Unit 1: Whole Number Relationships and Place Value
Days 2-13

Enrichment Investigation #1

Common Core State Standard(s):
 	
1.NBT.3:
	Standard(s) for Mathematical Practice:
	  1. Make sense of problems and persevere in solving them
	  2. Reason abstractly and quantitatively
	  4. Model with mathematics
	  5. Use appropriate tools strategically
	  6. Attend to precision
	  7. Look for and make use of structure

Materials Needed:
- *Detective Black* sheet
- Counters, connecting cubes, and/or base 10 blocks
- Detective Assistant badges

Instructions:
1. Students will use counters or connecting cubes to analyze statements about numbers to determine if the statements are true or false.
2. Students circle either true or false for each problem and justify their answers with pictures, drawings, words, etc.
3. If the student gets all nine problems correct, they earn their Detective Assistant badge.

Sources:

Answers to Detective Black sheet:

1) False
2) True
3) False
4) False
5) False
6) True
7) True
8) False
9) False

Detective Black needs your help solving a case. He cannot always tell when someone is telling the truth. Maybe you can help him. Can you tell when someone is telling the truth? Find out by doing the problems below. Be careful. Some of them are tricky. If you think a statement is true, draw a circle around **true**. If you think it is not true, draw a circle around **false**. Justify each answer with drawings, pictures, and/or words. Use counters or cubes to help you check the statements. If you need more space, use the back☺

				Prove it!
1.	I have more than 6 cookies. So my number of cookies could be 4.	True	False	
2.	My marbles make 5 groups of tens. So my number of marbles could not be 70.	True	False	
3.	I have 23 candy bars that I want to share fairly with 9 of my friends (I make number 10). If every child gets the same amount, there will be no candy bars left over.	True	False	
4.	There are 6 rows of cars in the parking lot. Each row has 10 cars in it. There are 7 more cars in the carpool line. So there could be a total of 76 cars in the parking lot.	True	False	
5.	Sarita has 5 different kinds of dolls. She has 5 of each kind. Sarita can arrange her dolls into 3 rows of 10 dolls.	True	False	
6.	Rick has 103 toy army men. He wants to put them in equal lines. Rick can make 10 lines of army men with 10 men in each row. He will have 3 army men left over.	True	False	
7.	Lily has 28 candies. Rosa has 3 groups of 10 candies. Tim has 4 more candies than Rosa. So Tim could have more candies than Lily has.	True	False	
8.	My number has 1 hundred, 2 tens, and 3 ones. Your number has 1 ten, 2 hundreds, and 3 ones. We have the same number.	True	False	
9.	Jacob has a huge pile of jelly beans. He put the jelly beans into 7 groups of 5. He had 4 jelly beans left over. Jacob has 54 jelly beans.	True	False	

Did you earn your Detective Assistant Badge? Check with your teacher.

Detective Assistant

For a Job Well Done!

Detective Name_____

Detective Assistant

For a Job Well Done!

Detective Name_____

Unit 1: Whole Number Relationships and Place Value
Days 2-13
Enrichment Investigation #2

Common Core State Standard(s):	Standard(s) for Mathematical Practice:
1.NBT.1 1.NBT.2 1.NBT.3	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.

Materials Needed:
- Blackline Masters
  - *Marta's Numbers* Activity Sheets (3 pages)
- Answer Key for Marta's Numbers

Instructions:
1. Students will analyze and compare numbers in a sequence to determine which counting numbers are missing.
2. Students will analyze and compare numbers in a sequence using decade counting to determine which numbers are missing.
3. Students will use their knowledge of place value, place value position, and the relationships between the positions in order to use number cards to create numbers according to directions (largest, closest to).
4. Students will use pictures, words, and numbers to explain how they solved their work.

Sources:
> Modeled on an activity from NYC Department of Education.

Marta's Numbers

Show how well you understand numbers. Help Marta solve her problems.

Marta loves to play **Fill in the Blank** games. What numbers should Marta write in the blank spaces? Write the correct numbers in each blank. Show how you solved the problem by using pictures, words, and numbers. Use more paper if you need it to show your work.

1) 18, ____, 20, 21, ____, ____, 24

2) ____, 40, ____, 60, ____, ____, 90

3) 11, ____, 31, 41, ____, ____

4) 48, 38, ____, 18, ____

Fill in the missing number to make each number sentence correct. Show your work using pictures, words, and numbers. Use more paper if you need to show your work.

