LessonTitle: Riddles and Logic **Pre 1.0**

Utah State Core Standard and Indicators Pre-Algebra Process Standards 1-5

Summary

This is a problem solving activity involving pairs of students. Students are given a series of clues to determine the number and color of tiles in a bag. Then they work in pairs to write riddles of their own creating sequences of clues that lead to a particular collection of tiles. Then they solve other students' riddles.

Enduring Understanding	Essential Questions
To do mathematics is to observe patterns or collect data, then make and test conjectures, and listen to and evaluate the ideas of others, and finally reframe or frame new questions.	How is solving riddles related to mathematics skills?
Skill Focus	**Vocabulary Focus**
• Problem Solving • Cooperative Learning	

Assessment

Materials: See below

Launch ideas:

Explore

"Many of the teachers were frustrated with the logistics of the tiles and how to keep the students from stealing them and/or losing them." It is important to establish procedures and rules from the beginning.

"[This activity] was hard to do at the beginning of the year when students and teachers were trying to get the protocol and procedures down for the class. Maybe moving this assignment back a few more weeks would be more helpful for some students."

Summarize

Apply

Teacher Information

This lesson was adapted from A Collection of Math Lessons (Burns and Humphreys)

Prepare the following materials before the lesson.

1) Color Tiles: 18 small plastic bags for pairs of students. Each bag contains 80 tiles, 20 each of red, blue, green and yellow.

2) Bags of tiles for Riddle 1 and Riddle 2. Each bag should contain the appropriate number of tiles and the corresponding riddle. [Students often pass along answers to riddles between classes. To avoid students knowing the answers to riddles, prepare 5 bags. The even bags have Riddle 2 in them and the odd bags have Riddle 1 in them. Pretend to grab random bags, an even and an odd.]

Riddle 1 (6 blue, 3 yellow tiles)

Clue 1 - There are fewer than 15 tiles.
Clue 2 - I used two colors.
Clue 3 - There are no green or red tiles.
Clue 4 - I have twice as many blue tiles as yellow tiles.
Clue 5 - There are 3 more blues than yellows

Riddle 2 (4 red, 3 blue, 3 green tiles)

For the second riddle, read the first 3 clues together. Let the pairs work on these clues for a few minutes. Then give the last two. Allow students to work together until they have solutions. Talk about not giving away solutions. Select students to explain their reasoning until all groups agree that their way has been explained.

Clue 1 - There are 10 tiles.
Clue 2 - I used three colors.
Clue 3 - I have zero yellow tiles.
Clue 4 - I have the same number of green and blue tiles.
Clue 5 - There are more red tiles than green or blue tiles.

Before giving the 6^{th} clue, have students find ALL POSSIBILITIES. Then tell them what is in the bag and ask them to come up with a 6^{th} clue which would produce exactly one answer. After they've given their ideas tell them the 6^{th} clue.

Clue 6- There are ¾ as many green as red tiles.

Directions:

1. Students solve riddles using clues prepared by the teacher. Pass each group a bag of tiles. Do the first riddle as a class. Read one clue at a time and discuss. Student pairs may manipulate their tiles as the clues are read. Discourse Suggestions:

- You are to show not just one possibility but all the possible arrangements.
- What clue might give you that result?
- Do you think the order of the clues is important?

2. Students work in pairs to create their own riddles. Ask students if they were going to make up a riddle, how might they start? (Ask students first, and then add to it as needed with the following)

1. Put some tiles in a bag.
2. Write a clue that gives information but doesn't give it away.
3. Write more clues.
4. Test the clues to make sure they produce exactly one solution.

Have students write their riddles on the riddle recording and assessment form.

3. Students solve other student's riddles. Before students solve each other's riddles, do the following riddle so students can recognize redundancy. (Place on the board at beginning of class. This riddle has a redundant clue.)

1. I have fewer than 15 tiles.
2. I have three colors.
3. I have twice as many yellow tiles as blue tiles.
4. There are two colors with the same number of tiles.
5. I have the same number of yellow and red tiles.

Give one riddle recording form out for every two teams. The two teams will assess each others' riddles.

4. Take home assignment. (See below)

5. Students correct each others HW using tiles.

6. Discuss the essential questions and have students respond in writing after the discussion.

Extension: At a later time in the year, return to this lesson again but use clues that include other math concepts, such as fractions, decimals, percents, ratios, primes, palindromes, powers, and square numbers.

Riddle Recording and Assessment Form

Team 1 Names: _____ _____

Riddle Clues:

1._____

2._____

3._____

4._____

5._____

Solution: Too easy Just right Too hard (circle one)

Explanation:

Redundant Clue:

Team 2 Names: _____ _____

Riddle Clues:

1._____

2._____

3._____

4._____

5._____

Solving Team 1 Names: _____ _____

Solution: Too easy Just right Too hard (circle one)

Explanation:

Redundant Clue:

Take Home Riddle Assignment

Name _____

1) Write about your experience with the riddles.
   - **a.** Did you enjoy the activity? Why or why not?
   - **b.** What math skills did you use?
   - **c.** Would you recommend I teach this to other classes? Why?
   - **d.** What suggestions for improving the lesson can you offer?

2) Write clues for a collection of tiles with 1 red, 1 blue, 3 green, and 6 yellow.

1._____

2._____

3._____

4._____

5._____

Solving Person's Name: _____

Solution: Too easy Just right Too hard (circle one)

Explanation:

Redundant Clue: