



MAA100
MATHEMATICAL ASSOCIATION OF AMERICA
CELEBRATING A CENTURY OF ADVANCING MATHEMATICS

31st Annual

MAA American Mathematics Competitions

AMC 8

TEACHERS'

MANUAL

Instructions and Reporting Forms
for School Contest Managers

Tuesday, November 17, 2015

Please read this booklet thoroughly upon receipt.

DATES TO REMEMBER

AMC 10/AMC 12 – Tuesday, February 2, 2016 &/or Wednesday, February 17, 2016

AIME – Thursday, March 3, 2016 or Wednesday, March 16, 2016

USAMO & USAJMO – Tuesday & Wednesday, April 19–20, 2016

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MATHEMATICAL ASSOCIATION OF AMERICA
CELEBRATING A CENTURY OF ADVANCING MATHEMATICS

MAA100

MAA American Mathematics Competitions

Dear Colleague:

Welcome to the 2015 administration of the AMC 8 exam. Thank you for supporting your students in this program. Our contest committee has again created for you what they think are stimulating and engaging contest problems. We have worked to balance the content and the level of difficulty. We hope that the result will be an enjoyable and educational experience both for you and your students. And please consider filling in the feedback form contained in this manual, so that we can serve you even better in future.

Please read this manual thoroughly before you administer our contests. It contains the rules and regulations for the AMC 8. Please be sure to fill out the School Identification Form and have the students complete the non-answer sections of the Answer Form (See Sections III and V) several days before the administration of the contest.

If you are a veteran of past AMC 8 contests, there are a few important changes this year that you should note:

- 1) The date for return of the contest papers has been changed: see page 3.
- 2) Use of trackable parcel service to return answer sheets is now required: see page 5.
- 3) We are replacing awarding of pins to students with certificates for your high scorers.
- 4) We will not be sending plaques to high scorers.
- 5) A complimentary copy of the examination will be shared electronically with you after the scheduled contest window has closed.

We again offer a “window” for contest administration. This will enable schools to participate officially in case of a school closing or an academic conflict with the official scheduled date. The alternate “window” dates this year are November 18–24. Further rules governing the use of the “window” are found on page 6 of this manual.

The Edyth May Sliffe Award, recognizing distinguished mathematics teaching, will be continued in 2015. Further details for nominating a teacher from your school are on page 9.

We will make every effort to process your results rapidly. Most schools will receive their results before the holiday break.

On behalf of the Committee on the American Mathematics Competitions, I send my appreciation to you for all of your help with this contest.

Sincerely,

Mark Saul, Ph.D.
Director, MAA American Mathematics Competitions

American Mathematics Competitions

PO Box 471 | Annapolis Junction, MD 20701

800.527.3690/phone | 240.396.5647/fax | amcinfo@maa.org | maa.org/math-competitions

ATTENTION CONTEST MANAGERS

IMPORTANT DATES	
November 2, 2015	Final day to register/order additional contest materials.
By November 16, 2015	Have students pre-fill all name and demographic information on answer sheets.
November 17, 2015	Official contest administration date
November 18, 2015	Return answer sheets to the MAA AMC office the day after contest administration — don't forget to use a trackable method. All answer sheets must be received no later than 12 days after contest administration.

- **Verify your contest materials immediately.** There should be enough answer sheets included to match the number of contests you purchased. If there are missing materials, please contact Customer Service at 800-527-3690 immediately.
- **Do not use photocopied answer sheets.** Photocopied answer sheets cannot be read by our scanners and cannot be scored, so please be sure to order enough contests and answer sheets for your students. For information on ordering additional contests/answer sheets, see the Additional Bundles Form on page 11 in your Teachers' Manual.
- **Check that all answer sheets are complete.** Have students fill in the answer sheets, filling in the bubbles completely with their name, age, date of birth, grade, gender, and section letter (if applicable) prior to the contest date. Incomplete answer sheets could result in incorrect or delayed scoring. After the contest administration, please verify that these portions of each answer sheet have been completed correctly.
- **Complete and include the School Identification Form.** The correct CEEB (school) code, number of answer sheets returned, and date contest was given are crucial to the scoring process. If you are unsure of the correct code, please contact our office at 800-527-3690 (US), 301-617-7805 (outside the US), or amcinfo@maa.org prior to returning your contest materials. Errors in completion of this form can lead to inaccurate score reports.
- **Complete and include the Certification Form.** This form can be found on page 9 of the Teachers' Manual and a copy of the form is included in your contest package. Please be sure to include all signatures and necessary exceptions.
- **Please mail completed answer sheets the day after the contest administration.** Answer sheets must be received by the MAA AMC office within 12 days of the contest date to receive your contest report and any awards earned. Those received after this time will be subject to a delay in scoring and will only receive electronic scores.
- **Returned answers sheets must be shipped via a trackable method.** The MAA AMC is not responsible for lost answer sheet packages.

