

MAA American Mathematics Competitions

AMC 10 & AMC 12 TEACHER'S MANUAL

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



AMC 10/12 A: THURSDAY, JANUARY 30, 2020

AMC 10/12 B: WEDNESDAY, FEBRUARY 5, 2020



MAA AMC
American Mathematics Competitions

Mathematical Association of America
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WELCOME TO THE COMPETITION THE 21ST AMC 10 AND THE 71ST AMC 12

What is the MAA 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 MAA American Mathematics Competitions are a series of examinations and accompanying curriculum materials that develop problem-solving skills and mathematical knowledge in middle and high school students.

What are the AMC 10 and AMC 12?

The AMC 10 and AMC 12 are school-based, 25-question, 75-minute, multiple choice competitions in high school mathematics designed to develop students' problem-solving skills and interest in mathematics.

When are the AMC 10 and AMC 12?

The A version of each competition is administered around the country on Thursday, January 30, 2020, and the B version of each competition is administered on Wednesday, February 5, 2020.

AMC 10 and AMC 12, A and B Dates:

There are two versions of each competition offered: An AMC 10 A and 10 B and an AMC 12 A and 12 B. There are some overlapping questions on the AMC 10 and AMC 12, so if an institution offers both competitions on the scheduled day, they must be given at the same time. Additionally, a participant may only take one competition per competition date. Participants are permitted to take the A version of any competition and the B version of any competition, if they meet the age and grade requirements. For example, a participant can take the AMC 10 A and AMC 12 B, or the AMC 10 A and AMC 10 B. However, that participant may not take the AMC 10 A and AMC 12 A. Your institution can register for all four competitions, which can be helpful for providing an alternative date for participants.

Why Host the AMC 10 and AMC 12?

- The AMC 10 and AMC 12 help high school students develop positive attitudes towards analytical thinking, a skill that is highly valued by universities and employers. The AMC 10 and AMC 12 connect classroom skills to unique problem-solving challenges in a fun and engaging manner.
- College admissions offices love to see evidence of problem-solving skills in their applicants. The AMC competitions provide students with an opportunity to demonstrate these skills in a low-stress, friendly environment.
- Over 1 million additional STEM graduates will be needed by 2022 to meet the growing demands of the labor market. The AMC 10 and AMC 12 can help your students identify an interest in and prepare them for future STEM careers.
- The AMC 10 and AMC 12 are the first in a series of competitions that lead all the way to the International Mathematical Olympiad. Participants with top scores on the AMC 10 or AMC 12 may be invited to take the American Invitational Mathematics Examination (AIME). High scorers on the AIME will be invited to participate in the USA Mathematical Olympiad.

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Pre-Competition Preparation

How do you prepare students?

The best way to prepare students for the MAA American Mathematics Competitions is to practice creative, analytical thinking throughout the year. Institutions involved with the MAA AMC often have year-round activities connected to special classes, math clubs, or other extracurricular groups. Individual students can benefit greatly from practicing math problems from past MAA AMC competitions. The MAA AMC offers a [variety of resources](#) designed to improve the problem-solving skills of students.

Who is eligible to participate?

Students with a passion for problem-solving who are 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

Teachers and competition managers who register their institution for the AMC 10 or AMC 12 receive a complimentary [K-12 Teacher Membership](#) to the Mathematical Association of America. The membership benefits for you and your classroom include:

- Access to the [MAA Curriculum Inspirations project](#), which provides free video and print materials, based on past AMC questions, designed to help educators teach students creative problem-solving 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 mathematics.
- Digital resources sent to your inbox throughout the year. These include MAA AMC program updates, practice problems, classroom tips and the latest math news.
- A subscription to Math Horizons, a quarterly digital magazine with articles, problems, contests, student research profiles, career ideas, and book reviews.
- A subscription to MAA FOCUS, a bi-monthly digital newsmagazine full of ideas about mathematics and the mathematics community.

Checklist for AMC 10 and AMC 12:

- Have participants carefully pre-fill all name and demographic information on their answer sheet prior to the competition day. The most common errors are filling in more than one circle in a column, not completely filling in the circles, or failing to use a #2 pencil. Participants must use their full legal name, no nicknames or abbreviations. Failure to do so could disqualify their results or cause delays in scoring. **The MAA AMC program office will not edit the information provided on the answer sheets.**
- Reserve a quiet room for at least 1 hour and 45 minutes on the days of the competitions to allow time for pre- and post-competition activities.
- Review the rules on the AMC 10 and AMC 12 Competition Certification Form that is included with the AMC 10 and AMC 12 competition materials.
- The day before the competition, remind participants of the time and location of the AMC 10 and AMC 12.
- Obtain a supply of #2 pencils and unmarked scratch paper. Inform participants that no aids are permitted other than scratch paper, graph paper, rulers, protractors, and erasers. **Calculators and electronic devices of any kind are not allowed.** The AMC 10 and AMC 12 questions do not require the use of a calculator.

