This is your individual test. You have 35 minutes to complete this test. No calculators will be allowed. The questions are arranged in the order of difficulty. You do not have to finish all the questions. Express answers as a fraction or round decimals to the nearest thousandth. Reduce all fractions and rationalize denominators. When the time is up, put down your pencil and hand your test to me face down. Good luck.

1. How many factors does 72 have?

2. A wallet contains 10 coins, all nickels or dimes, totaling 80 cents. How many dimes are there?

3. If the midpoint of the line segment between (-2, 5) and (8, a) is (3, 3), what is "a"?

4. Express as an ordered triple the mode, mean, and median of the following data
set: {13, 21, 17, 17, 28, 20, 23, 30, 28, 47, 2, 12, 28}

5. There are goats and ducks in a field. If there are 34 heads and 92 feet, how many goats are present?

6. Evaluate $2^{10}/2^{5}$.

7. How many distinct arrangements of the letters in "MAMBA" are possible?

8. How many cubes three inches on a side are required to build a solid cube 1 foot on a side?

9. Two lines are eight units apart. A circle, tangent to both lines, has a square circumscribed around it. What is the area of that square?

10. What is the prime factorization of 180?

11. The functions $f(x) = 3(x^2)+4$ and $g(x) = 2x+5$. Find $f(x) + g(x)$.

12. If z varies directly with the sum of x and y, and z=12 when x=1 and y=5, what is z equal to when x=7 and y= -12?

13. How many positive palindromes less than 10,000 have at least three identical digits?

14. What is the smallest prime number greater than 200?

15. Convert 2817 base 9 to base 3.

16. If x is the sum of the measures of the external angles of a regular nonagon, what is x/9?

17. A farmer's barn is populated with cows, chickens and spiders (at least one of each). If there are 31 heads and 92 legs present, at most, how many chickens could there be?

18. A cube is constructed such that its volume in cubic centimeters is half its surface area measured in square centimeters, what is the space diagonal of the cube, in centimeters?

19. How many positive numbers less than 24 are relatively prime to 24?

20. What is the length of the altitude to the hypotenuse for a 7-24-25 right triangle?

21. Name the figure represented by the following plane equation: $4x^2 + 5y^2 - 10x + 20y - 100 = 0$

22. If Christmas Day (Dec. 25) falls on a Monday in a certain leap year, on what day of the week was Valentine's Day (Feb. 14) of that year?

23. How many integers from 1001 through 2001 inclusive have exactly three of their digits the same?

24. Simplify (6 - 7i)/i where $i^2 = -1$.

25. Annie draws a circle, a triangle, and a square. If no side of the triangle is collinear with a side of the square, what is the largest possible number of points of intersection in the drawing?

26. Circle O is inscribed in square ABCD. Point P is the intersection of AO with the circle. What is the ratio of AP to OP?

27. Reduce the following fraction to lowest terms: the numerator is the quantity (1/x + 1/y) and the denominator is 1/(xy).

28. A parabola passes through the points (3, 3), (-3, 4), (-1, 1), and (2, a). Find a.

29. If $f(2x) = 4x^2 – 8x + 3$, determine f(x).

30. What is the maximum value of the function $f(x) = 3x – 2x^2$?

31. What is the fewest number of triangles that can be formed by five lines in a plane if each line must intersect at least two others and no more than two may be parallel?

32. Evaluate: $\log_4(128)$

33. If (2x+1)=7 mod 13 and x is an integer between 0 and 100 inclusive, what is the sum of all possible values of x?

34. A set contains the integers from 1 to 1001 inclusive. What is the highest number of elements in a subset such that no two elements from the subset add to a multiple of 5?

35. A nine term arithmetic sequence $a_1, a_2, \ldots, a_8, a_9$ satisfies $a_5 + a_7 = -17$ and $a_4 + a_6 = 17$. What is the sum of the terms of the sequence?

36. A ball in the shape of a single point, when dropped, will bounce to half its original height. Two such balls are dropped at one time, one from 10 meters above the ground, the other from 5 meters directly above the other ball. When the two balls collide, they bounce, effectively exchanging velocities. What is the total distance traveled by the two balls?

37. If $\mathbf{x^2 + y^2 = 12}$ and $\mathbf{x + y = -4}$, determine the value of $\mathbf{x^3 + y^3}$.

38. How many natural numbers less than 100 are congruent to 2 mod 7?

39. How many positive four-digit numbers contain exactly three distinct digits?

40. Find the sum of all the real values of g which satisfy
$\mathbf{(2g^2 + 5g - 13) \wedge (2g^2 + 7g + 3)}$.