5) 17 + ☐ = 27

6) 10 + 10 + 10 + 3 = ☐

7) 4 tens and ☐ ones = 44

8) 78 = ☐ tens and ☐ ones.

Marta has 3 cards.

| 2 | 7 | 4 |
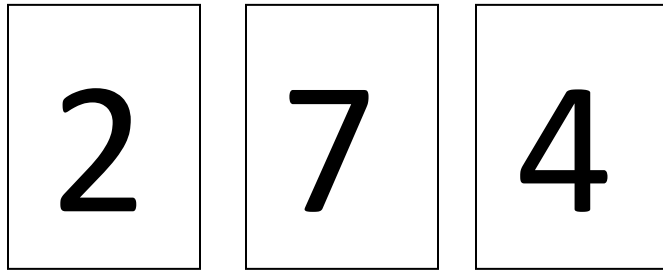
9)   What is the largest two-digit number Marta can make using these cards?
      Write that number in the blank boxes. Explain how you know using pictures,
      words, and numbers.

| | |

10)   Using the same three cards, what 2-digit number can Marta make that is
      closest to 50? Write that number in the blank boxes. Explain how you know
      using pictures, words, and numbers.

| | |

Answer Key for Marta's Numbers

Marta's Answers

1) The missing numbers are 19, 22, and 23.
2) The missing numbers are 30, 50, 70, and 80.
3) The missing numbers are 21, 51, and 61.
4) The missing numbers are 28 and 8.
5) 10
6) 33
7) 4
8) 7 tens and 8 ones
9) 74
10)   47

Unit 1: Whole Number Relationships and Place Value
Days 2-13
Enrichment Investigation #3

Common Core State Standard(s):	Standard(s) for Mathematical Practice:
1.NBT.1 1.NBT.2 1.NBT.3	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure.

Materials Needed:
- Blackline Masters:
  - *A Place for Each Number* sheets
  - *Where do These Numbers Belong* sheets
  - *Venn Diagram Sheets*
- Answer Keys:
  - *A Place for Each Number Answer Key*
  - *Where do These Numbers Belong Answer Key*
- Plain white paper or construction paper
- Counters, connecting cubes, other place value tools

Instructions:
1. Using *A Place for Each* Number, students will use their understanding of number sense and place value to analyze clues to determine where to place numbers in the shapes.
2. Using a separate sheet of paper, students will create their own *A Place for Each Number* by including a minimum of 3 shapes and a minimum of 8 placement statements.
3. Students will explore the use of a Venn Diagram to group numbers by referring to *Where do These Numbers Belong*. They will compare and contrast numbers to decide how to place them in a Venn Diagram using the blackline master *Venn Diagram Sheets*. Then they will explain the

thinking they used as they chose where to place the numbers.

Sources:
- Modeled after an activity from:
  Mathematics 3
  Silver Burdett Ginn: Parsippany, NJ, (1999).

A Place for Each Number

Each number in the box has a place in the picture. Read the clues and write each number where it belongs. The first one is don't for you.

| 87 | 123 | 14 | 95 | 78 | 101 | 60 | 32 | 19 | 111 |

(Here's a hint: Mark out each number in the box after you use it.)

32
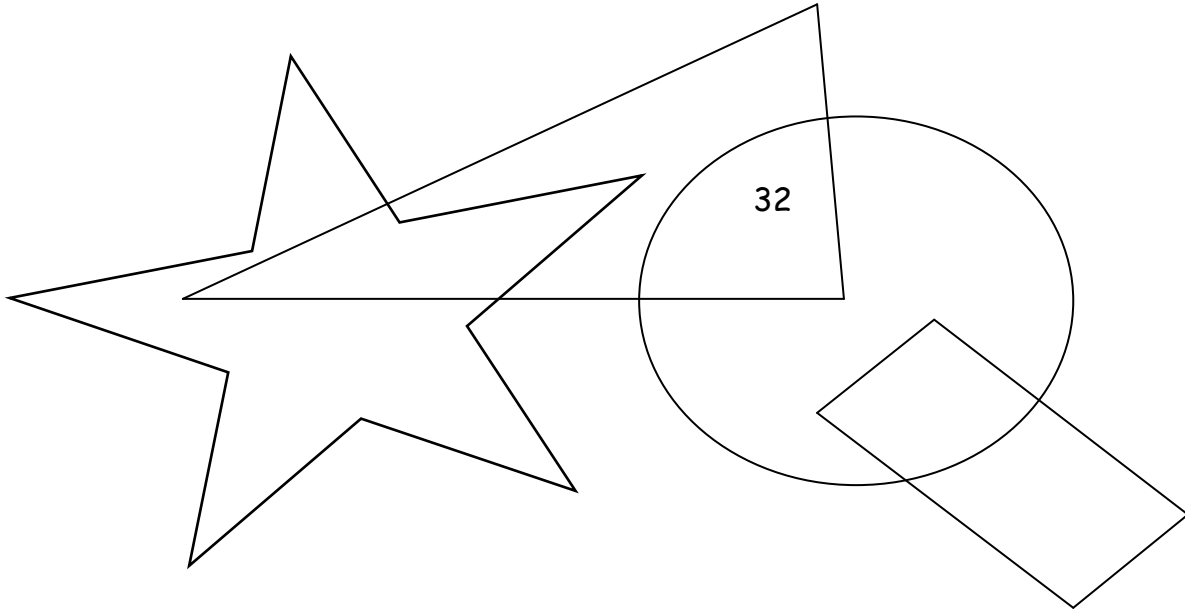
Clues:

