbers
Primary SOL	3.3 The student will <ol style="list-style-type: none">name and write fractions (including mixed numbers) represented by a model;model fractions (including mixed numbers) and write the fractions' names.
Related SOL	2.3a, b, 3.16, 4.2a, b

Materials

- Read aloud a story about five creatures
- Two construction paper squares
- Scissors

Vocabulary

halves, thirds, fourths, fifths, sixths, eighths, tenths

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Read a story about five creatures to the class. Relate the family in the story to fractions, using the five creatures in the house as a set model for a whole. Ask, "What fraction of the creatures in the house likes to eat mice?"
2. Ask for six volunteers to go to the front of the room to serve as a whole group. Ask the students to find fractions that politely describe parts of the whole group (e.g., two-sixths of the students are wearing tennis shoes). When appropriate, show reduced fractions by having students group themselves accordingly. For example, if two-sixths of the students have tennis shoes, ask students to arrange their groupings to demonstrate that one-third of the students are wearing tennis shoes (e.g., have all the students pair up to show three groups within the whole). Repeat this activity, allowing students to model and identify other fractions within the group.
3. Show the class two squares. Ask the students to describe the squares, making sure that they recognize that the squares are congruent. Cut one square in half vertically and the other square in half on the diagonal. Tell students to imagine the squares are granola bars. Ask, "Which piece would you like to have?" Discuss students' answers.

Greater Than, Less Than, or Equal To?

Reporting Category	Number and Number Sense
Topic	Compare fractions using words and symbols
Primary SOL	3.3 The student will <ul style="list-style-type: none"> c) compare fractions having like and unlike denominators, using words and symbols (>, <, or =).
Related SOL	3.3a, b

Materials

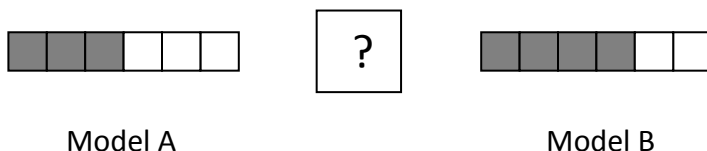
- Fraction models with like and unlike denominators

Vocabulary

numerator, like denominator, unlike denominator, greater than, less than, equal to

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

- Students will name two fractions from the models presented with like denominators.
- They will compare the size of the fraction models to determine if Model A is greater than, less than, or equal to Model B:



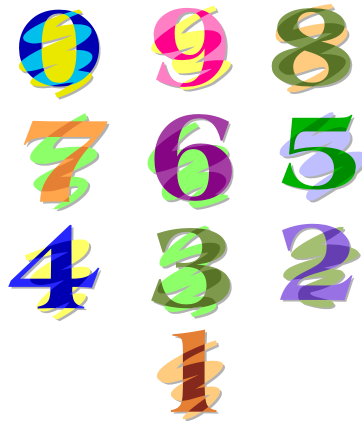
- Have students justify their responses. It is important that they recognize that each model represents one whole with 6 equal parts (boxes). Students should recognize that Model A has 3 of the 6 equal parts shaded and Model B has 4 of the 6 equal parts shaded. Students will consider that 3 shaded equal parts is less than 4 shaded equal parts, therefore, Model A is less than Model B.
- Have students identify the fraction name for the two models and record using symbols:

$$\frac{3}{6} < \frac{4}{6}$$

- Continue comparing fractions with like and unlike denominators to include models that are less than, greater than, and equal to.

FOURTH GRADE

Number and Number Sense



In Step with Numbers

Reporting Category	Number and Number Sense
Topic	Identify place value and compare whole numbers using symbols
Primary SOL	4.1 The student will <ol style="list-style-type: none">identify (orally and in writing) the place value for each digit in a whole number expressed through millions;compare two whole numbers expressed through the millions, using symbols ($>$, $<$, or $=$).
Related SOL	3.1a, c

Materials

- Number cards (one set per pair of students)
- Game marker for each player
- Game board for “In Step with Numbers” (one per pair)

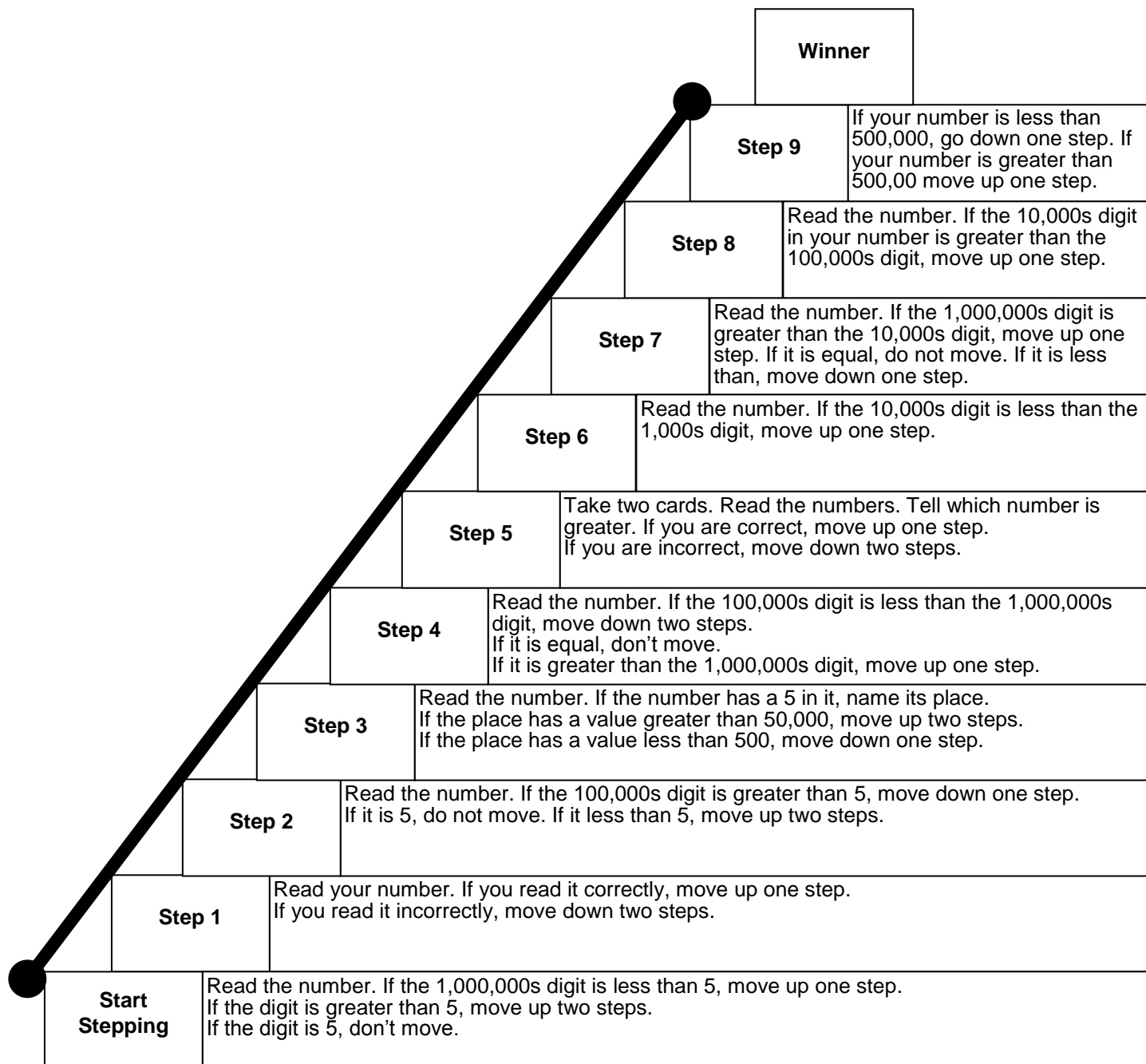
Vocabulary

ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions, place value, digit, whole number, period, units

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Introduce the activity by reviewing place values.
2. Put the number cards face down in a pile and have the players place their markers on “Start.”
3. Player One picks a card from the top of the pile. The player then reads the directions beside the “step” that he or she is on. Player One *cannot* move to the next step if the directions are not followed, as agreed to by Player Two.
4. Player One concludes turn by placing the number card at the bottom of the pile.
5. Player Two follows the same steps as Player One.
6. The game continues until one of the players has successfully reached the top.

