

GEORGIA TECH HIGH SCHOOL MATHEMATICS COMPETITION **FORMAT AND RULES**

Divisions: The competition is intended for students enrolled in grades eight through twelve. Younger participants are welcome, but should be aware that the level of difficulty of the competition is intended for grades eight through twelve. The GT HSMC will be conducted with participants in two divisions, Junior Varsity (JV) and Varsity. Participants enrolled in grades 11 and 12 **must** compete in the Varsity division. All other participants may, at their option, compete in either division.

Multiple Choice Exam: The first portion of the competition is a 20-question multiple choice exam. Participants will be directed by their HSMC brochures to their appropriate competition rooms. Each question on the multiple choice exam will have five choices, and participants are to choose the **one** choice that best answers the question and bubble in their choice on the provided SCANTRON sheet. If more than one bubble is filled in, the answer will be counted as incorrect. Participants will be given 90 minutes to complete the multiple choice exam. Scores on the multiple choice exam will be determined by the number of correct answers. There is no penalty for incorrect answers. Participants will be provided with scratch paper as needed. Participants shall comply with all instructions given by the HSMC volunteers in black T-shirts. The designated Head Proctor will resolve any disputes. The Head Proctor will read the following rules prior to the start of the exam:

- a. The multiple choice exam will be scored by machine. You must use a No. 2 pencil for the SCANTRON form. If you do not have a No. 2 pencil, please raise your hand, and a volunteer will bring you one. If you need another pencil during the exam, raise your hand, and a volunteer will bring you one. Ensure that you fill in the bubbles as shown in the example, making your mark heavy and dark. If you erase, be sure to erase completely. Do not make stray marks on the SCANTRON form.
- b. Write your three-digit ID number, found on your HSMC wristband, in the first three boxes in the portion labeled "Student ID Number" at the top of the SCANTRON sheet. Fill in the corresponding bubbles below your ID number.
- c. Write your division ("Varsity" or "JV") on the line labeled "SUBJECT" on the SCANTRON form.
- d. No calculators or notes are allowed on this exam. Place all materials other than the exam booklet, your scratch paper (provided by the HSMC), and your pencils on the floor under your seat.
- e. You must complete this exam individually. No cheating will be tolerated. You are to comply with all instructions that the Head Proctor and other Proctors give throughout the exam.
- f. If you have a question, raise your hand and a volunteer will assist you.

Challenging a question: Participants may challenge a question on the multiple choice exam if they believe it contains an error. A participant wishing to do so shall speak with a volunteer at the information desk after the answers to the multiple choice exam have been posted. Challenges will be lodged in writing and will be decided by the HSMC judges.

Semifinalists: Scores on the multiple choice exam will determine the semi-finalists invited to take the Proof-based Exam in the afternoon to compete for scholarships to Georgia Tech. The list of semi-finalists will be posted during the lunch period at approximately 1230.

Ciphering Exam: The second portion of the competition will be a 10-question ciphering exam. For this portion, participants will again work individually. Ciphering scores will determine individual ciphering awards as well as team scores. Participants will be directed by their HSMC brochures to their appropriate competition rooms. The Head Proctor will read the following rules prior to the start of the ciphering exam:

- a. The ciphering exam will be scored by hand. However, on the back of each ciphering form will be a SCANTRON-type grid for you to write your participant ID number (found on your HSMC wristband) in and then circle the corresponding digits. Any question not having a clearly indicated ID number may not be graded.
- b. No calculators or notes are allowed on this exam. Place all materials other than your pencils, scratch paper (provided by the HSMC), and the problem currently being solved on the floor under your seat.
- c. You must complete this exam individually. No cheating will be tolerated. You are to comply with all instructions that the Head Proctor and Runners give throughout the exam.
- d. If you have a question, raise your hand and a runner will assist you.
- e. Your score on the exam will be based on the number of questions you answer correctly and the amount of time it takes you to solve each problem. Problems solved correctly in the first two minutes will receive five points. Problems solved correctly between the calling of two minutes and three minutes will receive three points.
- f. For each of the 10 questions, the runners will distribute the question to you face down. Immediately place your ID number on the form as instructed before. Do not write anything in the score box, as the graders will use this area. After everyone has received a copy of the problem and had a moment to fill in their ID number, the Head Proctor will project the problem and read it aloud. After reading it aloud, he/she will say "You may begin" and start the timer. At this time and not before, turn over the problem and begin work. The Head Proctor will call out when one minute and fifty seconds have elapsed as your warning to be prepared to hand in the problem if you are able to solve it before two minutes elapse. He/she will call out when two minutes have elapsed, and you must either have your problem sheet in the air at this point or immediately raise it into the air for the runners to collect. Any problem sheets not raised prior to or immediately upon the call of two minutes will be collected after all those that were.
- g. The Head Proctor will inform you when two minutes 50 seconds have elapsed and then instruct you to stop when three minutes have elapsed. At this time, you must put down your pencil and raise your problem sheet in the air for a runner to collect.
- h. You must write your final answer in the designated area on the problem sheet. This is the only portion of your work on the problem that will be scored.
- i. After all problem sheets have been collected, the Head Proctor will project the answer to the problem and read it aloud while the runners hand out the next problem.
- j. You may speak to other participants between problems, but everyone must remain silent once a problem is projected until you are informed to stop work on that problem. The Head Proctor will disqualify any participant who disrupts the competition. This disqualification will be for the ENTIRE competition, nullifying your result on the multiple choice exam and preventing you from participating in the proof-based exam.