1. Write the number with 3 tens inside the circle and the triangle.

2. Write the number with 3 ones inside the star only.

3. Write the number with 0 tens inside the triangle and the star.

4. Write the number that has 6 tens with none left over inside the circle only.

5. Write the number with same amount of hundreds, tens, and ones inside the rectangle only.

6. Write the number with 1 ten and 4 ones inside the rectangle and the circle.

7. Write the number with 8 tens and 7 ones inside the triangle only.

8. Write the number with 7 tens and 8 ones so that it is not inside any shape.

9. Where is the biggest number? _____

10. Where is the smallest number? _____

11. Which numbers did not get used? _____

A Place for Each Number Answer Key

78

87

101

32

60

123

14

111
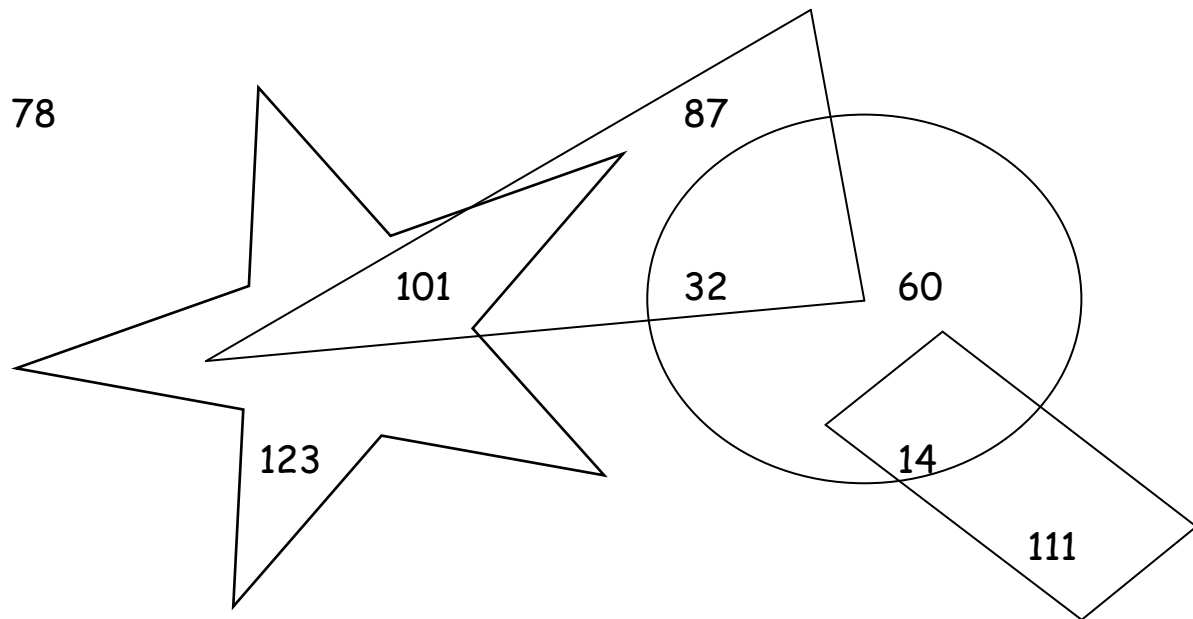
9. The biggest number is **inside the star**.

10. The smallest number is **inside the circle and the rectangle**.

11. The numbers that did not get used are: **19 and 95.**

Create "A Place for Each Number" Task Card

Create your own "A Place for Each Number." Give it to a friend to solve. Be sure to create an Answer Key!