In Step With Numbers



Number Cards

1,791,926	2,648,134
2,987,245	3,125,691
6,134,548	1,892,657
3,187,469	4,377,821
2,581,385	3,483,518
6,118,749	8,129,152

1,239,760	4,828,030
4,569,262	5,144,794
6,544,473	2,080,554
4,983,279	7,083,090
7,350,302	2,908,534
6,578,102	3,418,241

The Rocky Digits

Reporting Category	Number and Number Sense
Topic	Identify place value and compare whole numbers using symbols
Primary SOL	4.1 The student will a) identify (orally and in writing) the place value for each digit in a whole number expressed through millions; b) compare two whole numbers expressed through the millions, using symbols ($>$, $<$, or $=$).
Related SOL	3.1a, c

Materials

- Digit cards (one set per group); game markers for each player (e.g., small stones)
- “The Rocky Digits” game board for each group
- Spinner board and spinner (e.g., pencil or paper clip) for each group

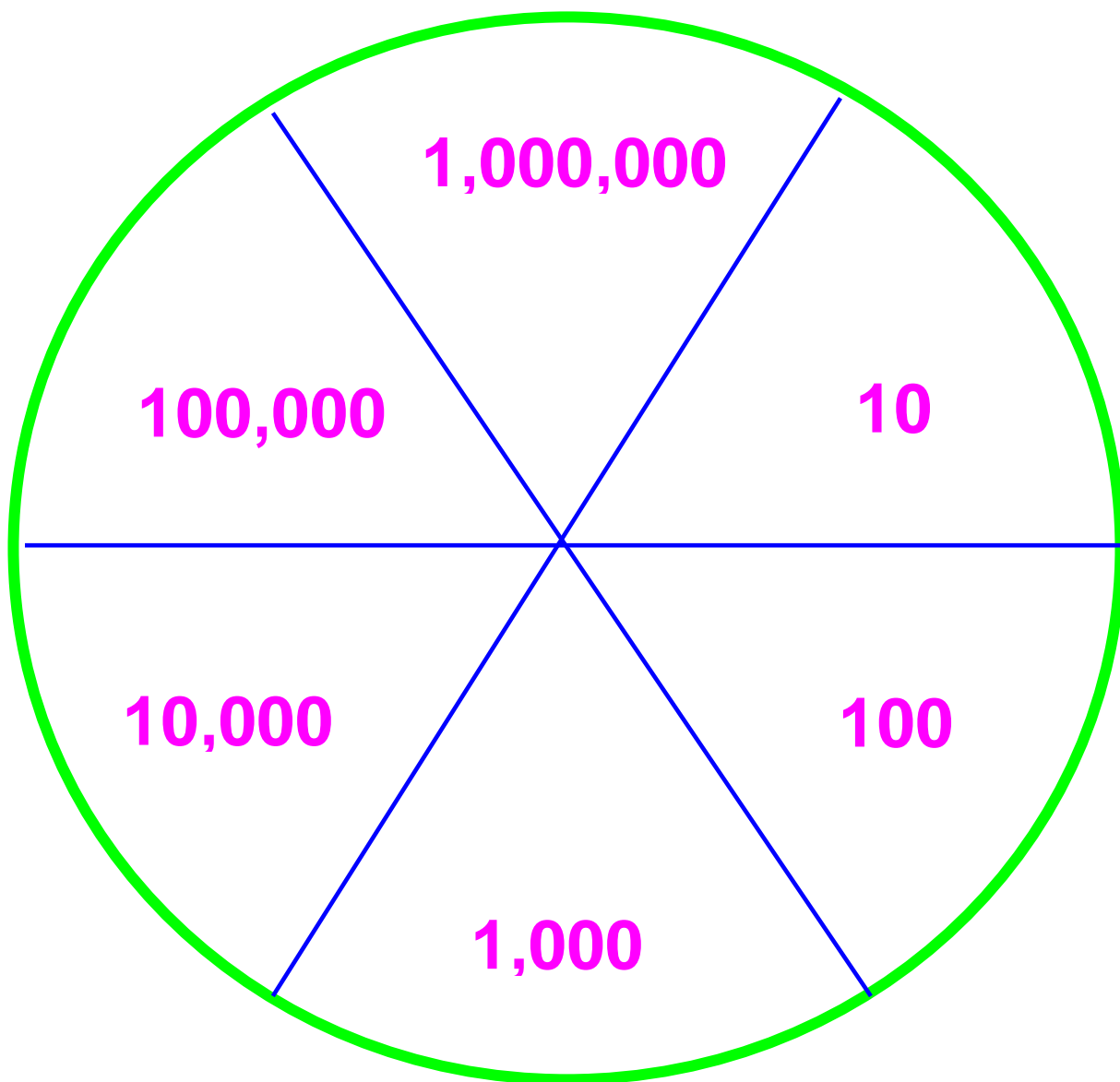
Vocabulary

ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions, place value, digit, whole number, period, units

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

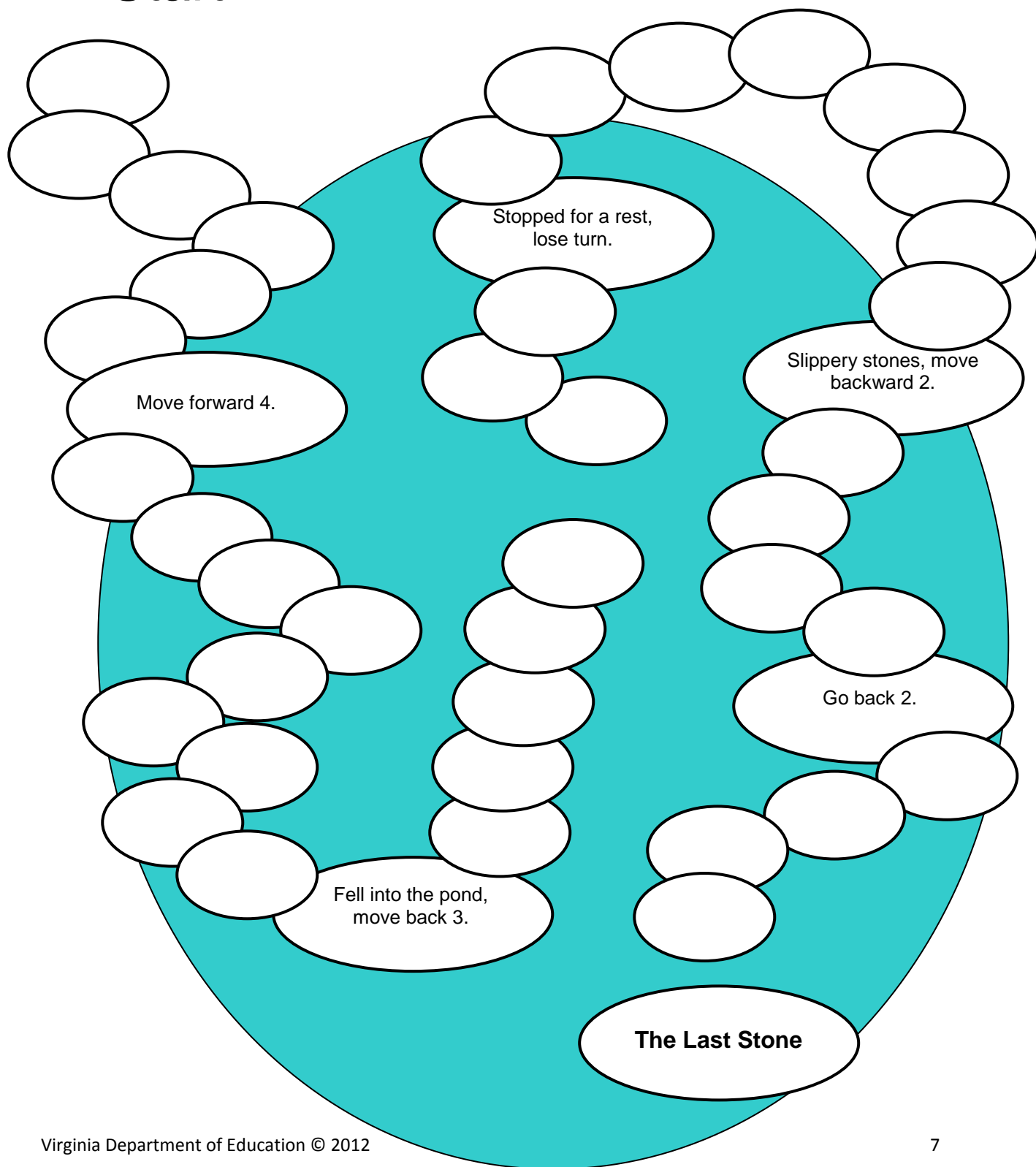
1. Introduce this activity by reviewing place values.
2. Have students cut out the attached digit cards, and place the cards face down in a pile.
3. Instruct all players to place their markers on “Start.”
4. Players should take turns picking the top card from the pile and then spinning the spinner.
5. When the spinner stops, the player should name the number on the card that corresponds with the place value where the spinner landed. After other students have agreed with the player’s answer, the player will move his or her marker that many spaces (i.e., the number in the named digit place) ahead on the game board. If the number on the card does not contain the place value on the spinner, the player loses a turn.
6. Players who land on spaces with directions must follow those directions.
7. The winner is the first person to reach the finish.

