



2005-2006 Problems

Maine Mathematics Science and Engineering Talent Search

Round 2(2005-2006) **Grades 6-9**

Deadline: (Postmark) November 1

Mail solutions to: MMSETS

P.O. Box 496

Orono ME 04473

NOTE: Please read and follow the GUIDELINES TO PREPARE SOLUTIONS (after the problems). Print out, complete and attach the cover sheet to your solution. The cover sheet is after the GUIDELINES

1. Type in an adding machine the sum $1+2+3+\dots+100$. As each number is added to the previous sum, the machine displays the new sum of the numbers that you have typed into the machine. How many times is the number 97 displayed?
2. (a) What is the sum of the first three odd numbers? (b) The sum of the first five odd numbers? (c) The sum of the first seven odd numbers? (d) The sum of the first twenty six odd numbers? (e) The sum of the first 2189 odd numbers?
3. What is the 87^{th} digit in the decimal representation of the fraction $\frac{1}{7}$?
4. Before a basketball game, the five starting players on the team are weighed. After weighing each player we calculate the average of the weight of the players already weighed. How much heavier the heaviest player is than the lightest one, if after every weighing the average weight of the players increased by one pound?
5. We have one empty Gatorade bottle, water and a marker. We'd like to mark half of the volume of the bottle without any measuring device. We could partially empty

or fill the bottle to make this decision and use the marker but no other bottles or cups are available for the experiment. How should we do this?

6. Find two six-digit numbers such that the number obtained by writing them one after another is divisible by their product.

7. There are 16 participants in a boxing tournament. Suppose that always the better competitor wins and there is a winner in each fight. What is the lowest number of matches to find the best, the second best and the third best boxer? Design a system of matches and describe how to decide who is the best, the second best and the third best boxer.

9. We have 100 pieces of wooden cubes, each is one cubic inch. Build different square based columns from these cubes. How many different columns could you design? Give the surface area of each column.

10. We have a five digit number. The sum of the digits is A . The sum of the digits of the number A is B . What is the largest possible value for B ?

Questions? Please e-mail to evaszillery-mmsets@me.acadia.net

Guidelines to prepare solutions

- Purpose: The purpose of organized writing is to help you explore and understand important mathematical concept. Written communication is key to comprehension: you can best understand mathematical ideas by explaining them clearly in writing.
- Write at a classmate's level: Specifically, write in such a manner that one of your classmates who are unfamiliar with the problem could easily follow your work. Thus, your solutions should be a well-organized, lucid explanation of what you're doing. In particular: clearly label all drawings and graphs. Identify any variables you use and, when appropriate, give their units. Don't pull formulas out of a hat (give a reference).
- Strike a balance between English sentences and mathematical equations: If your paper contains mathematical "chicken scratches" it will be almost impossible for a reader to follow what you have done.
- Make your paper presentable: Your paper need not be word-processed, but should be clean and neat. Don't scribble.
- Get an early start: many problems are challenging and require some experimentation. Starting a solution the night before it's due is a very bad idea.
- [_ HYPERSHIFT "http://www.mmsets.org/Problem%20sets/mmsetscoversheet.doc"](http://www.mmsets.org/Problem%20sets/mmsetscoversheet.doc)
Use our enclosed Cover Sheet, fill out and attach to your solution set.
- Students in grade 6-9 can submit solutions to both problem sets (6-9 and/or 9-12).

Deadlines

In general, the participants of the MMSETS will have at least one month for the submission of their solutions. The deadlines for the seven rounds are:

- Round 1 Due: October 4
- Round 2 due November 1
- Round 3 Due November 29
- Round 4 due January 4 (Wednesday)
- Round 5 January 31
- Round 6 February 28
- Round 7 March 28

These are the dates for postmarking the submissions; hence there is no need to utilize various special delivery services. We don't accept solutions submitted by e-mail.

The solutions submitted will be evaluated by a team of faculty members and graduate students. The scores will be sent to the students after each round. Except in cases of obvious oversights on our part, the scoring of the problems will be final. Appeals should be addressed to the coordinator of MMSETS.

MMSETS Cover Sheet 2005 - 06

Name:.....

Phone:

Address:

E-mail:

Grade:

School Name.....

School Address:.....

Math Teacher's Name:

Signature:

Date:

Remember, Complete this cover sheet and attach it to your solution set. Solutions should be postmarked by the due date for each problem set. They should be mailed to: MMSETS, P.O.BOX 496, Orono, ME 04473