Be sure to include the following:

- at least 3 shapes
- at least 8 placement statements
- Answer Key
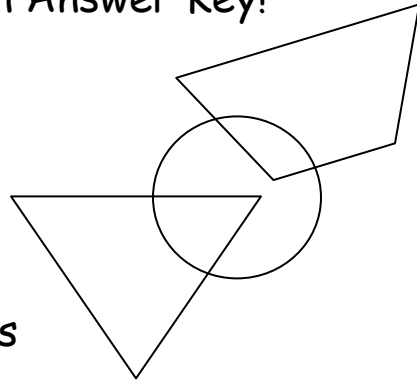
Where do these numbers belong?

There are many different ways to group numbers. A Venn Diagram is a good tool to use for this. Here is a Venn Diagram.

A   B
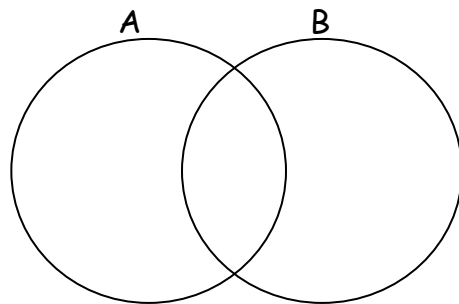
Look again at the numbers from the number box.

| 87 | 123 | 14 | 95 | 78 | 101 | 60 | 32 | 19 | 111 |

We could group them in a Venn Diagram like this:

A   B

14   111   101
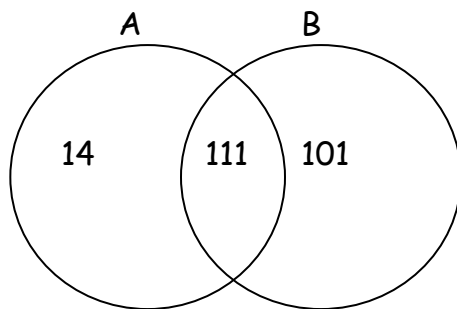
Circle A has numbers with 1 ten. Circle B has numbers with 1 one. In the middle, where the two circles cross, are the numbers that have 1 ten and also have 1 one.

What are some other ways you could group numbers from the box in a Venn Diagram?

Use the Venn Diagrams Sheet to show your groups.

On the lines under each diagram, explain how you made your groups.

Your teacher will give you more copies if you need them.

Venn Diagrams Sheet
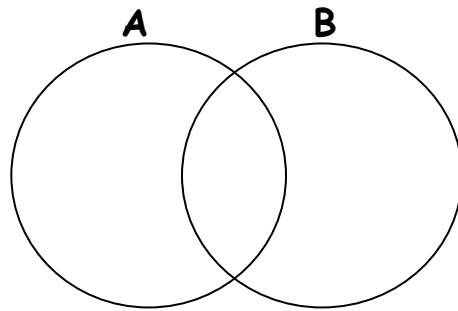
A   **B**

Here's how I made my groups.

The numbers in Circle A _____.

The numbers in Circle B _____.

The numbers in the middle _____.

A   **B**
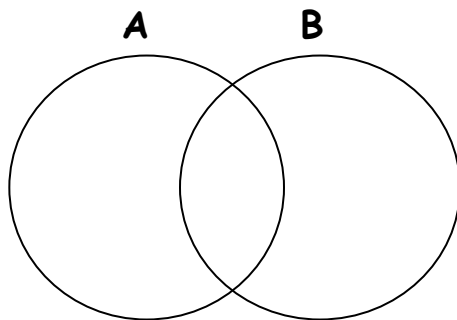
Here's how I made my groups.

The numbers in Circle A _____.

The numbers in Circle B _____.

The numbers in the middle _____.

Possible Answer Key: Where do these Numbers Belong?

A   B   95

111 87   14

123   60 78

101   32   19
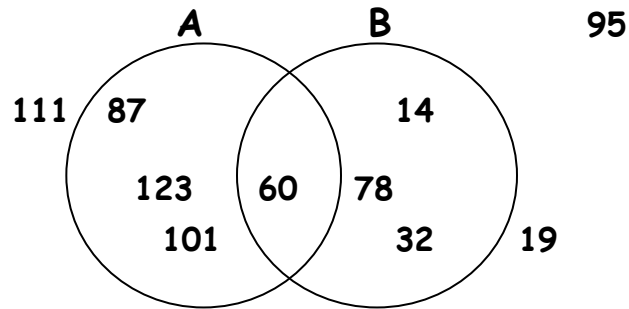
Here's how I made my groups.