Spinner



The Rocky Digits

Start



Digit Cards

1,673,126	1,408,234
2,327,245	1,308,601
731,518	292,567
1,202,469	1,021,321
3,105,304	473,518
708,246	123,152

2,101,921	1,247,317
815,384	583,561
2,008,773	964,232
524,789	3,106,528
815,437	756,243
4,569,262	100,744

1,239,761	8,280,310
6,544,473	2,080,554
2,183,270	7,883,090
3,350,302	402,004
530,182	1,208,241
2,183,270	7,883,090

Rounding Match

Reporting Category	Number and Number Sense
Topic	Identify place value, compare, using symbols, and round whole numbers
Primary SOL	4.1 The student will <ol style="list-style-type: none">identify (orally and in writing) the place value for each digit in a whole number expressed through millions;compare two whole numbers expressed through millions, using symbols ($>$, $<$, or $=$); andround whole numbers expressed through millions to the nearest thousand, ten thousand, and hundred thousand.
Related SOL:	3.1a, b, c

Materials

- A deck of “Rounding Match” cards per student or pair (copy the cards on cardstock and store in a baggie)

Vocabulary

ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions, place value, rounding, digit, whole number, period, units

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

- Make sets of the “Rounding Match” card deck.
- Have students, individually or in pairs, separate the cards into two piles. One pile will be cards that contain numbers with an underlined digit; the second pile will be numbers that end in zeros.
- Have students place these two piles face up on their desks, making sure not to mix the two piles.
- Students will take turns collecting rounding matches. Player One chooses a card from the “underlined” pile. The student must name the place with the underlined digit. The underlined digit indicates the place to which the number will be rounded.
- Player One looks through the other pile to find the “rounding match” for the number chosen from pile one. If Player Two agrees with the “rounding match,” then Player One gets to keep the match. Players take turns until all cards have matches.
- The player with the most “rounding matches” is the winner.

Rounding Match Cards

5 <u>3</u> 6,780	540,000
5, <u>6</u> 38,321	5,600,000
<u>8</u> ,042	8,000
<u>5</u> 4,906	50,000
<u>1</u> 5,387	20,000
<u>1</u> 3,097	10,000
5 <u>4</u> ,682	55,000
<u>9</u> ,302	9,000
<u>4</u> 83,102	500,000
2, <u>4</u> 73,361	2,500,000

<u>7</u> 40,678	700,000
<u>4</u> ,971	5,000
1, <u>7</u> 43	1,700
8,4 <u>1</u> 6	8,420
5,1 <u>3</u> 2,630	5,130,000
8 <u>0</u> 4,234	800,000
8,4 <u>1</u> 6	8,400
3, <u>7</u> 61	3,800
2,5 <u>6</u> 0,954	2,600,000
1, <u>7</u> 54,231	1,800,000

2,8 <u>6</u> 2,641	2,860,000
7 <u>5</u> 6,910	760,000
2,3 <u>8</u> 7,105	2,390,000
2,8 <u>2</u> 2,716	2,820,000
36 <u>7</u> ,098	367,000
2,3 <u>4</u> 5,011	2,350,000
1 <u>3</u> 3,947	130,000
6,01 <u>2</u> ,509	6,013,000
5, <u>0</u> 97,432	5,100,000

Brownies

Reporting Category	Number and Number Sense
Topic	Compare and order fractions and mixed numbers
Primary SOL	4.2 The student will b) compare and order fractions and mixed numbers.

Related SOL 3.3c

Materials

- A large sheet of paper with the title “Brownies” (one per student)
- Seven “brownies” (e.g., pieces of brown construction paper) per student

Vocabulary

fraction, mixed number, half, halves, fourths, eighths, whole

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Tell students that they are going to solve a “brownie” problem.
2. Give each student the large sheet of paper with the title, “Brownies,” and ask them to draw a table (e.g., a rectangle) that seats four people.
3. Tell students that the four people around the table will need to share seven brownies.
4. Show students that the “brownies” are the seven pieces of brown construction paper, which are to be used to demonstrate how to share the brownies fairly.
5. Students may fold or draw on the construction-paper brownies to solve the brownie-sharing problem. Remind students that using a pencil to show their work is a good strategy. Students also should include their steps for sharing the brownies. Ask questions like:
 - How did you “cut” your brownies?
 - What is a fraction?
 - How do you know that each person got a “fair share”?
6. Have students discuss their discoveries with each other and with the class.
7. Have students compare strategies and restate a classmate’s strategy in their own words.

Paper Bag Fractions

Reporting Category	Number and Number Sense
Topic	Compare and order fractions and mixed numbers and represent equivalent fractions
Primary SOL	4.2 The student will <ul style="list-style-type: none"> a) compare and order fractions and mixed numbers; b) represent equivalent fractions.

Materials:

- One “Paper Bag Fraction” game board per pair (teachers can also create their boards)
- 20 to 25 counters to use as markers; one paper bag per pair; one set of fraction bars (student made or purchased). *Note:* The fraction bars are *not* the plastic pieces but rather the strips that are shaded to show an indicated fraction. It may be helpful to have students make their own fraction strips prior to playing the game. This task can be done by cutting 28 strips that are 1 x 6 for every student (using 9 x 12 or 12 x 18 paper makes it easier). Have students measure and shade their fraction bars as follows (students may color the bars as they choose):
 - One unit bar, no divisions
 - Two bars divided into two parts (3"). Shade one whole entirely, then $\frac{1}{2}$.
 - Three bars divided into thirds (2"). Shade one whole entirely, then $\frac{1}{3}$, then $\frac{2}{3}$.
 - Four bars divided into fourths (1.5"). Shade one whole entirely, then $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$.
 - Six bars divided into sixths (1"). Shade one whole entirely, then $\frac{1}{6}$, $\frac{2}{6}$, $\frac{3}{6}$, $\frac{4}{6}$, $\frac{5}{6}$.
 - Twelve bars divided into twelfths (0.5"). Shade one whole entirely, then $\frac{1}{12}$, $\frac{2}{12}$, $\frac{3}{12}$, $\frac{4}{12}$, $\frac{5}{12}$, $\frac{6}{12}$, $\frac{7}{12}$, $\frac{8}{12}$, $\frac{9}{12}$, $\frac{10}{12}$, $\frac{11}{12}$.

Vocabulary

fraction, numerator, denominator, half, thirds, fourths, fifths, sixths, eighths, tenths, twelfths, greater than, less than, equal to

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Give partners a “Paper Bag Fraction” game board and one paper bag filled with the set of fraction bars. Place a container of counters and markers in the center of the table for students to share.

2. The object of the game is to cover five fractions in a row—horizontally, vertically, or diagonally. Each player will take a turn choosing a fraction bar from the paper bag, naming the fraction, and marking one fraction on the game board. After each turn, the player should return the fraction bar to the bag. The next player will choose a fraction bar from the bag and mark one answer on the game board, returning the fraction bar to the paper bag.
3. A strategy for the opponent is to block the other player from placing five counters in a row.
4. The first player to cover five fractions in a row wins.

Variations:

- Allow students to cover an equivalent fraction for the fraction bar that has been taken from the paper bag.

Paper Bag Fraction Game Board

$\frac{1}{4}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{1}{12}$	$\frac{3}{6}$
$\frac{1}{2}$	$\frac{5}{12}$	$\frac{1}{3}$	$\frac{2}{4}$	$\frac{2}{6}$
$\frac{4}{4}$	$\frac{2}{6}$	$\frac{4}{6}$	$\frac{3}{3}$	$\frac{3}{12}$
$\frac{10}{12}$	$\frac{2}{2}$	$\frac{8}{12}$	$\frac{5}{6}$	$\frac{4}{12}$
$\frac{7}{12}$	$\frac{4}{8}$	$\frac{9}{12}$	$\frac{1}{6}$	$\frac{11}{12}$

To Be Half, or Not to Be Half...That Is the Comparison

Reporting Category	Number and Number Sense
Topic	Compare and order fractions and mixed numbers, represent equivalent fractions, and identify the division statement
Primary SOL	4.2 The student will <ol style="list-style-type: none">compare and order fractions and mixed numbers;represent equivalent fractions; andidentify the division statement that represents a fraction.
Related SOL	3.3c

Materials:

- One set of fraction cards per student
- Color tiles or fraction circles
- Fraction sorting mat
- Scissors

Vocabulary

fraction, numerator, denominator, halves, thirds, fourths, fifths, sixths, eighths, tenths, twelfths, greater than, less than, equal to

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

This activity helps students become familiar with fractions, using concrete models to determine

if a fractional part of a whole is less than $\frac{1}{2}$, equal to $\frac{1}{2}$, or greater than $\frac{1}{2}$.

1. Direct students to cut the fraction cards apart and shuffle them.
2. Use the fraction sorting mat labeled with three sections: "Less than $\frac{1}{2}$ ", "Equal to $\frac{1}{2}$ ", and "Greater than $\frac{1}{2}$ ".
3. Have students place the fraction cards face down in a stack.
4. Ask students to place the color tiles, fraction circles, or other concrete fraction manipulative near the two players.
5. Ask students to take one whole and one $\frac{1}{2}$ manipulative and place above the game board to use as a benchmark.
6. Player One will take a fraction card from the top of the deck and determine if the fraction is "less than $\frac{1}{2}$ ", "equal to $\frac{1}{2}$ ", or "greater than $\frac{1}{2}$," and then place the fraction card in the appropriate section of the sorting mat. To prove that the card is in the

correct place, Player One will need to use the manipulatives to build a model of the fraction and compare it to a model of $\frac{1}{2}$. If the other player agrees, Player One will earn one point. If Player One has placed the fraction card in the wrong section of the mat, he or she will not earn a point.

7. Player Two will now have a turn, following the same steps as Player One.
8. Repeat this activity with thirds, sixths and eighths. Each time, have students relate the division statement to the fraction (e.g.; $\frac{1}{6}$ is the same as $1 \div 6$).

