Activity One

The following problem-solving activities will help you develop two important elements of critical thinking in mathematics: recognizing patterns and logical reasoning.

Place Value - Mystery Numbers

1. This mystery number has 4 digits. Every digit is an odd number. None of the digits is a 9. Every digit in the number is different. The smallest digit is in the thousands place. The greatest digit is in the ones place. The preceding describes two possible numbers. The mystery number is the greater of those two numbers. What is the mystery number?

_____

_____

_____

2. This mystery number has 5 digits. There is a 4 in the ten thousands place. None of the other digits is a 4. What is the smallest number that this mystery number can be?

_____

_____

_____

3. This mystery number has 6 digits. If you add one to this number it will be a 7 digit number. What is the mystery number?

_____

_____

_____

4. This mystery number is one half of a billion. How many zeros are in this number?

_____

_____

Activity Two

CATEGORICAL FUN

Introduction

The following are logical problems, or "brain-teasers," which contain the information needed for their solutions, but present it in indirect but **relational** ways. Consider the following relational statements:

- The red book belongs to Ludmilla's brother.
- Ivan is Ludmilla's brother.
- Ludmilla has only one brother.

From this, of course, we can conclude that the red book belongs to Ivan, but it takes three bits of information to link "red book" and "Ivan." Each statement establishes relationships by creating or limiting a category. "The red book belongs to Ludmilla's brother," for instance, shows that the owner of the book falls into the category of "brothers of Ludmilla." The second statement gives us one member of that category, and the third statement limits the category to that one member. This example is simple enough that you probably were not conscious of the categorical thinking you employed in solving it, but the greater complexity of the following problems makes it important to attack them step-by-step, category-by-category.

Try solving the problems below using relational statements.

A. The Flower Show

Jasmine, Rose, and Lily each had an entry in the county fair's flower competition. Coincidentally, the flowers they entered were a jasmine, a rose, and a lily, but not in that order — in fact, none of the three competitors entered their namesake flower. If, in addition, you know that Jasmine did not enter a rose, can you figure out which flower each woman entered?

B. The Dorms

Three women — named Dana, Alex, and Jean, all Business majors — signed up for a critical thinking class at San Jose State at the same time as three men — also named Dana, Alex, and Jean. The three men are majoring in English, Engineering, and Nursing, though not necessarily in that order. Given the following information, can you assign the correct name to each of those majors?

1. Jean lives in San Francisco with her mother.
2. The Engineering major lives on the peninsula, exactly halfway between San Jose and San Francisco.
3. Alex is joined in studying at San Jose State by both of her brothers.
4. The woman who lives nearest the Engineering major has three times as many brothers as he does.
5. The women with the same name as the Engineering major lives in San Jose.
6. Dana says he is smarter than the English major.

NAME: _____

Activity Three

PUZZLE CHOICE

Anagrams: an anagram is the result of rearranging the letters of a word or phrase to produce other words, using all the original letters exactly once.

Can you work out the items of food or drink from the following anagrams? Word lengths are shown in parentheses. **Solutions are written upside down at the bottom of the page.**

FOOD AND DRINK

1. AWFUL RECOIL (11) _____

2. IN REAL EGG (6, 3) _____

3. A MOTTO (6) _____

4. RICH EAT OK (9) _____

5. CHANGE MAP (9) _____

6. A SUGAR SAP (9) _____

7. RE A JUG ON ICE (6, 5) _____

8. EAT (3) _____

9. COOL CHEAT (9) _____

10. PUB TUNE TREAT (6, 6) _____

11. PAST EIGHT (9) _____

12. CHEAP (5) _____

13. A TROPIC (7) _____

Solution: 1. cauliflower 2. ginger ale 3. tomato 4. artichoke 5. champagne 6. asparagus 7. orange juice 8. tea 9. chocolate 10. peanut butter 11. spaghetti 12. peach 13. apricot

Activity Four

BRAIN TEASERS

Try solving the following brain teasers. Solutions are written upside down at the bottom of the page.

1. What do you have to give before you can keep it?

_____

2. What can you break without touching it?

_____

3. What is so fragile that sound can destroy it?

_____

4. The more you take, the more you leave behind. What are they?

_____

5. What goes up but never comes down?

_____

6. What's always coming but yet never arrives?

_____

7. What do you throw out when you want to use it, but take in when you don't want to use it?

_____

8. What grows down while it grows up?

_____

9. When I was born I was big but the older I get the smaller I am. What am I?

_____

10. I live where light is but die if light touches me. What am I?

_____

Solution: 1. Your word 2. A promise 3. Silence 4. Footsteps 5. Your age 6. Tomorrow 7. An anchor 8. A goose 9. A candle 10. A shadow

Activity Five

PERSONALITY HANDS PROJECT

Vocabulary Words:

Line, Negative Space, Overlap, Abstract

Materials:

12x18" white paper, sharpie, markers, scissors, black paper

Directions:

1. Trace your hand 6 - 8 times on a sheet of 12x18" white paper.

2. Using a marker, draw patterns, symbols, shapes, etc. that reflect your personality.

3. Problem solving is part of this project so you should decide how to incorporate the overlapping fingers. Color the negative space in between the fingers black, and anywhere it will be difficult to get to with scissors.

4. Cut out around the outside of the hands and glue on black paper.

5. Study the overall effect of your project and come up with a great title!

Activity Six

GAMES FOR CRITICAL THINKING

On your classroom or home computer, go to http://math-and-reading-help-for-kids.org/kids_games/index.html. There you will find a list of games that are designed to help you with your problem solving, logic, and memory skills. Choose at least two games and play them. Then, write at least a paragraph about each game. In each paragraph give the name of the game you chose, the skills you used in playing the game, and how well you like the game. Share these paragraphs with a classmate or with your teacher. This is an excellent way to exercise your "critical thinking" muscles.

Games for Critical Thinking

Name: _____

1. **Games that I chose to play:**

   _____
   _____
   _____

2. **Skills involved in playing each game:**

   _____
   _____
   _____

3. **How well I like the game:**

   _____
   _____
   _____
   _____
   _____