The numbers in Circle A <u>have an even number of tens.</u>

The numbers in Circle B <u>have an even number of ones (left-overs).</u>

The numbers in the middle <u>have even numbers of tens and an even number of ones</u>.

A   B

87   123

95   78 32   14   19

60   101 111
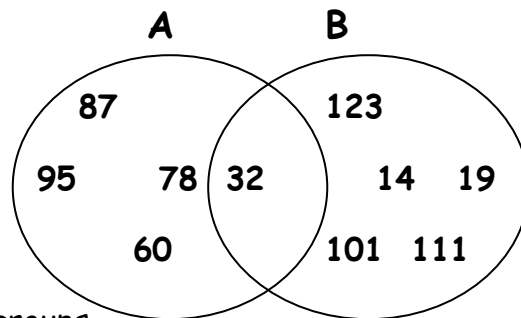
Here's how I made my groups.

The numbers in Circle A <u>have 3 or more in the tens place</u>.

The numbers in Circle B <u>have 3 or fewer in the tens place</u>.

The numbers in the middle <u>have exactly 3 in the tens place</u>.

Unit 1:   Whole Number Relationships and Place Value
Days 2-13
Enrichment Investigation #4

Common Core State Standard(s):	Standard(s) for Mathematical Practice:
1.NBT.1 1.NBT.2	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure.

Materials Needed:
- Blackline Master:
  - *Secret Code* activity sheets
- Answer Key:
  - *Secret Code Answers*

Instructions:
1. Students will decipher a secret number code to answer questions. Some of the numbers are mixed up. Students will need to write the "tricky" numbers in correct order.
2. Students will create a new secret code for someone else to solve.

Source:
- None

Secret Code

Doctor Math needs your help to unlock the secret code. Some of the numbers are tricky. Can you do it?

Code Shapes	☺	⬆	♡	△	☐	⬠	☾	⚡	☆	☀
Numbers	0	1	2	3	4	5	6	7	8	9

Here is how to get open the safe.
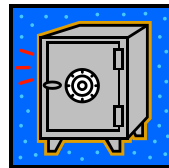
Tell Doctor Math how to turn the lock to open the safe.

Turn left △ times and stop on ♡ **tens**, ☾ **hundreds**, and ☆ **ones**.

Next, turn right ☐ times and stop on ☀ **hundreds**, ☺ **tens**, and ⚡ **ones**.

Last, turn left ⬠ times and stop on the number that has ♡ for the **thousands** and also for the **ones**, ☺ **hundreds**, and ⬆ **ones**. Now open the safe.
_____

Now, write these over to help Dr. Math. Be sure to write the numbers in correct order using place value. For example when writing numbers, do tens come before hundreds? Be sure to use numbers in place of the shapes.

Turn left _____ times and stop on _____.

Next, turn right _____ times and stop on _____.

Last, turn left _____ times and stop on _____. Now open the safe.
_____

What's in the safe?   A bag of money with 10 Ten dollar bills and 5 five dollar bills. How much money is in the safe? How do you know? _____

_____

Doctor Math must take the money to a secret house. Can you help him find the place?

The place where the money must go is a house on Pine Street. The number of the house has ☾ tens, ☆ ones, and ⚡ hundreds.

Tell Doctor Math where to take the money. Be sure the numbers are in correct order!

Take the money to _____ Pine Street.

_____

You are a good helper! Doctor Math has only △ more jobs for you to do.

Doctor Math has to meet his boss to talk about his work. The date and time are in code, so he needs your help so he can be on time for the meeting.

Doctor Math will meet his boss on a day in July. The day he will meet the boss has ☀ ones and ♡ tens. They will meet at night. They will meet after 8:00, but before 9:00. The meeting will take place at ⬆ ten and ⬠ ones after 8:00.

When will the meeting take place? Be sure your numbers are in the correct order.

The meeting will take place on July _____ at _____ p.m.

Doctor Math is going to the Spy Store to get some more spy tools. All the prices are in code.

He will need lots of money. He needs more dollars than ☐ hundreds, but less dollars than ⬠ hundreds.   The number of dollars he needs has ☺ tens and ☆ ones. He also needs some change. He needs ☀ dimes and ☀ pennies.

How much money does Doctor Math need to take to the Spy Store?

He will need _____ dollars and _____ cents, or $_____._____ .

Did Dr. Math have enough money in his safe? How do you know?

Now it's your turn!

You are almost to the end. The last thing you need to do is create a new secret code. Show your code to a friend to see if they can use it to solve problems like you did.