Fraction Cards

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{2}{4}$
$\frac{3}{4}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$
$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$
$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{4}{8}$	$\frac{5}{8}$
$\frac{6}{8}$	$\frac{7}{8}$	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$

$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$	$\frac{7}{10}$	$\frac{8}{10}$
$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$
$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$
$\frac{1}{7}$	$\frac{2}{7}$	$\frac{3}{7}$	$\frac{4}{7}$	$\frac{5}{7}$

Fraction Sorting Mat

Less than $\frac{1}{2}$	Equal to $\frac{1}{2}$	Greater than $\frac{1}{2}$

Model Match

Reporting Category	Number and Number Sense
Topic	Read, write, represent, and identify decimals
Primary SOL	4.3 The student will a) read, write, represent, and identify decimals expressed through thousandths.

Materials

- Recording sheets
- Copy of model cards
- Decimal cards

Vocabulary

tenths, hundredths, thousandths, word form, model

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Each individual or group should receive a set of model cards, written-form cards, and standard-form cards. (It is helpful if you pre-cut and prepare cards for students.)
2. Students may work individually or in groups to match the written form of a decimal to the standard form and the model card of each decimal.
3. Once students have matched the three cards for each decimal, they should record their matches on the recording sheet provided.
4. You can use the sample decimal recording sheet to demonstrate how you would like students to record their work. For the picture column, have students draw a model of the decimal like the one found on the matching model card, or use Base-10 blocks.

Variations:

- Have students distribute the cards among the members of their group and then play "Go Fish". Students are to find the matches representing the three forms of the decimal.

DECIMALS SAMPLE RECORDING SHEET

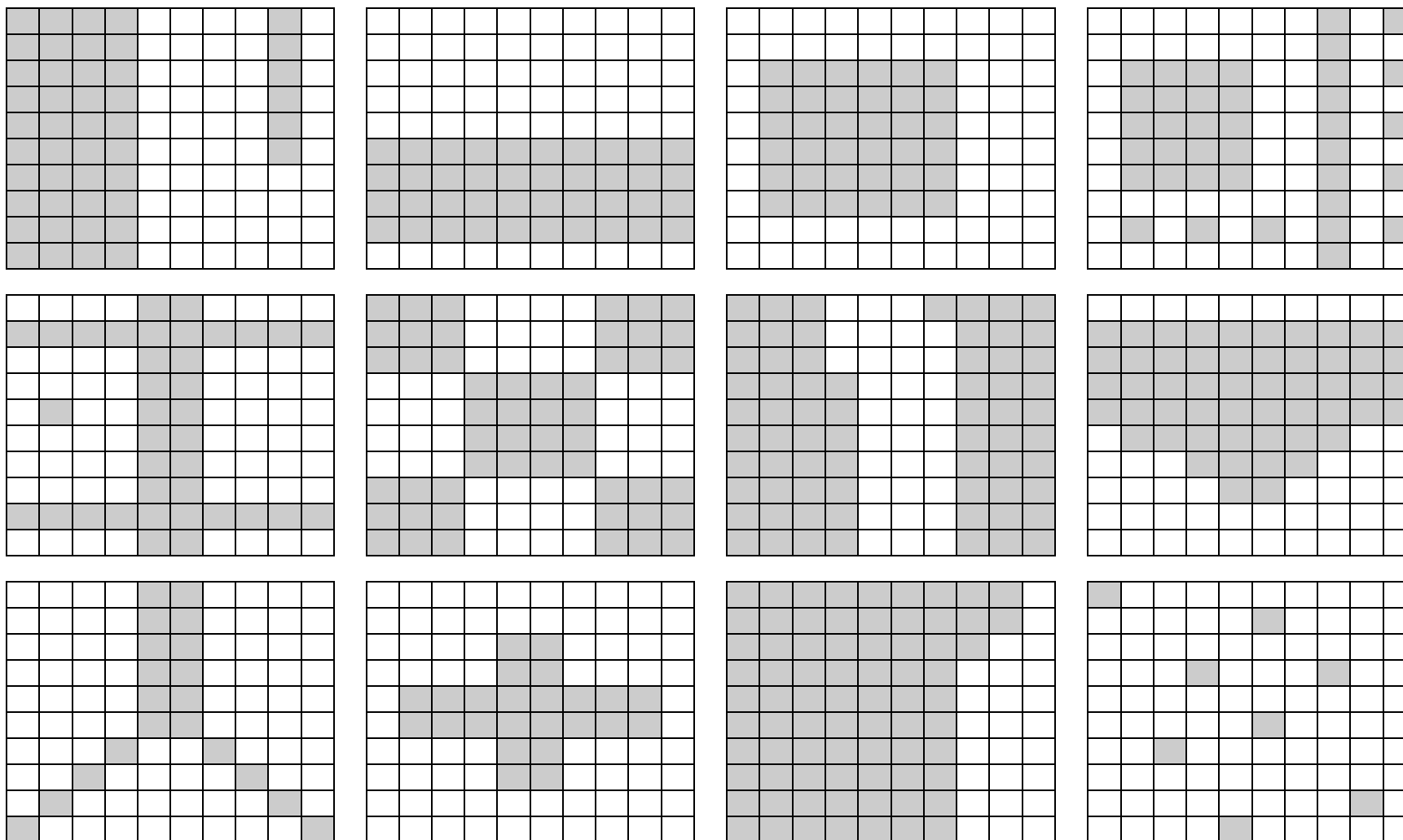
WORD FORM	STANDARD FORM	PICTURE
sixteen hundredths		
	0.06	
	0.25	
Thirty-four hundredths		

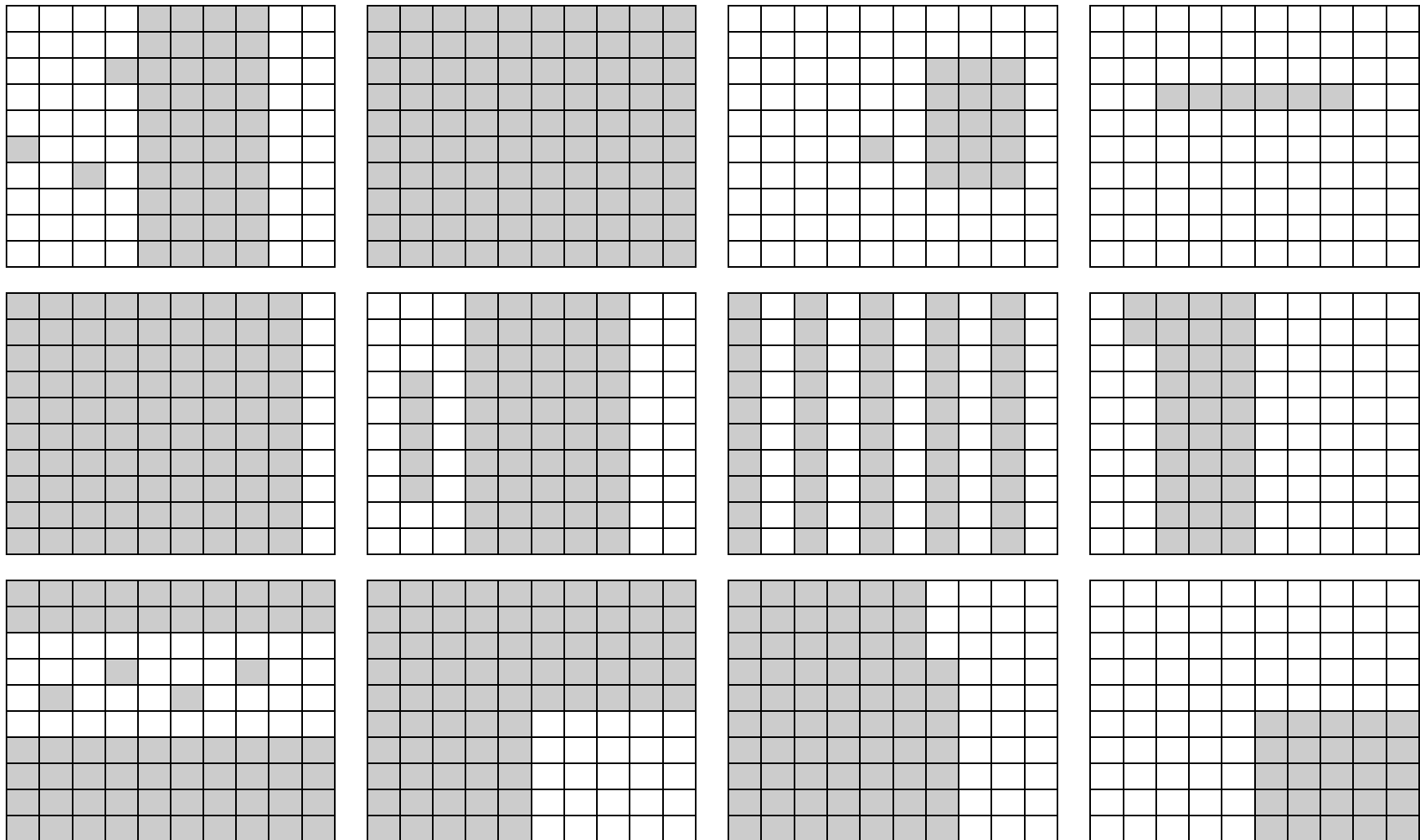
Name _____

DECIMALS RECORDING SHEET

WORD FORM	STANDARD FORM	PICTURE

Model Cards





Standard-Form Cards

0.56	0.68	0.52	0.53
0.4	0.06	0.43	0.96
0.34	0.64	1	0.16
0.2	0.08	0.32	0.75
0.24	0.55	0.67	0.25
0.75	0.5	0.36	0.37

fifty-six hundredths	sixty-eight hundredths	fifty-two hundredths	fifty-three hundredths
four tenths	six hundredths	forty-three hundredths	ninety-six hundredths
thirty-four hundredths	sixty-four hundredths	one whole	sixteen hundredths
two tenths	eight hundredths	thirty-two hundredths	seventy-five hundredths
twenty-four hundredths	fifty-five hundredths	sixty-seven hundredths	twenty-five hundredths
seventy-five hundredths	five tenths	thirty-six hundredths	thirty-seven hundredths

Decimal War

Reporting Category	Number and Number Sense
Topic	Read, write, represent, and identify decimals
Primary SOL	4.3 The student will a) read, write, represent, and identify decimals expressed through thousandths.

