2013 Mu Alpha Theta National Convention
Interschool Test Part A
Administration Instructions

Before the date of the contest

1. Familiarize yourself with the testing materials. You should have received:
   - Administration instructions (You're reading them.)
   - Answers to Frequently Asked Questions
   - A test (.docx & .pdf)
   - An answer sheet

2. Read these instructions (two pages), so that you can be prepared for everything you will need to do.

3. You may make as many copies as you need. If you print tests from the MS Word files that you were e-mailed, please double-check the copies to make sure that your version of Word interpreted the files correctly, especially the equations. In addition to a master copy of the answer sheet that your team captain controls, you may find it useful to have several working copies of the answer sheet for students to record answers as they work.

4. Please explain to potential competitors that most real-world problem-solving techniques are allowed on this contest. They are encouraged to do research using books or the Internet, as well as to apply technology such as calculators, spreadsheets, or computer programs to solve problems. The only restriction is that all collaboration should be within your school. Consulting with outside people, such as the local college professor or *Ask Dr. Math*® is not allowed.

5. Please explain to faculty and staff at your school that they are encouraged to participate in this contest. However, the answers turned in should be the work of the students at your school. If faculty or staff solve a problem, they should lead students to work in a similar direction rather than simply providing students with the answer or solution, so that students can learn the problem-solving techniques involved.

6. Please note that you may not show this test to any students before the test's start date, **Monday, April 22nd, 2013**. Additionally, you should avoid working on the problems yourself until that date.

7. If you have any questions about how to administer this test, please contact Tom Tosch: tomtosch@gmail.com.

8. To be considered for awards, a single answer sheet for your school must be scanned and e-mailed to Tom by 11:59:59 PM, Monday, April 29th, 2013.

During the contest

1. Distribute as many copies of the test and answer sheet as you like to your team. It is probably a good idea for your team captain to have master copies of both documents.

2. Encourage students to collectively brainstorm approaches to each problem. As days go by and students have more exposure to the problems and have tried various approaches, encourage students to revisit the collective brainstorming process.

3. Encourage students to look on the Internet and in reference books for problems similar to those on the contest.

4. Encourage students to model problems using calculators and/or spreadsheets.

5. Encourage students to double-check one another's work, and to explain their methods to one another. Many of the problems on this contest are involved enough that this process can catch subtle errors in students' approaches.

6. Remind students that partial credit can be earned on problems with multiple parts. On each problem consisting of multiple parts, a team's score will be $\left\lfloor 10\left(\frac{c}{t}\right)\right\rfloor$, where *c* is the number of parts the team gets correct, *t* is the total number of parts, and $\lfloor x \rfloor$ is the greatest integer less than or equal to *x*.

7. Remind students that answers should be complete, exact, and simplified unless otherwise specified.

At the end of the contest

1. Please double-check that your school name is legible on the answer sheet.

2. To be considered for awards, scan or electronically complete a single answer sheet and e-mail it to **tomtosch@gmail.com** by 11:59:59 PM, Monday, April 29th, 2013.

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Questions and Answers

Q: What is the format of the contest?
A: The contest consists of ten extended problems on which your team may collaborate for one week. Unlike many others, this contest relies on creativity, thoroughness, and focus more than memorization and speed.

Q: How is the contest scored?
A: Each problem will be worth 10 points. Many problems will consist of multiple parts, in which case the number of points received on a problem will be the appropriate fraction of the 10 possible points, rounded down to the nearest whole number.

Q: How many people may work on the test?
A: Any number of students from your school may work on the test. Collaboration is encouraged, as is outreach beyond students who typically attend math contests. Staff at your school may also participate in the process, though this should be in an advisory capacity (brainstorming, guiding, or double-checking student work). No *person* outside of the school should be consulted, but research in books or the Internet is encouraged.

Q: How long may we work on the test?
A: You may not open the test materials until **Monday, April 22nd, 2013**. Your completed answer sheet must be submitted by 11:59:59 PM on **Monday, April 29th, 2013**. Between those times, you may spend as much time as you like on the test. The more people that participate, and the more time they spend on the contest, the higher your school's score will likely be.

Q: Why do I have to administer the test during that particular week?
A: Having taken a test, students often discuss interesting problems with their peers via e-mail and electronic bulletin boards. If some schools test before others, it is our concern that schools that have not yet taken the test will be exposed to the test questions, which would alter their score and skew the results of the contest. To avoid this, we require that you administer the test during the specified week.

Q: What tools and materials can we use on the test?
A: Nearly anything goes! The solutions should be the work of the students at your school, so consulting with other teams or with outside experts (such as *Ask Doctor Math*® or local college staff) is not allowed. Using existing resources such as books or web sites is very much encouraged, as is applying technology such as calculators, spreadsheets, and computer programs.

Q: What strategies might students find useful on this contest?

A: This competition emphasizes many real-world problem-solving skills. Collectively brainstorming approaches to problems is probably the best way to determine possible routes to a solution. Collaborating with peers is a good way to learn the skills necessary to complete problems, as well as to double-check one another's work. Research into similar problems and creating your own simpler version of a problem are also great ways to figure out a productive method for solving a problem. Application of technology may allow students to more easily organize their work on a problem, test large numbers of possible solutions, or visualize a problem.

Q: What are "exact, complete, and simplified" answers?

A: "Exact" means that there are no approximations, which typically means that answers are left as fractions in terms of π, e, i, and radicals. "Complete" means that all correct answers are part of a student's answer; i.e. supplying one root of a quadratic would not be sufficient. "Simplified" includes things such as completely reducing all fractional quantities and expressing irrational quantities in simplest radical form, but there are sometimes answers with several comparably simple expressions. We do not consider answers such as $\frac{3}{\sqrt{2}}$ to be simplified, because it is inconvenient to have irrational numbers in the denominators of fractions when discussing or thinking about numeric quantities. We do not consider answers such as $2\left(1+\sqrt{2}\right)$ to be simplified, because an operation remains that can be performed exactly.

Q: Why don't I receive the answer key and solution guide with this contest?

A: We normally supply the answers and solutions for our contests with the testing materials. However, because you (the coach) may participate in the solution process for this contest, and because you do not need to grade your school's answers, you will receive the answers and solutions by e-mail as soon as the contest is over.

Q: What do I do if my students have a question about a problem?

A: If your students have a question about an interpretation of a problem that you are unable to answer, you can e-mail the question to **tomtosch@gmail.com**.

Q: Might there be alternate answers to some problems?

A: Yes. Because of the creative nature of some of the problems, it is quite possible that your students will think of something just as good as our answer, or even better. After you receive the answers and solutions, if you feel that your team's answer may deserve credit, just e-mail us explaining your rationale. Our graders will consider your team's answer and make a decision whether or not to give it credit.