Guidelines for Administering the Competition

- The competition is administered by a competition manager. This person must be a teacher, faculty member, or administrator affiliated with the institution. They must be an adult who is not related to any of the participants. Under no circumstances may a parent be involved in the administration of the competition.
- The competition must take place at the school or educational institution that has registered for the competition.
- All participants must take the competition at the same time, either in one group or in separate classrooms. Each group of participants must be under the supervision of a competition manager or an adult who fully understands the responsibilities and is not related to any of the students participating in the competition.

Competition Day

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.
- Make sure they set appropriate goals for themselves so that the competition is a positive experience. Even getting a few questions correct is an accomplishment.
- Set aside post-competition class time for discussion of solutions, and inform participants that they will get the chance to discuss the problems during the following week.

Before the Competition

Do not open the bundles until one hour before the start of the competition.

- Seat participants so they are separated by an empty space, if possible.
- Hand out the answer sheets with the participants' pre-filled name and demographic information and provide a #2 pencil with a good eraser to each.
- Open the bundles, hand out the AMC 10 or AMC 12 competition booklets and inform participants that they are not to open the competition booklet containing the problems until instructed to do so.
- Instruct participants to read the entire front cover of the AMC 10 or AMC 12 competition booklet. Allow 3 minutes for participants to review the front cover.
- Tell the participants to be as certain as possible of their answers before they mark the answer sheet. Sheets that contain stray marks may not be read correctly by the scanner that scores the competitions.
- Ask if there are any questions about the competition procedures. Inform participants that talking or asking questions during the competition is not allowed. They must do their own work.
- When it is time to begin, tell the participants to open the competition booklet. Remind them to be careful to match their answers to the corresponding problem.
- Remind participants that there are 25 problems and that they have 75 minutes to complete the competition. Then tell them to **begin**.

During the Competition

- Provide as quiet an environment as possible.
- Participants must be continuously monitored by the competition manager.
- Be sure that no participants has access to any electronic devices, including calculators, cellphones and smart watches.
- Warn any participants whose eyes wander, and disqualify any who are clearly copying answers or collaborating.
- Make an announcement when there are 15 minutes left and again when there are 5 minutes left.
- When time is up after 75 minutes, tell the participants to **stop** and have them sign their name in the space provided at the top of the answer sheet. Collect the answer sheets and competition booklets as quickly as possible.
- Inform the participants that the problems and solutions may not be discussed with anyone outside of the room either orally or digitally (e.g. email, online, and social media of any type) until 24 hours have passed from the official competition date. The competition booklets may be returned 24 hours after the competition period is over.



Competition Day

After the Competition

- **Please do not score the answer sheets.** Send them to the MAA AMC for scoring.
- Check each participants' answer sheets for complete and correct name and demographic information.
- Arrange the answer sheets by section (if applicable) and organize them so that each sheet faces the same direction with the same side up. Remove all paper clips, rubber bands, and scratch paper attached to answer sheets. Make sure that no two sheets are stuck together.
- Place no more than 200 sheets in one return envelope.
- Do not return blank sheets or sheets you do not wish to be scored.
- Complete the [Competition Certification Form](#), and ask your principal or person with comparable title to sign it and complete their section of the form.
- Place the School ID Form on top of the answer sheets and insert them into the return envelope. Place the [Competition Certification Form](#) in the return envelope for the AMC 10 and AMC 12 with the answer sheets and seal the envelope. Return the return envelope to the MAA AMC office the day after competition administration. Use an overnight or 2-day shipping service, with a tracking number, to guarantee timely arrival of these materials. FedEx, UPS, or USPS Overnight are strongly recommended. The MAA AMC is not responsible for lost or delayed answer sheets.
- **February 7, 2020** is the last day that AMC 10 A and AMC 12 A answer sheets will be accepted by the MAA AMC office for scoring. **February 14, 2020** is the last day that AMC 10 B and AMC 12 B answer sheets will be accepted by the MAA AMC office for scoring.
- AMC 10 and AMC 12 answer sheets submitted for scoring will not be returned to your institution.
- Indicate the total number of return envelopes you are shipping to the MAA AMC office in the space provided.
- After you have mailed all of your return envelopes, you may discuss the problems and solutions with your students. Remember that there will be institutions taking the competition in other locations at different times. It is important that no one discusses the problems and solutions in any online or public forum.