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I. Points to Note

NO CALCULATORS

The Committee on the American Mathematics Competitions has decided that the use of calculators will not be allowed. No problem on the contest will require the use of a calculator.

Block Scheduling or Other Conflicts

The Committee on the American Mathematics Competitions has decided that the contest may now be administered on more than one day during the window period. Please keep all student answer forms secured, and send everything back to us after all administrations have taken place.

Give your Student Scores a Boost!

You can find a sampling of good practice questions on pages 13–22 in this manual. Also, our Math Club Package provides more practice questions and resources to help teachers prepare students for the AMC 8. (Use the publications order form found on our website.)

Inform Parents/Guardians about this Activity!

The letter on page 24 can be duplicated and sent home with students or handed out at parent/teacher conference time or open house.

Survey Questionnaire

We are constantly trying to improve and streamline our processes. We would greatly appreciate it if you would take the time to answer the eight questions found on page 8. Mark responses using the grid on the back side of the school ID Form. Thank you!

K-12 Teacher Membership

With registration, you automatically receive a K–12 Teacher Membership in the Mathematical Association of America with e-subscriptions to Math Horizons and FOCUS, discounts on books and meetings, and access to the Curriculum Inspirations resources.

II. Contents of the Package

Your contest package contains

1. AMC 8 Report Envelope (marked with your school ID)
2. School Identification Form
3. Contest bundles
4. 10 Answer Forms for each bundle of 10 exams ordered
(Please check that the number of bundles corresponds to the number ordered. If it does not, call the AMC office as soon as possible.)
5. AMC 8 Certification Form 2015

III. What must be done prior to November 17, 2015

1. Complete the following Pre-Examination processes associated with the AMC 8 Answer Forms:
 - a. Have the students complete the following parts of the form. (The most common errors in the past have been filling in more than one circle in a column or not completely filling in the circles.)
 - (1) Last Name
 - (2) First Name
 - (3) Middle Initial
 - (4) Section Letter (if applicable)
- For each math class participating in the AMC 8, you may assign a different section letter of the alphabet (A–Z). These letters are assigned at the Contest Manager’s discretion, and may be assigned by class, grade or ability group. Ten or more students should be assigned to each Section Letter. If you return results with Sections that have fewer than ten students, we will combine these Sections into a single Section. Certificates are given to the top 3 students in each section (see pages 7–8).
- (5) Age/date of birth, grade and gender
 - b. Collect the Answer Forms for redistribution on the contest date.
 - c. **Please** make a final check to see if the forms have been marked correctly.
2. Review the rules found on the package(s) of the AMC 8.
 3. Discuss with your students the questions and solutions from previous AMC 8’s so that they may see the type of questions to expect.
 4. Review with your students the instructions on the cover of the 2015 AMC 8, found on page 26 of this manual.
 5. The day before the contest, remind students of the time and place of the AMC 8.
 6. Make arrangements to mail the AMC 8 REPORT ENVELOPE(s) by a **trackable mail service**.
 7. Obtain a supply of: (a) #2 lead pencils with good erasers, and (b) unmarked scratch paper. **Students may not use a calculator.**

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 problem on the contest will require the use of a calculator.

IV. Instructions for the Day of the Contest

Do not open the contest bundle(s) until just before you are ready to hand the exams to the students.