You can use this chart or write your code on another paper. Then write problems for your friend to solve by using your code and their skills with place value.

Your New Secret Code

0	1	2	3	4	5	6	7	8	9

Secret Code Answers

To open the safe:

Turn left **3** times and stop on **628**.

Next, turn right **4** times and stop on **907**.

Last, turn left **5** times and stop on **2012**. Now open the safe.
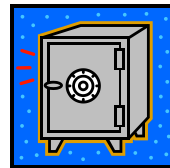
Deliver the money:

Take the money to **769** Pine Street.

Be on time to meet the boss:

Meet the boss on July **29** at **8:15** p.m.

Take enough money to the Spy Store:

Take **$408.99** to buy more spy tools.

Unit 1: Whole Number Relationships and Place Value
Days 2-13
Enrichment Investigation #5

Common Core State Standard(s): 1.NBT.2 1.NBT.3	Standard(s) for Mathematical Practice: 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 5. Use appropriate tools strategically. 7. Look for and make use of structure.

Materials Needed:
- Blackline Masters:
  - *Follow the Rules!* (4 pages)
- Answer Key:
  - *Follow the Rules!* (2 pages)

Instructions:
1. Students will analyze and compare numbers to place them inside and outside of circles following a given rule.
2. Students will analyze and compare numbers that are inside and outside of circles to determine the rule for that circle.
3. Students will create their own rules and place numbers inside and outside of circles according to their self-created rules, then have a classmate try to guess the rule.

Sources:
- Modeled on an activity from *Level 2—3 Mathematics Activities for the Elementary Classroom (KSAM)*, E.L. Kern and John E. Young (Eds.). Curriculum Associates, Inc. North Billerica, Massachusetts.
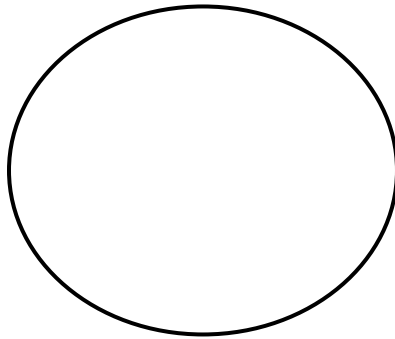
Follow the Rules!

Each circle on these pages has its own rule for what goes inside the circle, and what stays outside the circle. Put the correct numbers inside each circle.

Circle 1 Rule: Even Numbers

1	5	12	81	42	37	66	21	50	17	74	8

Which numbers from the box go inside the circle? Write the even numbers inside the circle and the odd numbers outside the circle.
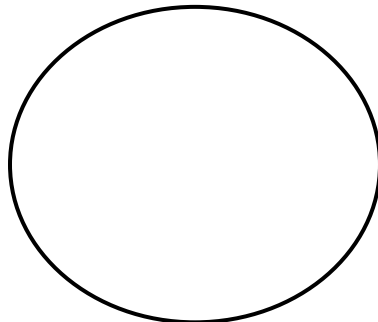
How did you know which numbers were even?

Circle 2 Rule: Numbers with exactly 6 tens

18	81	16	61	27	72	64	46	96	69	106

Which numbers from the box go inside the circle? Write the numbers with 6 tens inside the circle, and write the numbers that do not have 6 tens outside the circle.

Why did you select the numbers placed inside the circle?

Circle 3 Rule: Numbers Greater than 28 and Less than 60

10	31	56	61	27	100	65	46	90	59	40

Which numbers from the box go inside the circle? Write the numbers that fit the rule inside the circle, and write the numbers that do not fit the rule outside the circle.
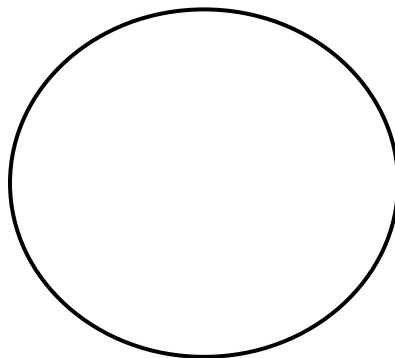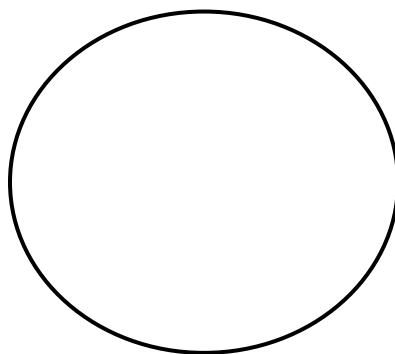
How did you know?

