

MAA American Mathematics Competitions

# 2017 AMC 10/12 TEACHER'S MANUAL

A guide for administering a successful and rewarding AMC 10/12 Competition



**COMPETITION DATES: TUESDAY, FEBRUARY 7, 2017  
AND/OR WEDNESDAY, FEBRUARY 15, 2017**



**MAA AMC**  
*American Mathematics Competitions*

Mathematical Association of America  
PO Box 471 Annapolis Junction, MD 20701

800-527-3690 • [amc.maa.org](http://amc.maa.org)

## WELCOME TO THE COMPETITION THE 18TH AMC 10 - AND - THE 68TH AMC 12

### What is the AMC Program?

The Mathematical Association of America's American Mathematics Competitions program leads the nation in strengthening the mathematical capabilities of the next generation of problem-solvers. Through classroom resources and friendly competition, the MAA AMC program helps America's educators identify talent and foster a love of mathematics. The MAA AMC program positively impacts the analytical skills needed for future careers in an innovative society.

The American Mathematics Competitions are a series of examinations and curriculum materials that build problem-solving skills and mathematical knowledge in middle and high school students.

### What is the AMC 10/12?

Geared towards high school students, the AMC 10 and AMC 12 are 25-question, 75-minute, multiple choice examinations in high school mathematics designed to promote the development and enhancement of problem-solving skills.

### When is the AMC 10/12?

This A version of this examination is administered around the country on Tuesday, February 7, 2017 and the B version of the examination is Wednesday, February 15, 2017.

### AMC 10/12 A and B Dates:

There are four different exams offered: AMC 10A, AMC 12A, AMC 10B, and AMC 12B. There are some overlapping questions on the AMC 10 and AMC 12, so if a school is offering both competitions on a given day, they must be given at the same time. For this same reason, a student may only take one examination per exam date. If they meet the age and grade requirements, students are permitted to take both an A version of an exam and a B version of either exam. For example, students can take the AMC 10A and AMC 12B, or the AMC 10A and AMC 10B, but may not take the AMC 10A and AMC 12A. Your school can register for all four competitions if they choose, which can be helpful for providing an alternate date for students.

### Why host the AMC 10/12?

- The AMC 10/12 provides an opportunity for high school students to develop positive attitudes towards analytical thinking and mathematics that can assist in future careers by applying classroom learned skills to unique problem-solving challenges in a low-stress and friendly environment.
- College admissions offices love to see problem-solving skills on applications. Help your students use their AMC score for college application qualifications.
- 1 million additional STEM graduates will be needed by 2022 to fill the demands of the labor market. The AMC 10/12 can help your students identify an interest in and prepare for STEM careers that will challenge and fulfill them.
- The AMC 10/12 is the first in a series of competitions that lead all the way to the International Mathematical Olympiad. Your students with top scores on the AMC 10 or 12, may be invited to take the American Invitational Mathematics Exam (AIME). High achievers on the AIME are invited to participate in the USA Mathematical Olympiad. This series of exams comprise the longest running and most prestigious high school mathematics competitions in the country.

25-question, 75-minute, multiple choice examinations

---

**1 MILLION ADDITIONAL  
STEM GRADUATES  
WILL BE NEEDED BY 2022  
TO FILL THE DEMANDS  
OF THE LABOR MARKET.**

---

# Pre-Exam Preparation

## How do you prepare students for the AMC 10/12?

Discuss questions and solutions from previous AMC 10/12 competitions so that students will know what type of questions to expect when they take the AMC 10/12 on February 7, 2017 and/or February 15, 2017.

## Who is eligible to participate in the AMC 10/12?

Students with a passion for problem-solving who are students in grade 10 or below and under 17.5 years of age on the day of the competition are eligible to participate in the AMC 10. Students in grade 12 or below and under 19.5 years of age on the day of the competition are eligible to participate in the AMC 12.

## Benefits for Teachers

The Mathematical Association of America provides classroom [prep materials](#) to educators free of charge. Registering as a competition manager gives you a membership to the MAA as a [K-12 Teacher member](#). Explore the [benefits](#) for you and your classroom:

- The [MAA Curriculum Inspirations project](#) provides free video and print materials, based on past AMC questions to help teachers and students develop high-level mathematical skills. All Curriculum Inspirations videos and materials are cross-referenced to the Common Core State Standards in Mathematics and designed to capture your students' interest in creative problem-solving while complementing your Common Core-based lesson plans.
- Throughout the year competition managers receive MAA Math Messenger, a monthly email with AMC updates, sample problems, mathematics news and the latest classroom resources.
- Competition managers receive a complimentary subscription to MAA Math Horizons, a digital magazine that brings you articles, problems, competitions, REU profiles, career ideas, and book reviews each quarter.
- Competition managers receive a complimentary subscription to MAA FOCUS, a digital news magazine full of ideas in mathematics and mathematics education every other month.
- Enroll your students in [AMC Advantage](#), an on-demand, self-paced online prep course for students of all levels. AMC Advantage offers skill-building problem sets on key AMC topics as well as full-length mock exams and their solutions.