1. Seat students so they are separated by an empty space, if possible.
2. Hand out the Answer Forms.
3. Provide a #2 lead pencil with a good eraser for each student.
4. Open the contest bundle(s), hand out the AMC 8 and inform the students that they are not to open the contest booklet until instructed to do so.
5. As you hand out the contest, tell the students to disregard the page which contains instructions for the contest manager.
6. Instruct students to read the entire front cover of the AMC 8. Allow 3 minutes to do this.
7. This 40-minute contest has 25 questions. When it is time to begin, tell students to unfold it to see all the problems and to be cautious about following the correct numeric sequence.
8. You will note that after the question there are five possible answers labeled A, B, C, D, and E. Only one answer is correct. Have your students mark their answers to these problems by the corresponding number on the answer form.
9. Tell your students to be **AS CERTAIN AS POSSIBLE OF THEIR ANSWERS BEFORE THEY MARK THE FORM**. Forms which contain imperfect erasures may not be read by the scanner that scores the contest. Tell your students to take special care to mark the answer in the row which corresponds to the problem number.
10. Remark to Teacher: Some students might wish to keep a personal record of their answers by circling their answers on the contest booklet before they are marked on the form. This procedure is acceptable provided it does not consume too much time. **However, the official answers will be the ones blackened on the answer form.**
11. Ask if there are any questions about procedures. Inform the participants that talking or asking questions during the contest is not allowed. They must do their own work.
12. Remind students that they have 40 minutes to complete the contest. Then tell them to BEGIN.
13. The contest should be proctored continuously as you would for any important contest. 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 contest. This includes “Smart Watches” and miniaturized calculators.
14. Announce when there are 15 minutes left and when there are 5 minutes left.
15. When time is up, 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.
Inform the students that the contest and solutions may not be discussed with anyone outside of their contest administration either orally, via email, internet, copier or media of any type until after November 24.

16. Collect all the students' Contest Booklets following the administration of the contests. **As the Answer Forms are handed in, check that each student's name is on each one and that it is bubbled in completely.**
17. **Please do not grade the answer forms.** Send them to the AMC for grading. Tell the students that their scores will be available by late December.

V. Instructions for Completing the School Identification Form

Several days before the contest date, please complete the following items on the School Identification Form.

1. Stamp or write your **school name** and complete **school mailing address** in the box in the upper-right hand corner. Please do not use address labels.
2. **School ID** — Your School ID is on your AMC 8 Report Envelope. Copy your School ID in the empty boxes under the words "School ID." Your school ID is 5 digits followed by a letter.
3. Mark the number of completed Answer Forms returned. Please do not count or return answer forms of students who were absent, blank forms or teacher "practice" forms.
4. Mark the proper circles for the date the contest was actually administered.
5. Be sure to complete the Survey on page 8 by marking your answers on the back side of the ID form.

VI. What to do Following the Contest

1. Place the School ID Form on top of the Answer Forms and insert in the Report Envelope.

Notes:

- a. Please check student answer forms for completeness (name, DOB, gender, etc.).
 - b. Please 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 SEPARATING ANY THAT MIGHT BE STUCK TOGETHER.**
 - c. Place no more than 200 forms in one envelope.
 - d. Do not return blank forms or teacher "practice" forms.
2. Complete the Certification Form, page 9. If you did not nominate a teacher for the Sliffe award when you registered, please visit the web page www.maa.org/math-competitions/teachers/sliffe-award and nominate a teacher today.
 3. Ask your Principal or person with comparable title to sign the Certification Form. Place the Certification Form in the AMC 8 Report Envelope, seal and send it by a **trackable mail service** within 24 hours or as soon as possible after all administrations have taken place.

Notes:

-  Indicate the number of packages you are returning in the space provided on the Report Envelope.
-  Affix adequate postage to the AMC 8 Report Envelope.

-  The AMC 8 Student ANSWER FORMS sent to Annapolis Junction, MD for grading will not be returned.

-  We charge \$25 for rescoring a student's individual contest.

4. **Please note:** After you have delivered all of the Answer Forms to the school office to be mailed, you may discuss the contest and solutions with your students. Remember that there will be schools taking the contest in other locations at different times, and some will be taking the contest on other "window" dates.
 - a. Inform the students that the contest and solutions may not be discussed with anyone outside of their contest administration either orally, via email, internet, copier or media of any type until after November 24.
 - b. The contest booklets **must** be collected from the students after the contest, but they may be returned after November 24.

VII. Report of Results

The AMC 8 will be scored at the AMC office.

Each school report includes the following data:

1. A list of the top 25 students in your school.
2. A report for each section with a minimum of 10 students. This report lists the score of each student.
3. One combined report for all sections with fewer than 10 students.
4. Tables of Item Difficulty for the participants in your school.
5. The dates of the AMC 10/AMC 12 are **Tuesday**, February 2, 2016 and/or **Wednesday**, February 17, 2016. We recommend interested students study prior year AMC 10/AMC 12 exams. AMC 10/12 registration forms may be found at amc-reg.maa.org.

