MATHCOUNTS®

2005
■ Chapter Competition ■
Team Round
Problems 1–10

School _____

Team Members _____ , Captain

_____

_____

_____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This round of the competition consists of ten problems which the team has 20 minutes to complete. Team members may work together to solve the problems. Team members may talk during this section of the competition. This round assumes the use of calculators, and calculations may also be done on scratch paper, but no other aids are allowed. The team captain must record the answers on his/her problem sheet, and all answers must be complete and legible. Only the team captain's problem sheet will be scored.

Total Correct	Scorer's Initials

1. A competition problem requires one hour to fully develop (write, proofread, edit, and typeset). This problem is then given to 30,000 students, each working an average of 24 seconds to solve the problem. What is the ratio of a problem's development time to the total time spent by the students to solve the problem? Express your answer as a common fraction.

1. _____

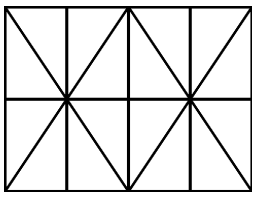
2. Select any three-digit multiple of 3. Calculate the sum of the cubes of the digits of that number. This is now your new number. Now calculate the sum of the cubes of the digits of this new number. Continue this procedure of adding the cubes of the digits of the resulting number until you arrive at a number that is equal to the sum of the cubes of its digits. What is this number?

2. _____

3. Emma and Ed walk into a room containing 30 assembled Tworks and enough pieces to assemble 100 more Tworks. A Twork takes eight minutes to assemble and 10 minutes to disassemble. If Emma starts assembling Tworks as Ed begins disassembling the ones that were already made, and they both continue to work until there are exactly 35 assembled Tworks in the room (and no partially assembled or disassembled Tworks), how many minutes will Emma have worked?

3. _____ minutes

4. How many triangles are in the figure below?



4. _____ triangles

5. How many integers are solutions to the equation $(x-2)^{(25-x^2)}=1$?

5. _____ integers

6. The minute hand of a clock measures 10 cm from its tip to the center of the clock face, and the hour hand from its tip to the center of the clock face is 5 cm. What is the sum of the distances, in meters, traveled by the tips of both hands in one 24-hour period? Express your answer to the nearest thousandth of a meter.

6. _____ meters

7. These are two shoelace patterns for two identical shoes with fourteen holes each. Assume that the holes form a rectangular grid and that each hole is 1 cm from its nearest horizontal and vertical neighbor-holes. Calculate the ratio of the total length of the shoelace shown in Pattern #1 to the total length of the shoelace shown in Pattern #2. Express your answer as a decimal to the nearest hundredth.

7. _____

Pattern #1

Pattern #2

8. A four-digit perfect square number is created by placing two positive two-digit perfect square numbers next to each other. What is the four-digit square number?

8. _____

9. If Ella rolls a standard six-sided die until she rolls the same number on consecutive rolls, what is the probability that her 10^{th} roll is her last roll? Express your answer as a decimal to the nearest thousandth.

9. _____

10. A standard deck of playing cards with 26 red cards and 26 black cards is split into two piles, each having at least one card. In pile A there are six times as many black cards as red cards. In pile B, the number of red cards is a multiple of the number of black cards. How many red cards are in pile B?

10. _____ red cards