Supplemental Problems

1. There are 5 teams in a softball league: the Bulls, the Cougars, the Ducks, the Eagles, and the Falcons. If each team must play each other team exactly once in a season, how many games must be played?

2. List all of the ways 33 in postage using 1 , 5 , and/or 20 stamps. How many ways are there?

3. If you can only use the digits 1, 2, 3, 4, and 5, how many three digits are in increasing order? (For example, the digits of 125 are in increasing order, since $1 < 2$ and $2 < 5$. However, the digits of 251 are not since $5 > 1$.)

4. Suppose the cost to increase airport security nationwide next year is estimated to be \$45 billion. If the cost is equally shared by each of the 250 million U.S. citizens, how many dollars does each citizen pay of the increased security?

5. In a barn with cows and chickens, the number of legs was 16 more than twice the number of heads. How many cows were in the barn?

6. The length of a rectangular garden is 4 feet less than twice the width. The perimeter is 88 feet. Find the dimensions of the garden.

7. In a group of 40 students, 20 have cats, 15 have dogs, and 4 have both cats and dogs.

   (a) How many students have neither cats nor dogs?

   (b) How many students have cats but not dogs?

8. The sum of the three natural number is 24. One of the numbers is half the sum of the other two but is twice their difference. What are the numbers.

9. In a group of 28 students, 11 are taking math, 19 are taking English, 12 are taking history, 6 are taking math and history, 9 are taking history and English, 7 are taking math and English, and 5 are taking all three subjects.

   (a) How many of the students are not taking any of the three subjects?

   (b) How many of the students are taking only math?

   (c) How many of the students are taking only one of these subjects?

10. What is wrong with the following numeral? 96_{nine}

11. In base four, write the next 7 numerals after 232_{four}.

12. How many 9 in. $\times$ 9 in. tiles does it take to tile the floor of a 12 ft. $\times$ 15 ft. kitchen? Explain.

13. A mile long train is moving at 60 miles per hour when it reaches a mile-long tunnel. How long does it take the entire train to pass through the tunnel? Explain.

14. The cost of 10 pencils is \$0.84. At the same rate, what is the cost of 25 pencils?

15. How long will it take you to count to 1 billion if you allow 2 seconds for each number? Assume you count 24 hours a day, 7 days a week, and 52 weeks a year.

16. Find the whole numbers a and b for which the following hold:

    $49 = a + b$, and

    if a is divided by 7 and b is divided by 4, the sum of the answers is 10.

17. In each part, state whether the given set is closed under the specified operation. If your answer is "No", give a counterexample to show whey the set is not closed under that operation.

    (a) Is $A = \{1, 3, 5, 7, 9, \ldots\}$ closed under **addition**?

    (b) Is $A = \{1, 3, 5, 7, 9, \ldots\}$ closed under **multiplication**?

    (c) Is $C = \{2, 4, 6, 8, 10, \ldots\}$ closed under **addition**?

    (d) Is $A = \{2, 6, 10, 14, 18, \ldots\}$ closed under **multiplication**?

18. A number is 18 less than its additive inverse. What is the number?

19. One of your students asks if you can illustrate what $3 \div \frac{2}{3}$ means. What would you draw?

20. A customer was one day late paying a credit card bill in the amount of \$4500 and was charged a 1.5% late fee. What was the amount of the late fee?

21. A number is increased by 32. The new number is one-third of 60% of the original number. What was the original number?

22. If x is 40% of y, what percent of $2y$ is $3x$? Show your work.

23. If the cost of a new car is 17000 (plus 7.73% sales tax) and a down payment of 20% of the total cost is required, how much money will a consumer need to drive out in a new car?

24. Suppose a student in our Math 1030 class has earned the following grades: 895 points out of 1000 total homework points, 120 points out of 200 total quiz points, 75 points out of 100 total exam 1 points, 90 points out of 100 total exam 2 points, 85 points out of 100 total critique paper points, and 200 points out of 250 total final exam points.
    Please calculate this student's numerical grade. (Hint: look at the syllabus for the grade break-down.)