AMC Toolkit:

Results and Resources for Competition Managers

Score reports will be emailed to competition managers as part of the *AMC Toolkit: Results and Resources for Competition Managers* as soon as the answer sheets are scored. If you do not receive your results via email from the MAA AMC program within 30 days of administering the AMC 10 and AMC 12, please contact amcinfo@maa.org to verify that your answer sheets were received.

Please retain the digital score report for future reference. Many students cite these scores on applications to college and other programs. The MAA AMC cannot look up individual participant scores after the competition cycle has been completed.

The *AMC Toolkit* is also a valuable resource for your classroom. You can use it to:

- Access your students' results.
- Find resources for problem-solving lessons.
- Explore [MAA's Top Ten Problem-Solving Strategies](#) to find videos and essays that bring excitement to mathematics learning and thinking.
- Download and print fillable PDF certificates to recognize student participation and high scores on the AMC 10 and AMC 12.

Please add amcinfo@maa.org to your list of approved email contacts so that you receive important emails.

**SCORE REPORTS WILL BE EMAILED TO
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ARE SCORED**

Invitational Competitions

American Invitational Mathematics Examination

The American Invitational Mathematics Examination (AIME) is an invitational competition for the top performers of the AMC 10 and AMC 12. It is an honor to be invited to take the AIME, which can lead to being selected to the US International Mathematical Olympiad team. The main date for this competition (AIME I) is March 11, 2020, with an alternative (AIME II) date on March 19, 2020. Unlike with the A and B versions of the AMC 10 and AMC 12, students can only take one AIME competition. If they take both, they will be disqualified. Please ensure that you are able to administer one of these days in the event that a student qualifies for the AIME.

AIME Qualification: Qualification parameters depend on the results of the AMC 10 and AMC 12 competitions. For the AMC 10, at least the top 2.5% of all scorers on each version are invited, and for the AMC 12, at least the top 5% of all scorers on each version are invited. A cut off score will be announced for each competition based on the distribution of scores.

AIME Preparation: The AIME has a different format than the AMC 10 and AMC 12. The AIME 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, show them the MAA [AMC resource page](#) so that they can familiarize themselves with the types of problems on the AIME.

AIME Administration: The materials for administering the AIME on March 11 or 19, 2020 are included in your AMC 10 and AMC 12 materials. Please do not discard the AIME materials, even if your institution has not had AIME qualifiers in the past. Competition managers are required to offer the AIME I or AIME II at their institutions. In the event that a competition manager is unable to offer either one of the AIME's they must help their students who qualified find an alternative location. For both AIME competitions, the problems will be emailed to competition managers. For more information about how to administer the AIME, please read the [Invitational Competitions Teacher's Manual](#).

THE AIME I IS MARCH 11, 2020

WITH AN ALTERNATE DATE (AIME II) OF MARCH 19, 2020

AIME Location: Participants must take the AIME at the same location where they took the AMC 10 or AMC 12. This is to ensure that participants' AMC 10 or AMC 12 scores can be matched with their AIME scores for USA Mathematical Olympiad qualification. In the event that a participant absolutely cannot take the AIME at the same location, they are to make arrangements with a different competition manager who has the materials to administer the AIME, and complete the [Change of Venue Form](#). Participants that need to take the AIME at a different venue should reach out to nearby institutions listed on the Additional Competition Locations webpage.

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. Participants who took the AMC 12 and AIME are eligible for the USAMO and participants who took the AMC 10 and AIME are eligible for the USAJMO. Each year approximately 500 participants are chosen for the two Olympiads based on a combination of AIME scores and AMC 10 or AMC 12 scores. For more information about qualification and administration details, please read our [Invitational Competitions Teacher's Manual](#).

MATERIALS TO HOST THE AIME ON MARCH 11 OR 19, 2020 ARE INCLUDED WITH YOUR AMC 10 AND AMC 12 COMPETITION 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 DATE, THE COMPETITION PROBLEMS WILL BE EMAILED TO COMPETITION MANAGERS RATHER THAN MAILED LIKE THE AMC 10 AND AMC 12.