## Administering the AMC 10/12 - What You Need To Know

Use these checklists to host a successful competition.

### Pre-exam checklist for AMC 8:

- Complete and collect the answer forms for redistribution on the competition date.
- Please review all answer forms to ensure that they have been marked correctly!
- **Students must use their full legal name, no nicknames or abbreviations. It is important for students to pay special attention to marking their name and address accurately.** Remind them that student names listed on the AMC website come from this form and this is how they are identified and invited for any invitational competitions. **The AMC program office will not edit any of the information provided on the answer form once submitted.**
- Ensure that students complete the non-answer sections on both sides of the answer form. Failure to do so will forfeit their results and could cause delays in scoring. The most common errors are when students fill in more than one circle in a column or do not completely fill in the circles. View correct examples on [the AMC 10/12 information page](#).
- Reserve a quiet room for at least 1 hour and 45 minutes on the day of the competition, to allow time for pre- and post-examination activities.
- Review the rules that are included with the AMC 10/12 printed test bundles.
- **Tips for first-time participants:** Encourage participation by students who have not taken these competitions before. Help them prepare and make sure they know what to expect. For new students, getting even a few questions correct is an accomplishment. Make sure they set appropriate goals for themselves, so that the competition is a positive experience for every student.
- The day before the competition, remind students of the time and place of the AMC 10/12.
- Make arrangements to mail the AMC 10/12 Report Envelopes with mail service that offers tracking.
- Obtain a supply of #2 pencils with good erasers, and unmarked scratch paper. Inform students that no aids are permitted other than scratch paper, graph paper, rulers, protractors, and erasers. **NO CALCULATORS OR ELECTRONIC DEVICES OF ANY KIND ARE ALLOWED.** No AMC 10/12 questions require the use of a calculator.

# Competition Day

## Administering the AMC 10/12 - What You Need To Know

Use these checklists to host a successful competition.

### Before the exam

**Note to teachers:** Do not open the test bundles until just before you are ready to hand the exams to the students.

**The competition test bundles must be opened only an hour before the competition will begin, no earlier.**

- Seat students so they are separated by an empty space, if possible.
- Hand out the previously completed answer forms and provide a #2 lead pencil with a good eraser for each student.
- Open the test bundles, hand out the AMC 10/12 booklet and inform the students that they are not to open the competition booklet until instructed to do so.
- Instruct students to read the entire front cover of the AMC 10/12 exam. Allow 3 minutes for students to review the front cover. Remind students that six points are given for a correct answer, 0 points for an incorrect answer and 1.5 points for an answer left blank. Students should consider this scoring system as they decide whether or not to guess on a question; if they can narrow down their answer choices to three or less, it is probably advantageous to guess, if not, they might want to skip the question altogether.
- Tell your students to be AS CERTAIN AS POSSIBLE OF THEIR ANSWERS BEFORE THEY MARK THE FORM. Forms that contain stray marks may not be read correctly by the scanner that scores the competition. Tell your students to take special care to mark the answer in the row that corresponds to the correct problem number.
- Ask if there are any questions about examination procedures. Inform students that talking or asking questions during the competition is not allowed. They must do their own work.
- When it is time to begin, tell students to unfold the competition booklet to see all the problems and to be careful to match their answers to the corresponding question. Remind students that there are 25 problems and that they have 75 minutes to complete the competition. Then tell them to BEGIN.

### During the exam

**Note to teachers:** The competition should be proctored continuously as you would for any important exam. The proctor must warn any students whose eyes wander and disqualify any students caught copying answers or collaborating. Try to provide as quiet an environment as possible. Be sure that no student has access to a calculator or calculating device during the competition.

- Announce when there are 30 minutes left and when there are 5 minutes left.
- When time is up at 75 minutes, tell the students to STOP and have them sign their name in the space provided on the student answer form. Collect the answer forms and exams as quickly as possible.
- Collect all the students' competition booklets following the administration of the competitions. As the answer forms are handed in, check that each student's name is correct on the form and that it is bubbled in completely.
- Inform the students that the competition and solutions **may not be discussed with anyone** outside of the room either orally or digitally, i.e. email, internet, or social media of any type until after the competition period is over (24 hours after the official competition date). The competition booklets must be collected from the students directly after the competition, but they may be returned 24 hours after the competition period is over.



# Competition Day

## Administering the AMC 10/12 - What You Need To Know

Use these checklists to host a successful competition.

### After the exam

- **Please do not grade the answer forms.** Send them to the AMC for grading.
- Check student answer forms for complete personal information (legal name, DOB, gender, etc.).
- Arrange the forms by section with each form facing the same direction with the same side up. REMOVE ALL PAPER CLIPS, RUBBER BANDS OR NOTE PAPER ATTACHED TO ANY ANSWER FORMS. PLEASE FAN THE FORMS TO SEPARATE ANY THAT MIGHT BE STUCK TOGETHER.
- Place no more than 200 forms in one report envelope.
- Do not return blank forms or teacher “practice” forms.
- Place the School ID Form on top of the answer forms and insert in the report envelope.
- Complete the [Certification Form](#) and ask your Principal or person with comparable title to sign the [Certification Form](#) and complete the rest of the form.
- Place the [Certification Form](#) in the AMC 10/12 report envelope with the answer forms, seal the envelope and **send it by a trackable mail service within 24 hours** or as soon as possible after all examinations have been administered.
- Indicate the number of packages you are returning in the space provided on the Report Envelope.
- Affix adequate postage to the AMC 10/12 report envelope.
- **Note to teachers:** The AMC 10/12 student answer forms sent to the AMC office in Annapolis Junction, MD for grading will not be returned.
- After you have delivered all of the answer forms to the school office to be mailed, you may discuss the competition and solutions with your students. Remember that there will be schools taking the competition in other locations at different times. Hence, it is important that no one discuss problems and solutions in any online or public forum.

### AMC Toolkit:

#### Results and Resources for Competition Managers:

The AMC office will send results in a digital report by email as soon as the answer forms are scored. If you have not received your results via email from the AMC program within 30 days after the AMC 10/12 is administered, please contact [amcinfo@maa.org](mailto:amcinfo@maa.org) to verify that your answer forms were in fact received.

Please retain this digital report for future reference, either in your files or with the student counselor's office. Many students cite these scores on applications to college and beyond. AMC cannot look up individual student scores after the competition cycle has been completed.

#### What's New with AMC Results in 2016-2017?

- In an effort to give AMC competition managers access to results faster than ever, scores will be emailed to competition managers as a part of a digital toolkit.
- The AMC Toolkit: Results and Resources for Competition Managers will be emailed to competition managers. Please add [amcinfo@maa.org](mailto:amcinfo@maa.org) to your list of approved email contacts so that you receive important emails.
- Use this digital toolkit to access your students' results and find resources for problem-solving classroom lessons.
- The AMC Toolkit: Results and Resources for Competition Managers is not just a listing of scores. It's also a valuable resource for your classroom!
  - Check out MAA's [Top Ten Problem-Solving Strategies](#). These videos and essays bring excitement to mathematics learning and thinking.

---

**THE AMC OFFICE WILL SEND RESULTS  
IN A DIGITAL REPORT BY EMAIL AS SOON AS  
THE ANSWER FORMS  
ARE SCORED.**

---

# Invitational Competitions

## American Invitational Mathematics Examination

The American Invitational Mathematics Examination (AIME) is an invitational exam for the top performers on the AMC 10/12 A and B versions. It is an honor to be invited to take the exam, which can lead all the way up to being invited to the US International Mathematical Olympiad team. The main date of this exam (the AIME I) is March 7, 2017, with an alternate date (AIME II) of March 22, 2017. Unlike the A and B versions of the exam, students can only take one AIME exam. Please ensure that you are able to proctor one of these days in the event that a student qualifies for the exam.

**AIME Qualification:** Qualification parameters vary with the results of the AMC 10/12 competitions. For each AMC 10, at least the top 2.5% of all scorers are invited, and for each AMC 12, at least the top 5% of all scorers are invited. The reason for this difference is to include the top younger students, while making sure that the AIME is an appropriate experience for all invited. A cut-off score will be announced for each exam (10A, 10B, 12A, and 12B) based on the distribution of scores to include these students. **Note that this is a change from previous years in which a minimum cutoff was announced at the outset of the competition cycle. There is no preset cutoff score for the 2017 AIME.**

**AIME Preparation:** The AIME has a different format than the AMC 10/12: the exam is 3 hours instead of 75 minutes, all answers are 3-digit integers instead of multiple choice, and there are 15 problems instead of 25. If you have students who are first-time AIME qualifiers, make sure to show them the MAA's AMC [resource page](#) so that they can familiarize themselves with the types of problem on the AIME examination.

**AIME Administration:** Materials to host the AIME on March 7 or 22, 2017 are included with your AMC 10/12 examination materials in case your students' scores qualify them for AIME participation. Please do not discard the AIME materials, even if your school has not had any AIME qualifiers in the past. For either exam date, the competition problems will be emailed to competition managers rather than mailed like the AMC 10/12. For more details about how to administer the AIME I or II, please read the [Invitational Competitions Teacher's Manual](#).

---

**The AIME I is March 7, 2017,**  
with an alternate date (AIME II) of March 22, 2017

---

**AIME Location:** Students are to take the AIME at the same testing location where they took the AMC 10/12 whenever possible. This is to ensure that a student's AMC 10/12 score can be accurately matched with their AIME score for USA Mathematical Olympiad USA(J)MO qualification. In the event that a student absolutely cannot take the AIME at the same competition location, they are to make arrangements with a different competition manager who has the materials to proctor the exam and complete the "[Change of Venue](#)" form. Students seeking a new venue for AIME participation should reach out to schools nearby, using the [Additional Contest Locations](#) tool to look up AMC hosts.

## United States of America Mathematical Olympiad and Junior Mathematical Olympiad

The United States of America Mathematical Olympiad (USAMO) and Junior Mathematical Olympiad (USAJMO) are each two-day, nine-hour, proof-based examinations. Those who took the AMC 12 and AIME are eligible for the USAMO and those who took the AMC 10 and AIME are eligible for the USAJMO. Each year approximately 500 students are chosen for the two Olympiads based on a combination of AIME results and AMC 10/12 results. For more information about exam qualification and administration details, please read our [Invitational Competitions Teacher's Manual](#).

---

Materials to host the AIME on March 7 or 22, 2017 **ARE INCLUDED WITH YOUR AMC 10/12 EXAMINATION MATERIALS IN CASE YOUR STUDENTS' SCORES qualify them for AIME participation. PLEASE DO NOT DISCARD THE AIME MATERIALS, even if your school has not had any AIME qualifiers in the past.** For either exam date, the competition problems will be emailed to competition managers rather than mailed like the AMC 10/12.

---

# AMC Policies

**Policy for Changes:** The Committee on AMC may, from time to time, change the program rules, regulations, awards and conditions of participation in whole or in part. Whenever possible competition managers will be notified of these changes ahead of time.

**Early administration** is NEVER permitted and will lead to a disqualification of the results. Such an administration would jeopardize the validity of all scores from other schools.

**Official administration:** The only official day for the AMC 10/12A is February 7, 2017 and the only official day for AMC10/12B is February 15, 2017. Only official participants are eligible for participation in the AIME. Please note that if you are taking the exam in a time zone outside of the continental US, that the exam must start after 9AM EST on the official competition day.

**Unofficial administration:** The exam can be offered unofficially after the official administration timeframe has ended. Answer sheets will be scored but results will be considered unofficial and will not count towards AIME qualification. The last day for unofficial AMC 10/12 administration is February 27, 2017. Be sure to mark the exceptions box at the bottom of the [certification form](#) as indicated when submitting answer sheets.

## **Competition Proctoring**

- The proctoring of any AMC 10/12 should be by a teacher (preferably a mathematics teacher) or administrator at the school; a college or university teacher of mathematics, or a responsible adult who is a math club or team coach, and not related to any of the participants. Even if you are a teacher, administrator, or math coach at the school, you may not be a proctor if you are related to any of the students taking the exam.
- The proctoring of the competition must take place in a public building, (i.e., school library, college or university, church, etc.).
- All students must take the competition at the same time, either in one group or in separate classrooms and be under the supervision of a proctor.
- The proctor should not be related to any of the participants. Under no circumstances may a parent proctor for their child.

**Students with Accommodation Plans (e.g., for Visual or Learning Disabilities):** The AMC 10/12 time limit for students who are visually impaired or have a learning disability is 2 hours. A teacher or a school administrator may read the questions to the student and mark the answers as directed by the student. Braille and large print exams must be ordered no later than three weeks prior to the exam date. It is the responsibility of the school and the competition manager to make arrangements consistent with the student's accommodation plan. Please contact AMC at [amcinfo@maa.org](mailto:amcinfo@maa.org) for more information.

**Questionable Scores:** If it is clear to the competition manager from personal observation that a student has cheated, then the competition manager must disqualify the student. If the competition manager receives an accusation or obtains indirect evidence of cheating, then the manager must hold back the student's paper and immediately report all the facts of the situation to the AMC Director, who in conjunction with the Committee on AMC, will determine what to do. UNDER NO CIRCUMSTANCES may the school decide on its own to accept a questionable score.

**Refund/Credit Policy:** If your school is unable to take the competition, please use the materials as practice sets for preparation for next year or as supplemental classroom materials. Do not return the exam materials. WE CANNOT GIVE REFUNDS OR CREDITS AFTER THE COMPETITION MATERIALS ARE SHIPPED.

---

**GOOD LUCK TO YOUR STUDENTS  
ON THE MAA AMC 10/12!**  
We hope they find the competition  
challenging and exciting and  
**LEADS TO A FUTURE  
in analytical thinking**

---