PLEASE NOTE:

IF YOU DO NOT RECEIVE YOUR 2015 AMC 8 REPORT OF RESULTS BY JANUARY 15, 2016 PLEASE CALL THE AMC OFFICE at 800-527-3690.

ALL student answer forms returned for grading will be *RECYCLED* after February 15, 2016.

VIII. Eligibility and Participation Schedule

1. We encourage all students in grades 6, 7, and 8 to participate in the AMC 8. All USA, USA embassy, Canadian and foreign school students in grade 8 or below are eligible to participate as long as they are under 14.5 years of age on the day of the contest.
2. The contest may be given during regular mathematics classes, to a section of the students, or at one time to the entire group of students.

Notes:

- a. You should discuss academic integrity with your students if the contest is administered at several times or on more than one day, and all copies of the contest should be retained by the teacher until after all administrations have taken place.
- b. See Section IX for instructions relating to administering the contest on other dates.

IX. Policy Statements

1. Official & Unofficial Administration of the AMC 8

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: If you are unable to give the contest on November 17th because, for example,

- a. your school is closed,
- b. your school has an academic conflict,
- c. the class periods have been shortened due to an assembly or other reason, or
- d. the majority of your students will be on a field trip,

then your school may use any day between November 18–24.

The AMC 8 should be given officially on the first day that the school has available testing time, from Wednesday, November 18 through Tuesday, November 24.

Please note: Because the contest may be given officially during the “window” days, as indicated above, you must collect the students’ contest booklets and instruct them not to discuss the contest questions and solutions outside their contest administration until after November 24.

We define the term “**contest administration**” as a group of students who are taking the contest at the same time in the same room.

Unofficial administration after November 24 is permitted. Be sure to mark the exceptions box at the bottom of the certification form as indicated. **The last date to take the contest unofficially is Friday, December 11, 2015.**

2. Irregularities

If it is clear to the Contest Manager or another proctor that a student has cheated, then the Manager must disqualify the student’s score and not submit that student’s AMC 8 ANSWER FORM for grading.

If there is inconclusive evidence of cheating or an accusation without clear evidence, the Contest Manager must report this irregularity in writing when submitting the ANSWER FORMS for the school. This written report and the questionable ANSWER FORM(s) should be clearly identified, banded together and submitted along with the other ANSWER FORMS.

3. Follow-up Inquiries

The results of this AMC 8 identify students with exceptional mathematical ability. To assure that the purpose is served, the Committee on the American Mathematics Competitions reserves the right to make inquiries about scores, to re-examine students and to disqualify scores if necessary. If the required security procedures are not followed, all scores from a school may be disqualified.

4. Refund/Credit Policy

If your school is unable to take the AMC 8, please use the materials as practice sets for the next year. **WE CANNOT GIVE REFUNDS OR CREDITS AFTER THE CONTEST MATERIALS ARE SHIPPED.**

5. Learning Disabilities

The AMC allows schools to provide the same accommodations already established for timed mark-sense tests in a student’s written education program, including extra time up to a maximum of 70 minutes for the AMC 8. Students using additional time may not be eligible for state or national awards. A teacher or a school administrator may read the questions to the student and mark the answers as directed by the student. Please be sure to mark this information on the School Certification Form (page 9).

6. Braille or Large Print Exams

The AMC 8 is available in Braille and large print formats. Braille and large print exams must be ordered prior to October 16, 2015. Please contact us at amcinfo@maa.org for more information.

1. The time limit set by the Committee on the American Mathematics Competitions for visually impaired students is 70 MINUTES.
2. Please note that a certified teacher or a school administrator may read the questions to the student and mark the answers as directed by the student.

7. English Language Learners

English Language Learners may use a book or dual-language nontechnical dictionary between their native language and English. A student may use the dictionary only the first time that he/she takes the AMC 8. **The dictionary must be given to the school contest manager to examine and retain for the 24-hour period preceding the test.** The proctor must announce to other students that the student(s) has/have been given special permission to use the dictionary during the contest. **NO ELECTRONIC TRANSLATORS ARE ALLOWED FOR ANY REASON.**

8. Request for Student Names Policy

The American Mathematics Competitions (AMC) receives requests from educational institutions and organizations for the names of high-scoring AMC 8 students. The AMC evaluates interested institutions and organizations individually for appropriateness. We do not collect addresses of students participating in the AMC 8, so we are not able to provide lists allowing direct contact of students. Instead, we provide legitimate educational institutions of all levels and professional and scholarly organizations with the postal address of school contest managers who have students meeting criteria such as high score or region of school. Then consistent with school policies and at the discretion of the school contest manager and the school administration, the contest manager can pass the organization’s information to students. Most organizations find this an effective and appropriate way to contact high-ability middle-school students.