Circle 4 Rule: Numbers with Tens and no Left-overs

10	31	56	60	27	100	65	80	90	150	40

Which numbers from the box go inside the circle? Write the numbers that fit the rule inside the circle, and write the numbers that do not fit the rule outside the circle.

How did you decide which numbers had no left-overs?

Now it is time for a change. For these circles, the numbers are in place and you must guess the rule. Here is a small example:

| 5 20 14 35 42 |

20
14 (5
35) 42
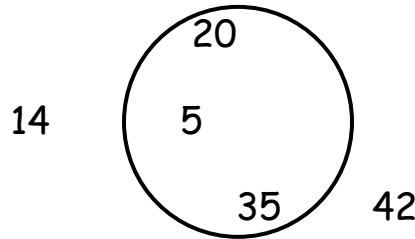
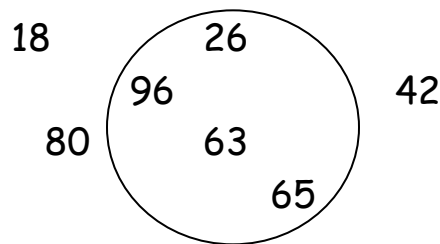What is the rule for this circle? <u>Numbers I can get when I count by fives.</u>

Now it is your turn to guess the rules.
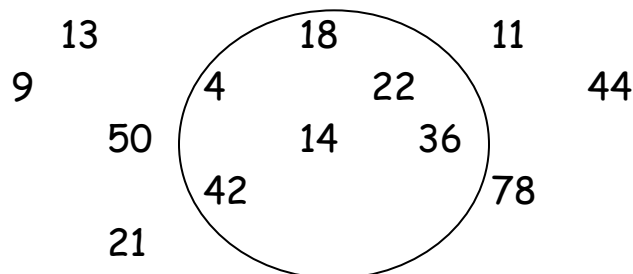
Circle A: What is my rule?

| 18 96 42 63 26 65 80 |

18   26
    96   42
80   63
        65

The rule for Circle A is _____.

Circle B: What is my rule?

| 4 9 13 18 21 42 36 78 50 14 22 11 44 |

13   18   11
9   4   22   44
50   14   36
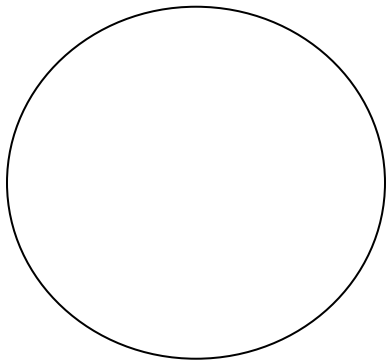   42   78
21

The rule for Circle B is _____.

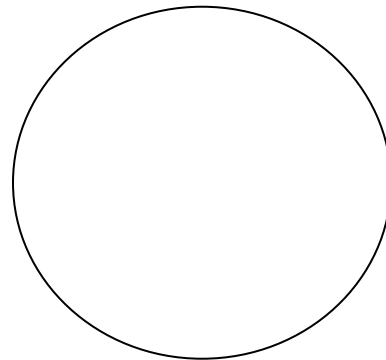**Now it is your turn!** Write some numbers inside and outside of each circle. Have a friend try to guess your rule.
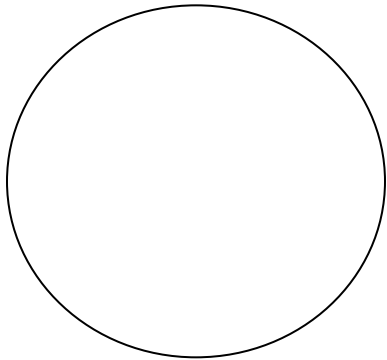
Rule: _____
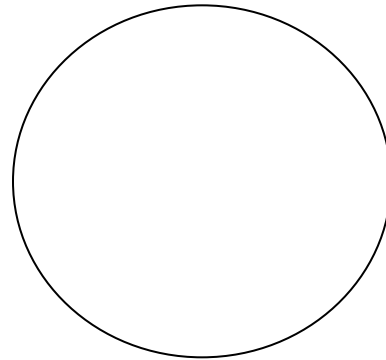
Rule: _____
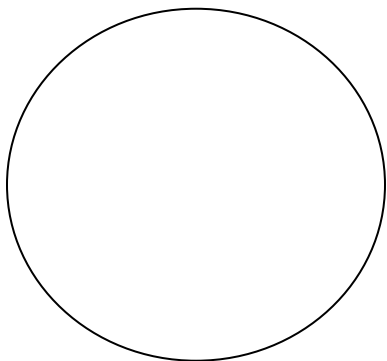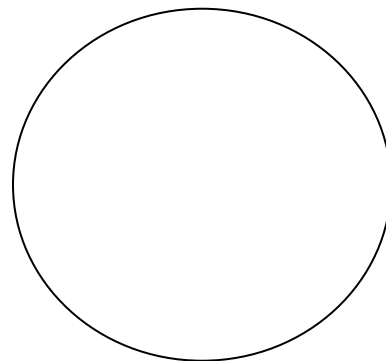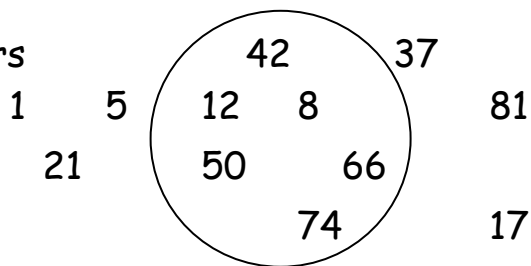
Rule: _____