Tie-breaker procedures: In the event of a tie score for places receiving trophies, a tie-breaker will be held at the beginning of the awards ceremony. The tie-breaker will consist of up to five questions. The first three questions will be administered in the same form as the regular portion of the ciphering competition, with five points awarded for correct answers submitted in the first two minutes and three points awarded for correct answers submitted in the last of the three minutes allotted. Any ties that cannot be broken based on the totals earned by tie-breaker participants on these three questions will be broken through up to two additional questions. For the fourth question, participants will be given up to three minutes. Participants shall turn in their solution as soon as they complete work on the problem. If no participant answers correctly, a final question will be used. If more than one participant answers correctly, participants will be ranked in the order in which they submitted their solutions. The fifth question will be conducted in the same manner as the fourth. If ties remain after the fifth and final question, they will remain unbroken.

Challenging a question: Participants may challenge a question on the ciphering exam if they believe it contains an error. A participant wishing to do so shall speak with the Head Proctor after **all** ciphering questions have been completed. Challenges will be lodged in writing and will be decided by the HSMC judges. For ciphering tie-breakers, challenges may be lodged orally with the head proctor after the third question (but not before), after the fourth question, and after the fifth question.

Proof-based exam: The final portion of the competition will be a five-question proof-based exam. Two hours are allowed for the proof-based exam. Only participants designated as semi-finalists (as determined by the judges based on scores on the multiple choice exam) will compete in the proof-based exam. The list of semi-finalists will be posted by 1230. Scores on the proof-based exam will determine the winners of the HSMC. All participants will take the proof-based exam in room 103 of the Instructional Center. The Head Proctor will read the following rules prior to the start of the proof-based exam:

- a. The proof-based exam consists of five problems. Please ensure that the test envelope in front of you is for the correct division and write your three-digit ID number, found on your HSMC wristband, on the sheet on the envelope. There is also a spot on each problem folder inside the envelope for you to write your ID number. Do so immediately upon opening the envelope.
- b. No calculators or notes are allowed on this exam. Place all materials other than the exam envelope, your scratch paper (provided by the HSMC), and your pencils on the floor under your seat.
- c. You must complete this exam individually. No cheating will be tolerated. You are to comply with all instructions that the proctors give throughout the exam.
- d. If you have a question, raise your hand and a proctor will assist you.
- e. The Proof-Based Exam will be graded by an experienced group of faculty and teaching assistants. Be sure to write neatly when writing your solutions. Do not include scratch work with your solution. Place only your final solution and its explanation/proof on the problem folder. If you need additional space, include a separate sheet of paper inside your problem folder, labeling it with your ID number, the division, and the problem number. Indicate page numbers as appropriate.

Scores on the proof-based exam will be determined on the basis of all five questions with all questions equally weighted. In the event of a tie, elegance of proof and scores on the multiple choice exam will be used by the judges to break ties.

Challenging a question: Participants may challenge a question on the proof-based exam if they believe it contains an error. A participant wishing to do so shall speak with the Head Proctor after the proof-based exam is completed. Challenges will be lodged in writing and will be decided by the HSMC judges.

Team scores: A team shall consist of four or more students from the same school competing in the same division. A team's score shall be the sum of 60% of the sum of the top four scores by team members on the multiple choice exam and 40% of the sum of the top four scores by team members on the ciphering exam. (The team members contributing to the multiple choice portion of the score need not be the same as those contributing to the ciphering portion of the score.) Ties shall be broken utilizing the following methodology:

- a. The team having the greater team score on the multiple choice exam shall be ranked higher.
- b. The sum of 60% of the score of team's highest-scoring individual on the multiple choice exam and 40% of the score of the team's highest-scoring individual on the ciphering exam shall be computed for each tied team. The team with the higher sum shall be ranked higher. If this sum is the same, the comparison shall continue for the second-, third-, and fourth-highest scores in the same manner.
- c. Teams shall each designate one representative to participate in a ciphering tie-breaker as described under the ciphering rules above.

If a tie cannot be broken using the above criteria, it shall remain unbroken.