Materials

- Game board
- Number cards (four sets)
- Game pieces
- Pen/marker
- Number cube or spinner

Vocabulary




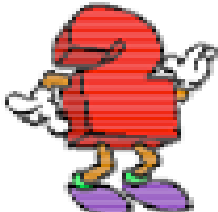
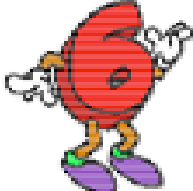

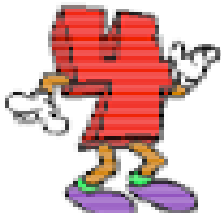
tenths, hundredths, thousandths, compare, greater than, less than, equal to

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

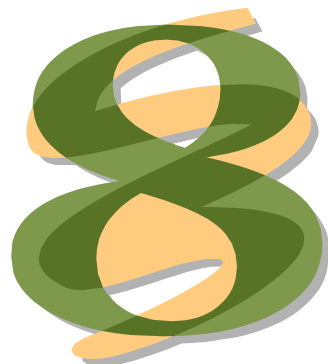
1. Explain to students that the object of the “Decimal War” game is to create a decimal number larger than your opponent’s.
2. Using the number cards provided, each player will draw a card. The player that draws the larger number will go first. (Players should put their cards back in the deck and shuffle the number cards before play begins.)
3. Player One draws a card from the top of the deck, shows the card to Player Two, and records the number in one of the decimal place columns on the recording sheet. (The player should *not* allow the opponent to see which decimal place was chosen.) Once the player decides on a decimal place, the number cannot be moved.
4. Player Two then draws a card, shows it to Player One, and records the number in a decimal place column on the recording sheet. (Again, the opponent should not be allowed to see which decimal place was chosen.) Once the player decides on a decimal place, the number cannot be moved.
5. Repeat steps 3 and 4 until the row on the recording sheet is filled and a number has been created.
6. Players compare numbers, and the one with the larger number rolls the (or spins the spinner) and moves his or her game piece on the game board.
7. Players move to the next row on the recording sheet and repeat steps 3 number cube through 6 until one player crosses the finish line, winning the game.

Decimal Place Value Chart

ONES	TENTHS	HUNDREDTHS	THOUSANDTHS

START		Go Back 1 Space			
				Go Forward 2 Spaces	
Move Forward 2 Spaces					
	<h1>Decimal War</h1>				
					
Lose a Turn					Go Back 3 Spaces

Number Cards



Memory Place Value: Decimal Match

Reporting Category

Number and Number Sense

Topic

Read, write, represent, identify, and round decimals

Primary SOL

- 4.3 The student will
- read, write, represent, and identify decimals expressed through thousandths;
 - round decimals to the nearest whole number, tenth, and hundredth.

Materials

- Memory game cards
- Number cube
- Recording sheet

Vocabulary

tenths, hundredths, thousandths, round

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Place all of the memory cards face down on a playing surface.
2. Each student will roll the number cube once. The student with the highest roll will go first.
3. The first player will turn over two cards in an attempt to find a match.
4. If the player has a match, he or she will record the match on the recording sheet and play passes to the next student who will try to find a match.
5. If the player does not have a match, play passes to the next student who will try to find a match.
6. The game is over once all of the cards have been matched. The player with the most decimal matches wins the game.

Variations:

- Ask students to order the decimals on their recording sheets from least to greatest.
- Have students round the decimals to the nearest place. (Underline one digit on the cards prior to students playing the game.)

Memory Cards

3.817	Three and eight hundred seventeen thousandths
0.092	Ninety-two thousandths
4.201	Four and two hundred one thousandths
0.386	Three hundred eighty-six thousandths

0.374	Three hundred seventy-four thousandths
0.306	Three hundred six thousandths
8.92	Eight and ninety-two hundredths
1.503	One and five hundred three thousandths

0.738	Seven hundred thirty-eight thousandths
0.902	Nine hundred two thousandths
0.064	Sixty-four thousandths
0.433	Four hundred thirty-three thousandths

0.203	Two hundred three thousandths
0.418	Four hundred eighteen thousandths
0.359	Three hundred fifty-nine thousandths
0.794	Seven hundred ninety-four thousandths

0.14	Fourteen hundredths
0.85	Eighty-five hundredths
0.725	Seven hundred twenty-five thousandths
0.87	Eighty-seven hundredths

Name: _____

Memory Place Value Game Recording Sheet

Standard Form	Word Form	Rounded Decimal

What's My Number?

Reporting Category	Number and Number Sense
Topic	Read, write, represent, identify, and round decimals Compare and order decimals and write the decimal and fraction equivalents
Primary SOL	4.3 The student will <ol style="list-style-type: none">read, write, represent, and identify decimals expressed through thousandths;round decimals to the nearest whole number, tenth, and hundredth;compare and order decimals; andgiven a model, write the decimal and fraction equivalents.

Materials

- Set of “secret” decimal numbers on index cards (to be created by instructor, with decimals ranging from 0.01 to 10.0)

Vocabulary

tenths, hundredths, thousandths, fractions, decimals, rounding, greater than, less than, equivalent

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

- Model an example of the activity by asking a student to choose a “secret” decimal card. *(For demonstration purposes, share the secret number with the participating student—0.75.)*
- Ask the student “yes” or “no” questions to obtain clues about the secret decimal number. For example: “Is this number decimal less than one? Do the digits in this decimal total 12? Does this number have a five in the hundredths place? Is this number equivalent to $\frac{3}{4}$?”
- Group or pair students and give *one* student in the group an index card with a secret decimal number.
- Other students in the group will try to guess the secret number. If the guess is incorrect, the student with the card will tell the others whether the secret number is greater or less than the number guessed. Students will continue to ask “yes” or “no” questions until they correctly guess the secret decimal number.

Variations:

- Use a fraction or decimal as the secret number.

Decimal Board Activities

Reporting Category	Number and Number Sense
Topic	Compare and order decimals and write the decimal and fraction equivalents
Primary SOL	4.3 The student will c) compare and order decimals; and d) given a model, write the decimal and fraction equivalents.

Materials

- Decimal board
- Chips or crayons
- Paper and pencil

Vocabulary

tenths, hundredths, thousandths, greater than, less than, equal to, compare

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Provide each student with a decimal board and chips or crayons to cover answers on their decimal board.
2. Using the provided question lists, ask students to determine the answer, and then cover the corresponding decimal on their decimal board.
3. Play continues until students discover a hidden picture after covering the appropriate decimal numbers. Check for accuracy.

Note: Four sets of questions are included for use with the decimal boards. However, there are many other sets of questions that you may come up with for the decimal boards.

NAME _____

DECIMAL BOARD

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2
0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3
0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4
0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5
0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.6
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.7
0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.8
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.0

Game Questions for Decimal Board 1

1. What is two hundredths less than thirty-five hundredths? **0.33**
2. What is four hundredths less than forty-seven hundredths? **0.43**
3. What is three hundredths less than six tenths? **0.57**
4. What is two hundredths less than two tenths? **0.18**
5. What is four hundredths less than fifty-eight hundredths? **0.54**
6. What is two hundredths less than forty-nine hundredths? **0.47**
7. What is two hundredths less than twenty-seven hundredths? **0.25**
8. What is one hundredth less than fifteen hundredths? **0.14**
9. What is three hundredths less than twenty-five hundredths? **0.22**
10. What is one hundredth less than fifty-four hundredths? **0.53**
11. What is two hundredths less than fifty-eight hundredths? **0.56**
12. What is seven hundredths less than two tenths? **0.13**
13. What is three hundredths less than nineteen hundredths? **0.16**
14. What is five hundredths less than six tenths? **0.55**
15. What is two hundredths less than thirty-nine hundredths? **0.37**
16. What is one hundredth less than twenty-nine hundredths? **0.28**
17. What is three hundredths less than two tenths? **0.17**
18. What is four hundredths less than sixteen hundredths? **0.12**

Decimal Board 1 Key

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2
0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3
0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4
0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5
0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.6
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.7
0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.8
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.0

Game Questions for Decimal Board 2

Use your decimal board to help you extend or complete the pattern. Place a chip or color the next decimal number in the pattern.

