1. Evaluate $164 \div 4$.

2. Danny Kim is 5 ft 3 in tall. If he wants to grow until he is exactly 2 in taller than Jeremy Lin, who is 75 in tall, how many inches must he grow?

3. What is one-fourth of the sum of one-fourth and one-fourth?

4. At Justin's Pizza Parlor, slices of pizza cost \$1.50 per slice, or \$9.00 for a whole pie of 8 slices. If Dr. Abramson wants to buy 1 slice of pizza for all 160 math team students, how much money does he save by buying all pies instead of all individual slices?

5. Chester, Ryan, Dominic, and Kevin take the Joe Holbrook Memorial Math Competition, and each of them finishes in the top 4. Given that both Kevin and Chester place higher than Dominic, and Ryan does not finish in the bottom 2, who comes in 4th?

6. The number 1126 can be factored as the product of two primes. Find their sum.

7. If $\frac{36}{84} = \frac{x}{28}$, what is x?

8. What is the sum of the 200th positive even number and the 200th positive odd number?

9. If $x + y = 37$, and $3x - y = 19$, find x.

10. Compute 111111^2.

11. 17 consecutive integers sum to 0. What is the smallest of these integers?

12. Find the largest number X such that the 4-digit number $8X54$ is divisible by 3.

13. If the fraction $\frac{4}{37}$ can be written as a repeating fraction of the form $0.\overline{abcabcabc\cdots}$, find $a + b + c$.

14. Fritz wants to fill up his snack shelf so that exactly $\frac{1}{4}$ of his snacks are chips, $\frac{1}{5}$ are crackers, $\frac{1}{6}$ are chocolate, and the rest are gummy worms. What is the smallest total number of snacks he must buy so that he can fulfill these conditions?

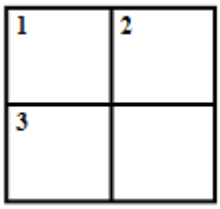
15. Arthur made 30 of his 45 three-point attempts and 80% of his 100 free throws. If free throws are worth one point each, what fraction of his total possible points has Arthur scored?

16. $ABCD$ is a quadrilateral with right angles at B and D, $AB = 7$, $BC = 24$, $CD = 20$, and $DA = 15$. What is the area of this quadrilateral?

17. A company sells 5 shirts every weekday and 10 shirts every weekend. How many shirts will they sell in a 10 day period from Sunday, October 14th, 2012 to October 23rd?

18. $a\#b = a \cdot b - a$. For example, $5\#7 = 5 \cdot 7 - 5 = 35 - 5 = 30$. What is $(((25\#16)\#9)\#4)\#1$?

For problems 19 through 22, fill in the following crossword puzzle, putting a single digit in each box.



19. (1 across) A perfect cube

20. (1 down) A perfect square

21. (2 down) A multiple of 8

22. (3 across) A multiple of 13

23. Find the integer x that satisfies $x^3 + 3x^2 + 3x = 124$.

24. Arjun decides to make a sequence of numbers going: $1, 2, 1, 2, 2, 1, 2, 2, 2$,... If the pattern continues this way, then find the sum of the first 63 numbers in the sequence.

25. Ash Ketchum takes care of two types of Pokmon: Doduos, which have 2 heads and 2 legs, and Dodrios, which have 3 heads and 2 legs. One day, Ash counts 291 heads and 222 feet on all of his Pokmon. How many Doduos does he have?

26. Andrew Cho needs to choose two new people for his band, the Chonas Brothers. He needs to choose these people from a group of 4 girls and 5 boys, where at least one person chosen is a boy. How many different pairs of people can he choose?

27. If the infinite geometric sum $\frac{1}{a} + \frac{1}{a^2} + \frac{1}{a^3} + \cdots$ equals $\frac{4}{5}$, then what is the value of $\frac{1}{a^2} + \frac{1}{a^4} + \frac{1}{a^6} + \cdots$?

28. What are the last three digits of $5^{2012!}$?

29. Dennis drives from his house to school and back. On the way there, he drives half the *time* at 40mph and the other half the *time* at 60mph. On the way back, he drives half the *distance* at 40mph and the other half of the *distance* at 60mph. What is his average speed for the entire trip?

30. How many real roots does the polynomial $x^{72} + x^{24} + x^4 + x^2 + 1$ have?

31. A happy pair of numbers is pair of two numbers such that each digit in one number is greater by exactly 1 than each corresponding digit in the second number. For example, 1283 and 2394 are a happy pair. The sum of two numbers in a certain happy pair is 5823. What is the larger number?

32. If $a + b = 5$ and $ab = 7$, what is the value of $a^4 + b^4$?

33. What is the maximum number of intersections between 10 lines and 2 circles?

34. What is the smallest number with exactly 12 positive integer divisors (including 1 and itself)?

35. Izzy is thinking of a 3-digit number with all non-zero digits. When she squares each of its digits and adds them up, she gets exactly twice the sum of the digits. What is the number?

36. How many ways are there to arrange 5 identical cats and 4 identical dogs in a row, if the first and last animal must be the same?

37. Kelvin rolls a fair, six-sided die numbered 1 to 6, while AJ rolls a fair, 10-sided die numbered 1 to 10. What is the probability that AJ's roll is at least twice Kelvin's?

38. How many divisors of 3600 are perfect squares?

39. What is the smallest positive integer that leaves a remainder of 1 when divided by 3, 1 when divided by 5, and 0 when divided by 7?

40. Two integers differ by 9 and have the smallest possible product. What is this product?

41. A certain solid has 8 triangular faces and 6 octagonal faces. How many edges does it have?

42. James flips a fair coin 7 times. What is the probability that James gets more heads than tails?

43. What is the sum of the digits of $10^{2012} - 10^{1337}$?

44. At a certain hospital, the doctor realizes that any given patient has a $\frac{1}{4}$ chance of having chicken pox, a $\frac{1}{3}$ chance of having a cold, a $\frac{1}{6}$ chance of having lupus, and a $\frac{1}{4}$ chance of being perfectly fine. If a patient cannot be afflicted with more than one condition, what is the probability that in the next four patients, there is exactly one patient with each condition?

45. $\triangle PQR$ has side lengths $PQ = 17$, $QR = 18$ and $PR = 19$. If I is the incenter of $\triangle PQR$, then find $(PI)^2$.

46. A bug starts at point A of equilateral triangle ABC. Each second, the bug randomly moves to one of the adjacent vertices, each with probability $\frac{1}{2}$. What is the probability that after 3 seconds the bug has visited all 3 vertices? (Note: the bug has already visited point A, since that is its starting point).

47. Paul makes a regular tetrahedron out of clay with side length $\sqrt{2}$. He then turns the tetrahedron into a cube without removing or adding clay. What is the side length of the cube?

48. Quadrilateral $ABCD$ has $\angle A = \angle B = 60^\circ$, $\angle C = 150^\circ$, $AB = 8$, and $CD = 3$. The perpendicular bisector of $\overline{AB}$ meets $\overline{AB}$ at X and $\overline{CD}$ at Y. Find XY.

49. Call an ordering of letters *reasonable* if there is at least one consonant adjacent to each vowel. How many different reasonable orderings can we create with the word "BREEZES"?

50. Let S be the set of all 10 digit numbers (i.e. they cannot begin with 0) made from using each of the digits $0, 1, 2, ..., 9$ exactly once. What is the average of all the numbers in S?