MATHCOUNTS

1989-90

■ School Competition ■

Team Round

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This section of the contest consists of 10 questions which the team has 20 minutes to complete. Team members may work together in any way to solve the problems. Team members may talk during this section of the contest. Calculators, slide rules, books, or other aids are not permitted to be used during the tests. Calculations may be done on scratch paper. All answers must be complete, legible, and simplified to lowest terms. The Team Captain must record answers on his/her own problem sheet. If the team completes the questions before time is called, use the remaining time to check your answers.

Team Name _____

Team Members _____, Captain

_____

_____

_____

Total Correct	Scorer's Initials

MATHCOUNTS is a cooperative project of the National Society of Professional Engineers, the CNA Insurance Companies, the Cray Research Foundation, the General Motors Foundation, the National Council of Teachers of Mathematics, the National Aeronautics and Space Administration, and the United States Department of Education.

1. Les has a total of \$1.75 in coins in his pocket. If he has only quarters, dimes, and half-dollars, and at least one of each, what is the total number of coin combinations that he can have? 1. _____

2. Find the arithmetic mean of the reciprocals of the first three prime numbers. 2. _____

3. If x is the average of 13, -16, and 6 and if y is the cube root of 8, find $x^2 + y^3$. 3. _____

4. If you have one of each of the following coins (a penny, nickel, dime, quarter, and half dollar) what is the total of the different amounts of money you can obtain by forming all possible two-coin combinations? 4. _____

5. How many different 7-digit positive integers are possible if the first digit cannot be 0? 5. _____

6. The diameter of a circle is 16. By what number must the radius be decreased in order to decrease the area of the circle by 48π? 6. _____

7. If a girl 5 feet tall could walk around the equator, how many feet further would the top of her head travel than her feet? Assume that the earth is a sphere. Express your answer in terms of π. 7. _____

8. A skateboard is on sale at a discount of 20%. Later the sale price is reduced by an additional $12\frac{1}{2}\%$. The sale price after the two successive discounts is what percent of the original price? 8. _____

9. Find a two-digit number that is equal to twice the product of its digits. 9. _____

10. 25 students average 84 on a test. Another group of 20 students averages 66. Find the overall average. 10. _____