1. 0.05, 0.1, _____
2. 0.27, 0.36, 0.45, _____
3. 0.1, 0.08, 0.06, _____
4. 0.5, 0.45, 0.4, _____
5. 0.2, 0.4, _____
6. 0.45, 0.35, _____
7. 0.14, 0.16, 0.18, 0.2, _____
8. 0.3, 0.33, 0.35, 0.38, 0.4, 0.43, _____
9. 0.12, 0.16, 0.2, 0.24, _____
10. 0.59, 0.58, 0.57, _____
11. 0.01, 0.04, 0.07, 0.1, _____
12. 0.22, 0.29, 0.36, _____
13. 0.47, 0.37, 0.27, _____
14. 0.02, 0.12, 0.22, _____
15. 0.09, 0.11, 0.18, 0.2, 0.27, 0.29, 0.36, _____
16. 0.5, 0.49, 0.48, _____

Decimal Board 2 Key

0.01	0.02	0.03	<u>0.04</u>	0.05	<u>0.06</u>	0.07	0.08	0.09	0.1
0.11	0.12	<u>0.13</u>	0.14	<u>0.15</u>	0.16	<u>0.17</u>	0.18	0.19	0.2
0.21	<u>0.22</u>	0.23	0.24	<u>0.25</u>	0.26	0.27	<u>0.28</u>	0.29	0.3
0.31	<u>0.32</u>	0.33	0.34	<u>0.35</u>	0.36	0.37	<u>0.38</u>	0.39	0.4
0.41	0.42	<u>0.43</u>	0.44	<u>0.45</u>	0.46	<u>0.47</u>	0.48	0.49	0.5
0.51	0.52	0.53	<u>0.54</u>	0.55	<u>0.56</u>	0.57	0.58	0.59	0.6
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.7
0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.8
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.0

Game Questions for Decimal Board 3

1. Which is less **0.01** or 0.02?
2. Which is more 0.09 or **0.1**?
3. Which is more 0.11 or **0.12**?
4. Which is more 0.01 or **0.09**?
5. Which is more **0.23** or 0.22?
6. Which is less **0.18** or 0.81?
7. Which is less **0.34** or 0.43?
8. Which is less **0.27** or 0.28?
9. Which is more **0.45** or 0.35?
10. Which is less **0.36** or 0.62?
11. Which is less **0.54** or 0.60?
12. Which is more **0.56** or 0.46?
13. Which is less **0.63** or 0.65?
14. Which is more **0.67** or 0.66?
15. Which is more 0.37 or **0.72**?
16. Which is more 0.77 or **0.78**?
17. Which is less 0.89 or **0.79**?
18. Which is less 0.91 or **0.81**?
19. Which is less **0.91** or 1.0?
20. Which is less **1.0** or 2.0?

Decimal Board 3 Key

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2
0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3
0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4
0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5
0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.6
0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.68	0.69	0.7
0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.8
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.0

Questions for Decimal Board 4

Round each problem to the nearest hundredth:

1. 0.234 (0.23)
2. 0.274 (0.27)
3. 0.453 (0.45)
4. 0.571 (0.57)
5. 0.633 (0.63)
6. 0.750 (0.75)
7. 0.154 (0.15)
8. 0.235 (0.24)
9. 0.430 (0.43)
10. 0.438 (0.44)
11. 0.247 (0.25)
12. 0.256 (0.26)
13. 0.669 (0.67)
14. 0.553 (0.55)
15. 0.345 (0.35)
16. 0.635 (0.64)
17. 0.468 (0.47)
18. 0.333 (0.33)
19. 0.457 (0.46)
20. 0.661 (0.66)
21. 0.652 (0.65)

Decimal Board 4 Key

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.1
0.11	0.12	0.13	0.14	<u>0.15</u>	0.16	0.17	0.18	0.19	0.2
0.21	0.22	<u>0.23</u>	<u>0.24</u>	<u>0.25</u>	<u>0.26</u>	<u>0.27</u>	0.28	0.29	0.3
0.31	0.32	<u>0.33</u>	0.34	<u>0.35</u>	0.36	0.37	0.38	0.39	0.4
0.41	0.42	<u>0.43</u>	<u>0.44</u>	<u>0.45</u>	<u>0.46</u>	<u>0.47</u>	0.48	0.49	0.5
0.51	0.52	0.53	0.54	<u>0.55</u>	0.56	<u>0.57</u>	0.58	0.59	0.6
0.61	0.62	<u>0.63</u>	<u>0.64</u>	<u>0.65</u>	<u>0.66</u>	<u>0.67</u>	0.68	0.69	0.7
0.71	0.72	0.73	0.74	<u>0.75</u>	0.76	0.77	0.78	0.79	0.8
0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.9
0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.0

Fraction/Decimal Combo

Reporting Category	Number and Number Sense
Topic	Write the decimal and fraction equivalents
Primary SOL	4.3 The student will d) given a model, write the decimal and fraction equivalents.

Materials

- 20 index cards for each group
- Pencils
- Paper
- List of fractions

Vocabulary

equivalent, fraction, decimal

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Give 20 index cards to each group of students.
2. Provide students with a list of fractions and equivalent decimals.
3. Have each group write one fraction per card on the first 10 cards.
4. Next, have the groups write decimals, one per card, on the remaining 10 cards. The decimals must be equivalent to the fractions written on the first 10 cards (see example below).

Example:

$\frac{1}{4}$
0.25

5. Instruct groups to exchange cards with another group. When you say, “go,” the groups must sort the cards from least to greatest using the fractions. Then they must put the equivalent decimal card under each fraction. The first group to correctly complete the task is the winner.

Suggested Fractions and Equivalent Decimals

Fractions	Decimals
$\frac{2}{2}$	1.0
$\frac{1}{2}$	0.50
$\frac{1}{4}$	0.25
$\frac{3}{4}$	0.75
$\frac{1}{5}$	0.20
$\frac{2}{5}$	0.40
$\frac{3}{5}$	0.60
$\frac{4}{5}$	0.80
$\frac{1}{8}$	0.125
$\frac{3}{8}$	0.375
$\frac{5}{8}$	0.625
$\frac{7}{8}$	0.875
$\frac{1}{10}$	0.10
$\frac{3}{10}$	0.30
$\frac{7}{10}$	0.70
$\frac{9}{10}$	0.09

Decimal Spokes

Reporting Category	Number and Number Sense
Topic	Read, write, represent, identify, and round decimals; Compare and order decimals and write the decimal and fraction equivalents
Primary SOL	4.3 The student will <ol style="list-style-type: none">read, write, represent, and identify decimals expressed through thousandths;round decimals to the nearest whole number, tenth, and hundredth;compare and order decimals; andgiven a model, write the decimal and fraction equivalents.

Materials

- Game board
- Number or dot cube or spinner
- Game cards
- Game pieces

Vocabulary

tenths, hundredths, thousandths, round, compare, greater than, less than, equal to

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Instruct students that the object of this activity is to move one's game piece across the game board spokes, through the center to another spoke, and back to the original starting point by reading, identifying, rounding, and comparing decimals correctly.
2. Each student in the pair or group of four will roll the number or dot cube (or spin the spinner) once, to determine who will go first.
3. Instruct the first player to choose a card and read the number or answer the question aloud. If the other players agree that the answer is correct, the first player rolls (or spins the spinner) and moves that many spaces. If the player provided an incorrect answer, that player may not roll the number or dot cube (or spin the spinner), and must stay in place.
4. Players may share a space with only one other team member. If a third player lands on the same space, that player must redo the roll or spin.
5. The first player back to his or her spoke wins the game.
6. Additional blank cards are included if you wish to make game cards.

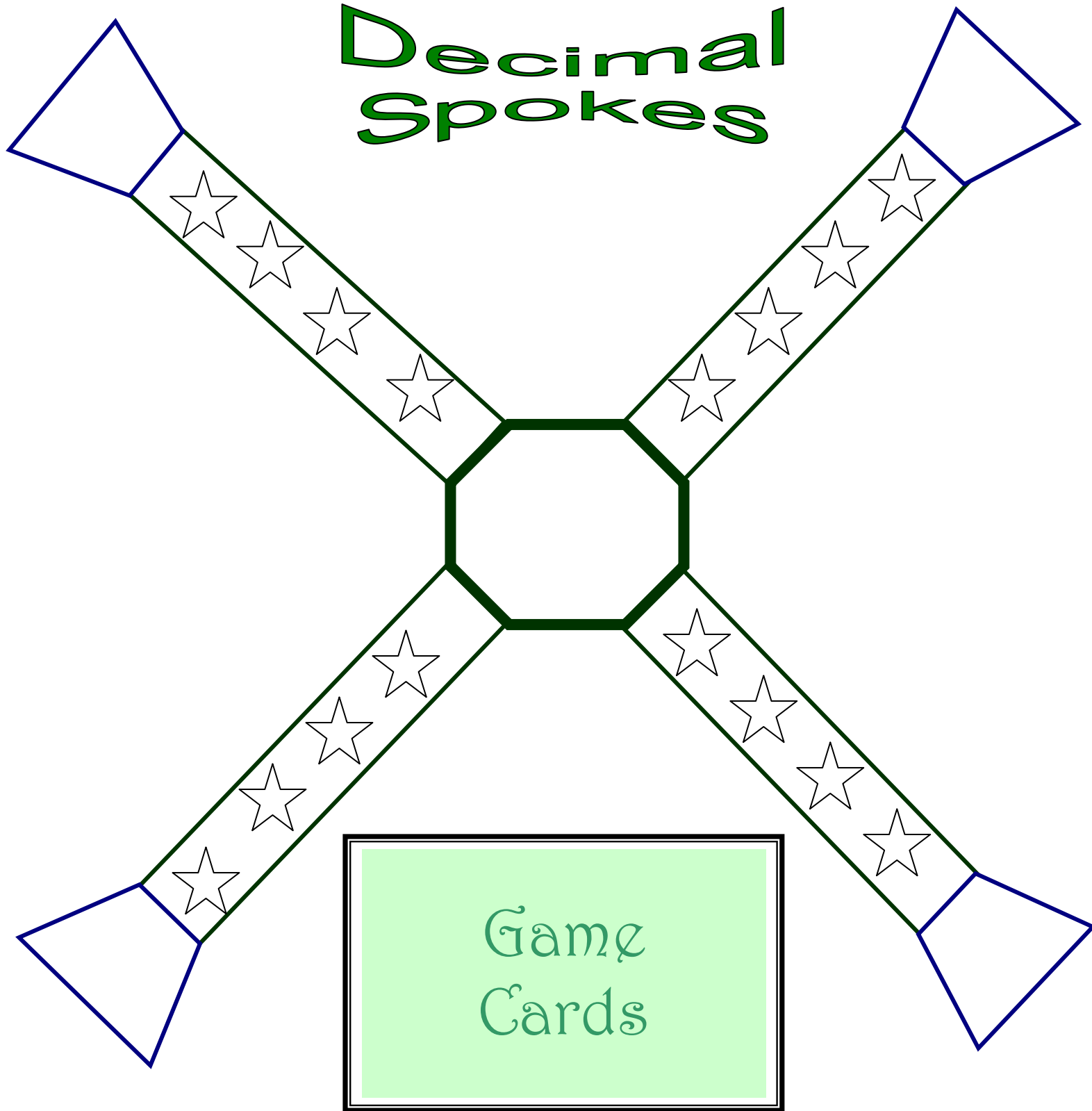
Decimal Spokes Game Cards

Read the following number: 29.513	Read the following number: 0.84	Read the following number: 4.761
Read the following number: 73.804	Read the following number: 0.053	Read the following number: 0.107
Round 0.528 to the nearest hundredth.	Round 0.782 to the nearest hundredth.	Round 9.625 to the nearest hundredth.

<p>Round</p> <p>3.501</p> <p>to the nearest tenth.</p>	<p>Round</p> <p>21.94</p> <p>to the nearest tenth.</p>	<p>Round</p> <p>6.826</p> <p>to the nearest tenth.</p>
<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.927 ___ 0.792</p>	<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>6.250 ___ 6.205</p>	<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.216 ___ 0.27</p>
<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.48 ___ 0.395</p>	<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>8.72 ___ 8.702</p>	<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.73 ___ 0.730</p>

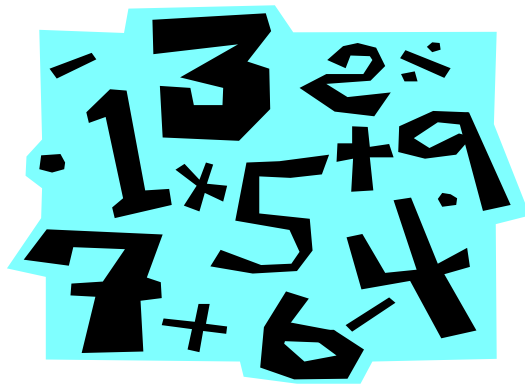
<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.936 ___ 0.937</p>	<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.082 ___ 0.82</p>	<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.7 ___ 0.16</p>
<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.058 ___ 0.581</p>	<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.41 ___ 0.9</p>	<p>< > =</p> <p>Which symbol completes the statement below:</p> <p>0.731 ___ 0.713</p>

Decimal Spokes



FIFTH GRADE

Number and Number Sense



Roll 'em

Reporting Category	Number and Number Sense
Topic	Round decimals
Primary SOL	5.1 The student, given a decimal through thousandths, will round to the nearest whole number, tenth, or hundredth.

Materials

- Three number cubes per pair
- Pencil and paper

Vocabulary

round, decimals, whole number, hundredths, tenths

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Player One rolls the three number cubes and puts the three numbers together to form a decimal, then rounds the decimal to the nearest hundredth.
2. Player Two checks the number to make sure it is rounded to the nearest hundredth. If it is correct, Player One gets a point.
3. Player Two rolls the number cubes, makes a decimal, and rounds it to the nearest hundredth. Player One checks the number and, if correct, Player Two scores one point.
4. If a player rounds the number incorrectly, that player must subtract two points from his or her score.
5. Play continues until a score of 10 is reached or you call time.

Note: This is a quick way to determine if a student knows how to round decimals.

Fishing for Decimals/Fractions

Reporting Category	Number and Number Sense
Topic	Recognize and name fraction and decimal equivalents
Primary SOL	5.2 The student will a) recognize and name fractions in their equivalent decimal form and vice versa.
Related SOL	4.3d

Materials

- Fraction and decimal game cards
- Pencil and paper

Vocabulary

equivalent, fractions, decimals, tenth, hundredth, thousandth

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

The game is played like the “Go Fish” card game.

1. Each player is dealt five cards. The remaining cards are placed in the middle of the playing area to be used as the “fishing” pile.
2. At each turn, the player asks another player for a card he or she needs to make a pair. If the other player has the card, he or she must give it to the player who asked for it. The player then lays down the matched pair. If the other player does not have the desired card, then the first player must “go fish” by drawing another card from the pile.
3. The first player to match all of his or her cards, and thus have no cards remaining in hand, is the winner.

Game Cards

$\frac{1}{2}$	0.50	$\frac{1}{5}$	0.20	$\frac{1}{4}$
$\frac{5}{6}$	0.83	$\frac{3}{5}$	0.60	$\frac{3}{4}$
$\frac{3}{8}$	0.375	$\frac{3}{10}$	0.30	$\frac{4}{5}$

0.80	$\frac{1}{8}$	0.125	$\frac{2}{5}$	0.40
$\frac{5}{8}$	0.25	$\frac{7}{8}$	0.875	$\frac{7}{10}$
0.70	$\frac{9}{10}$	0.90	0.25	0.75

Line-Up

Reporting Category	Number and Number Sense
Topic	Compare and order fractions and decimals
Primary SOL	5.2 The student will b) compare and order fractions and decimals in a given set from least to greatest and greatest to least.

Materials

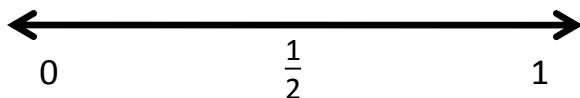
- Paper and pencils
- Number cards containing fractions and decimals
- Sentence strips

Vocabulary

least to greatest, decimal, fractions, denominators, numerators

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Give each group or pair of students a number line marked like the one shown below:



(Use a sentence strip for the number line.)

2. Suggested numbers for the number card sets:

$$\frac{1}{2}, 0.91, 0.04, 0.89, 0.51, \frac{2}{8}$$

$$\frac{3}{10}, 0.37, 0.08, 0.65, 0.71, \frac{3}{5}$$

$$\frac{1}{5}, 0.81, 0.07, 0.43, 0.21, \frac{1}{4}$$

$$\frac{2}{5}, \frac{7}{10}, 0.50, 0.03, 0.71, 0.42$$

0.73, 0.06, 0.25, 0.76, $\frac{1}{2}$, $\frac{3}{4}$

3. Give the group or pair a set of number cards that contain both fractions and decimals. Working together, the students must decide where each number fits on the given number line. The students will place the cards on the number line from least to greatest. Once all students have completed their number lines, students may move around the room checking each other's number lines.
4. Bring the students back into the pairs/groups and discuss why the numbers were placed on the number line at each point.

Assessment

- **Questions**
 - Why were the numbers placed on the number line at each point?
 - How did you know which was least and which was greater?

Fractions and Decimals...Out to Dry

Reporting Category	Number and Number Sense
Topic	Compare and order fractions and decimals
Primary SOL	5.2 The student will b) compare and order fractions and decimals in a given set from least to greatest and greatest to least.

Materials

- Yarn
- Clothesline
- Clothes pins
- Number cards
- Recording sheets
- Pencils
- Calculator (optional)

Vocabulary

least, greatest, order, fractions, decimals, mixed numbers

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Create five groups (decks) of number cards, each including fractions, decimals, and mixed numbers.
2. Place each deck of cards at a learning station in the classroom.
3. Have students work in small groups to order the number cards from least to greatest and place them on the clothesline. Students should record their results on the handout provided.
4. Check for accuracy and replace the decks. Then have the students rotate to the next station, until all groups have completed all five decks.

