Math Grades 8-12
Logic/Probability & Statistics

Sylvie and Bruno
Chapter 18: "Queer Street, Number Forty"
Lewis Carroll

Directions:
The students will explore the mathematics found in *Sylvie and Bruno* Chapter 18: "Queer Street, Number Forty". Have students read the poem and answer the following questions.

1. Decide if the following excerpt from *Sylvie and Bruno* is true or false. Give examples to support your answer. "Well," said Arthur, "do you accept it as self-evident? Is it as obvious, for instance, as that 'things that are greater than the same are greater than one another'?"

2. Decide if the following excerpt form *Sylvie and Bruno* is true or false. Use words or drawings to support your answer. "Nor to prove that 'all angles are equal', I suppose?"

3. Arthur said, "that the trains go every ten minutes." If the first train run is at 9:00am and the last is at 5:00pm, how many train runs are there for the day?

4. The following problem is found in the reading, "By this time the carriages, that were to convey the revelers to their respective homes, had begun to assemble outside the Castle-grounds: and it became evident—now that Lady Muriel's cousin had joined our party that the problem, how to convey five people to Elveston, with a carriage that would only hold four, must somehow be solved." Find the number of possible ways that 5 people could sit in 4 seats.

5. The following paragraph is found in the reading, "A smooth grassy slope, bounded, at the upper end, by venerable ruins half buried in ivy, at the lower, by a stream seen through arching trees—a dozen gaily-dressed people, seated in little groups here and there—some open hampers—the debris of a picnic—such were the Facts accumulated by the Scientific Researcher. And now, what deep, far-reaching Theory was he to construct from them? The Researcher found himself at fault. Yet stay! One Fact had escaped his notice. While all the rest were grouped in twos and in threes, Arthur was alone: while all tongues were talking, his was silent: while all faces were gay, his was gloomy and despondent. Here was a Fact indeed! The Researcher felt that a Theory must be constructed without delay." How many ways can 2 people be chosen as a group from the dozen that

are there? How many ways can 3 people be chosen as a group from the dozen that are there?

<u>Solutions:</u>

1. False. It cannot be said that just because two quantities are greater than another, then they are greater than each other. For example 7>4 and 8>4. It cannot be concluded that 7>8. Another example: 6>2 and 9-3>2. It cannot be concluded that 6>9-3.

2. False. All angles are not equal. For example,   . Another example:

   is not equal to
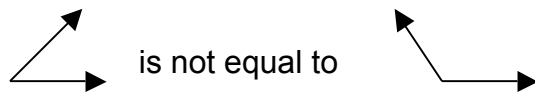
3. 49. Each hour there are 6 runs (For example, during the 9:00 hour there are runs at 9:00, 9:10, 9:20, 9:30, 9:40, 9:50 and during the 10:00 hour there are runs at 10:00, 10:10, 10:20, 10:30, 10:40, 10:50). Hence, from 9:00am until 4:50pm there are 48 runs   for 5:00pm.

4. This is a Combinations problem. The solution is found by calculating $_5C_4$ = 5 (the number of ways 4 things can be chosen from a group of 5).

   $_nC_r =$ ——————   Or, for students that have not yet learned about

   Permutations and Combinations, a list of possible combinations could be made. There are 5 people: Arthur (A), Lady Muriel (LM), Eric Lindon (EL), The Earl (E), and the speaker (S).
   The possible outcomes are:
        A, LM, EL, S
        A, LM, EL, E
        A, LM, E, S
        A, EL, E, S
        LM, EL, E, S

5. This is a Combinations problem. First, the number of ways 12 things can be taken 2 at a time: $_{12}C_2$ = 66. Second, the number of ways 12 things can be taken 3 at a time: $_{12}C_3$ = 220.