AMC Policies

Policy for Changes: The MAA Committee on the American Mathematics Competitions may 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: Early administration is **never** permitted and will result in disqualification of all scores from your institution. Early administration jeopardizes the validity of all scores from other institutions.

Official Administration: The only official day for the AMC 10 A and AMC 12 A is January 30, 2020, and the only official day for the AMC 10 B and AMC 12 B is February 5, 2020. Only official participants are eligible to qualify for the AIME. Please note that if you are administering the competition in a time zone outside the continental US, it must start after 9 AM EST on the official competition day.

Lost or Delayed Packages: In order to receive your score report and any certificates earned, answer sheets must be received by the MAA AMC office by February 7, 2020 for the AMC 10 A and AMC 12 A, and February 14, 2020 for the AMC 10 B and AMC 12 B. The MAA AMC is not responsible for lost or delayed answer sheets. Answer sheets received after these deadlines will not be scored. This means that participants will not be eligible to qualify for the AIME and their scores will not appear on the MAA AMC website.

Refund/Credit Policy: If your institution is unable to take the competition, please use the materials as practice sets to prepare for next year's competition or as supplemental classroom materials. Do not return the competition materials. **We cannot give refunds or credits after the competition materials have shipped.**

Students with Accommodation Plans: The time limit for participants who require accommodations (e.g., for physical and learning disabilities) is 2 hours for the AMC 10 and AMC 12. A teacher or a school administrator may read the questions to the participant and mark the answers as directed by the participant. Braille and large print competition booklets must be ordered no later than three weeks before the competition date. It is the responsibility of the institution and the competition manager to make arrangements consistent with the participant's accommodation plan. Please contact MAA AMC at amcinfo@maa.org for more information.

Questionable Scores: If it is clear to the competition manager from personal observation that a participant has cheated, then the competition manager must disqualify that participant. If the competition manager receives an accusation or obtains indirect evidence of cheating, the competition manager must immediately report all the facts of the situation to the MAA AMC Office at amchq@maa.org. The MAA AMC Office will determine what further action to take. **Under no circumstances** may the competition manager decide on their own to accept a questionable score.

Inclement Weather and School Cancellation Policy: If school is canceled on the day of the AMC 10 A and AMC 12 A, the competition manager must contact AMC customer service immediately (amcinfo@maa.org) so the institution can register for the AMC 10 B or AMC 12 B. If school is cancelled on the day of the AMC 10 B or AMC 12 B and the competition cannot be administered, participants will not be eligible to qualify for the AIME. In the event of a school closure, the competitions can be offered at a different location. The competition manager must receive approval from the school administration before offering the competition at an alternative location.

AMC 10 A and AMC 12 A - January 30, 2020	
Jan. 15, 2020	Final day to order additional AMC 10/12 A bundles for participating institutions located in Canada, Alaska, Puerto Rico, Hawaii, Guam, and the Northern Mariana Islands.
Jan. 17, 2020	Final day to order additional AMC 10/12 A bundles for participating institutions located within the continental United States.
Jan. 29, 2020	Have participants pre-fill all name and demographic information on answer sheets.
Jan. 30, 2020	Official AMC 10 A and AMC 12 A date.
Jan. 31, 2020	Return answer sheets to the MAA AMC office within 24 hours of the competition. Use an overnight or 2-day shipping service, with a tracking number. FedEx, UPS, or USPS Overnight <u>are strongly recommended.</u>
Feb. 7, 2020	Last day that AMC 10/12 A answer sheets will be accepted by the MAA AMC office for scoring.

AMC 10 B and AMC 12 B - February 5, 2020	
Jan. 15, 2020	Final day to order additional AMC 10/12 B bundles for participating institutions located in Canada, Alaska, Puerto Rico, Hawaii, Guam, and the Northern Mariana Islands.
Jan. 17, 2020	Final day to order additional AMC 10/12 B bundles for participating institutions located within the continental United States.
Feb. 4, 2020	Have participants pre-fill all name and demographic information on answer sheets.
Feb. 5, 2020	Official AMC 10 B and AMC 12 B date.
Feb. 6, 2020	Return answer sheets to the MAA AMC office within 24 hours of the competition. Use an overnight or 2-day shipping service, with a tracking number. FedEx, UPS, or USPS Overnight <u>are strongly recommended.</u>
Feb. 14, 2020	Last day that AMC 10/12 B answer sheets will be accepted by the MAA AMC office for scoring.