Sample “deck” combination:

0.625, $\frac{3}{4}$, $1\frac{1}{5}$, 0.15, $\frac{1}{2}$

Fractions and Decimals...Out to Dry

Name _____

Date _____

DECK A

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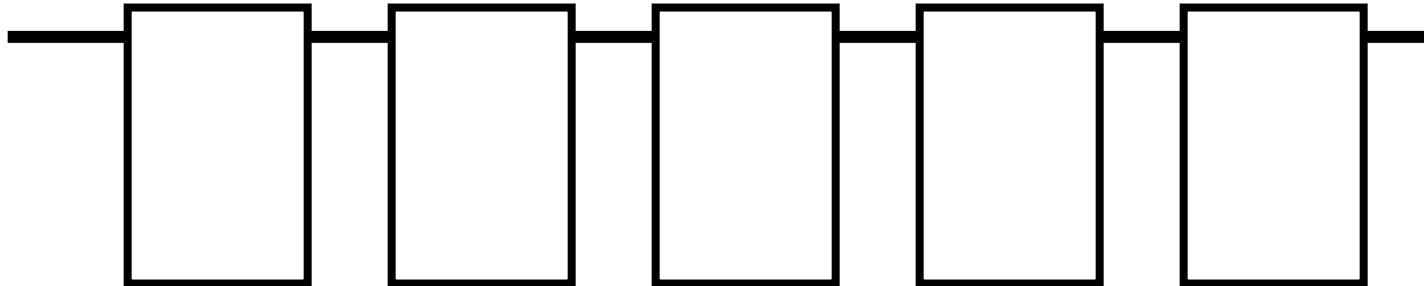
DECK B

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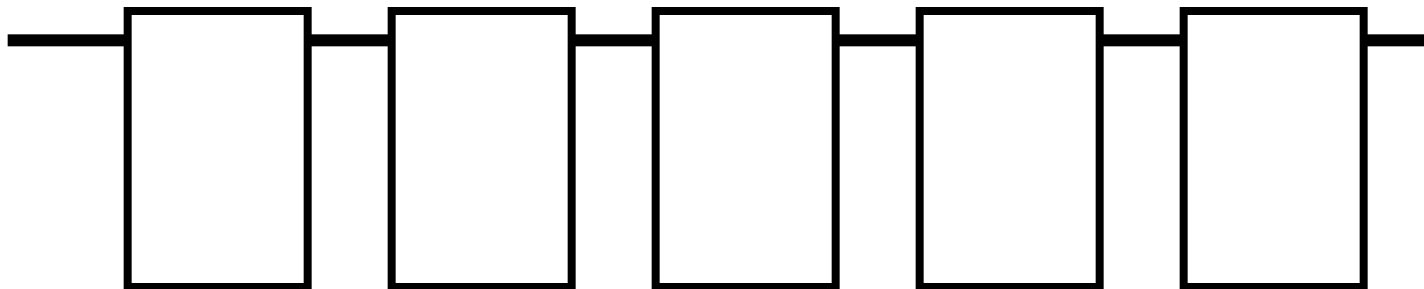
DECK C

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DECK D



DECK E



Prime and Composite Numbers

Reporting Category	Number and Number Sense
Topic	Prime and composite numbers
Primary SOL	5.3 The student will a) identify and describe the characteristics of prime and composite numbers.
Related SOL	4.5a

Materials

- Colored tiles
- Grid paper
- Pencils
- Scissors
- Glue
- Chart paper

Vocabulary

prime, composite, factor, multiples, common factors

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

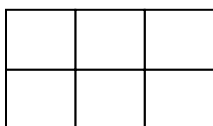
1. Review with students their understanding of factoring. Ask students to define the mathematical term *factor* and provide examples of factors to help them generate the definition for themselves. Display or hand out copies of a multiplication table, if needed.
2. Ask students to give you all the factors for 8, and prompt them to give the factor pairs, not just one number. For example, if a student says that 4 is a factor of 8, ask how he/she knows that. The response should be, “Because $2 \times 4 = 8$.” Ask for factors of other numbers, and list them on the board. Have students look for similarities and differences among the factors. For example, all numbers have 1 and the number itself as factors. Some numbers have more than 1 and itself as factors. These numbers are different from those with only 1 and itself as factors. This concept lays the foundation for understanding prime and composite numbers.
3. The students will now use their knowledge of factoring to assist them with investigating characteristics of prime and composite numbers. Have pairs of students use colored tiles to find as many different arrays as they can for making the facts of a given product, using the colored tiles given. Each time they find an array, they can then represent it on grid paper. They must use all of the tiles each time.

Examples:

Factor Arrays for 6:



$$1 \times 6$$



$$2 \times 3$$

Factor Arrays for 1:



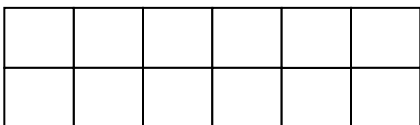
$$1 \times 1$$

4. The students color one square on the grid paper for every one colored tile in their array. This will form an array on their grid paper.
5. They will cut it out and glue it to their chart paper and label it with the corresponding factors. They continue this process until they believe that they have found all of the factors.
6. Students are to record the factor pairs for the number 12. Listing the factors from least to greatest is a good way to help students stay organized.

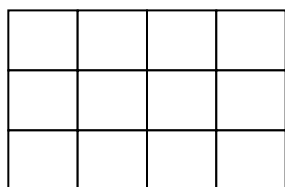
Factor Arrays for 12:



$$1 \times 12$$



$$2 \times 6$$



$$3 \times 4$$

- Students determine that the factor pairs are 1 and 12, 2 and 6, 3 and 4 and list them on the Factor Arc in ascending order that link the factor pairs (1 links to 12, 2 links to 6, and 3 links to 4).

Factor Arc for 12



- Record all the data on the chart paper and have students discuss what they notice about the different numbers. They should notice that only one rectangle could be created with some of the numbers. Have students locate these numbers on the chart and discuss the characteristics of the factors of these numbers. Note that the factors of these numbers (dimensions of these rectangles) are only the number and 1. Ask students if they know the name of these types of numbers (prime). *Prime numbers* are defined as having exactly two unique factors. Explain that the other numbers, those that have more than two factors, are called *composite*.
- The students then check their factors by creating a factor arc at the bottom of their chart paper.
- The students must also include a title on their chart paper. Their chart paper should look similar to the following:

Sample Chart Paper Setup

Prime and Composite Numbers

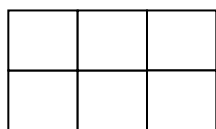
Name _____

Number: 6

Arrays:



1 x 6



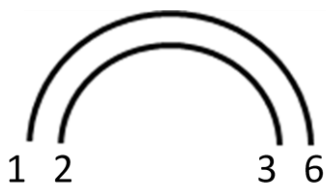
2 x 3

Factors: 1 and 6
2 and 3

Number of Arrays: 2

Prime or Composite: Composite

Factor Arc



Even and Odd Numbers

Reporting Category	Number and Number Sense
Topic	Even and odd numbers
Primary SOL	5.3 The student will b) identify and describe the characteristics of even and odd numbers.

Materials

- Colored tiles in bags
- Chart paper for operations with even and odd numbers
- Markers
- Overhead projector
- 12 pieces of bubble gum for modeling

Vocabulary

even, odd, fair, equal

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Even numbers:

1. Ask students what they know about even and odd numbers. Have them discuss if the number 7 is even or odd and their rationale for their decision.
2. Give students a bag of different numbers of colored tiles to divide. Have them empty out their bags and ask for strategies about how to divide their colored tiles fairly. Discuss if the number is even or odd by determining if there is anything left over after dividing the items into two equal piles.
3. Ask the students if they can determine if the number 42 is even or odd. Have students justify why this number is even or odd. Ask students to think about place value and which place value position is the most important for determining whether a number is even or odd. Students may decide that the 2 in the ones place determines whether the student's number is even or odd. Please note that the number 2 is even.
4. Students also need to think about even and odd numbers in terms of divisibility (dividing fairly). Have a student come to the overhead projector and model dividing 12 pieces of bubble gum by 2 (fair share division) since we now know that the number 2 is even. Students determine that 12 divided by 2 equals 6 with no remainder. Have students think about a division fact that results in no remainder. If there is no remainder, then we can say that the division is fair or equal with no leftovers. Dividing an even number by 2 results in no remainder, so we can determine that a number is even when we can divide it by 2 and have no remainder.
5. Through more exploration, students may notice that a number is divisible by 2 if its last digit (the digit in the ones place) is 0, 2, 4, 6, or 8.

Odd numbers:

6. Ask students what we call a number that cannot be evenly or fairly divided by 2. For example, 25 cannot be divided by 2 fairly or evenly since it has a remainder of 1. These numbers are called odd. Therefore, any number whose last digit is not 0, 2, 4, 6, or 8 is an odd number.
7. Give students more time to explore even and odd numbers with operations. Students will make conjectures such as: even + even = even, even + odd = odd, etc.

Sample Chart

Operations and Odd and Even Numbers

Addition	Subtraction	Multiplication
even + even = even	even – even = even	even x even = even
odd + odd = even	odd – odd = even	odd x odd = odd
even + odd = odd	even – odd = odd	even x odd = even
odd + even = odd	odd – even = odd	odd x even = even