Rule: _____

Rule: _____

Rule: _____

Follow the Rules!

Answer Key

Circle 1: Even Numbers

1   5   (42)37

12 8   81

21   50 66

74   17

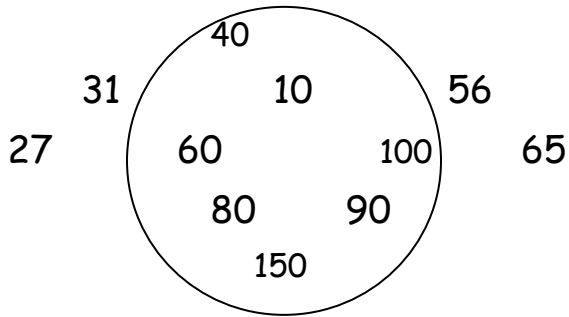In circle 1: 42, 12, 8, 50, 66, 74. Outside: 37, 1, 5, 81, 21, 17

Circle 2: Numbers with 6 tens

18   81

61   16

27   69 72

96   64   46

106

In circle 2: 61, 69, 64. Outside: 18, 81, 27, 96, 16, 72, 46, 106
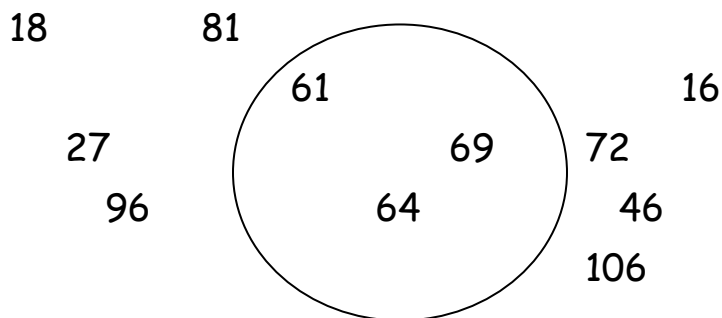
Circle 3: Numbers Greater than 28 and Less than 60

65

10   31 56

61   46 40   27

100   59 90

In circle 3: 31, 46, 40, 59. Outside: 65, 56, 10, 61, 27, 100, 90
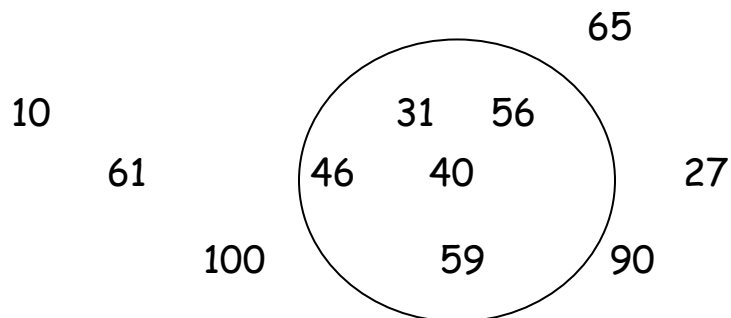
Circle 4: Numbers with tens and no left-overs.

40
31   10   56
27   60   100   65
        80   90
        150

The rule for Circle A is <u>numbers that have a 6 in them</u>.

The rule for Circle B is<u> even numbers less than 43</u>.