X. Intramural Awards

- School Certificate of Honor — awarded to schools with a team score (AMC 8, top 3 students scores) of 66 or greater.
- School Certificate of Merit — awarded to schools with a team score (AMC 8, top 3 students scores) between 50 and 65, inclusive.
- Certificate of Distinction — is given to all students who receive a perfect score.

- AMC 8 Winner Certificate — given to the student(s) in each school with the highest score.
- Certificate of Outstanding Achievement — the top three students in each of your assigned sections will receive, respectively, a gold, silver, or bronze certificate. In case of a tie, additional certificates will be included with your results.
- AMC 8 Distinguished Honor Roll Certificate — given to all students who score in (approximately) the top 1%.
- AMC 8 Honor Roll Certificate is given to all students who score in (approximately) the top 5%.
- AMC 8 Achievement Roll Certificate — given to all students in 6th grade and below who score 15 or above.

Questionnaire to Help Us Serve You Better

Thank you in advance for taking the time to answer these questions for us. Answer to the best of your ability, and if you don't know, just give us a "best estimate". Please fill in your answers in the ovals provided on the back of the school ID form. Thank you!

1. **Rate the difficulty of the AMC 8 problems 1-15 compared to the difficulty of your mathematics curriculum:**
 0) much easier 1) easier 2) about the same 3) harder 4) much harder

2. **What level math classes take the AMC contest? Mark all that apply:**
 0) grade 8 1) grade 7 2) grade 6 3) grade 5 & 4 4) Math Club (all ages)
 5) only advanced students (all grades)

3. **What are the obstacles in your school to offering the AMC 8? Mark all that apply:**
 0) cost 1) paperwork/purchase order 2) scheduling 3) duration of contest 4) finding location 5) other

4. **The AMC is considering electronic delivery (.pdf document) of the AMC 8 contest questions. The contest would be printed out and copied at each school, then administered by paper-and-pencil to students. How convenient would this procedure be for your contest venue?**
 0) Extremely inconvenient 1) Mildly inconvenient 2) As convenient as the current method of delivery
 3) Slightly more convenient than the current method of delivery 4) Much more convenient than the current method of delivery

5. **Would you be interested in a more condensed AMC 8 Teachers' Manual? For example, only including instructions for the day of the contest and having other forms, like Additional Bundles, located online.**
 0) very interested 1) interested 2) neutral 3) not interested 4) do not want

6. **Is the curriculum in your school or district adopting or moving toward the Common Core State Standards?**
 0) yes 1) no 2) not sure

7. **Is the AMC 8 a good supplement to the Common Core State Standards in Mathematics' topics?**
 0) yes 1) somewhat 2) no 3) not sure

8. **Which of the following features would you be interested in having access to using your online AMC Contest Account? Mark all that apply:**
 0) ability to edit student information
 1) prefilled student certificates
 2) more payment options
 3) ability to buy downloadable AMC Publications, like Math Club Packages, past contests, etc.
 4) ability to build custom reports
 5) I did not create an AMC Contest Account this year.

XI. AMC 8 Certification Form 2015

We encourage all students in grades 6, 7, and 8 to participate in the AMC 8. All USA, USA embassy, Canadian and foreign school students in grade 8 or below are eligible to participate as long as they are under 14.5 years of age on the day of the contest. The AMC 8 must be administered by a teacher or an adult not associated with or related to any of the participants. The administration of the contest must take place in a public building (e.g., school, library, church). **Please send all Answer Forms from your school or group at one time.**

For a school, the Contest Manager and the Principal, Vice Principal, Headmaster, Home School Coordinator, or person with comparable title must sign this form and return it with your student Answer Forms. The Contest Manager must wait until all aspects of the contest process at the school have been completed.

Certification by the principal, official, or person with comparable title:

- a. I certify that the contest package(s) were retained in their sealed condition within an hour of the start of the administration of the contest.
- b. I accept for our school/home school the rules and procedures described on this page and pages 4–6, and accept that failure to follow these rules and procedures may result in DISQUALIFICATION from official standing of all scores from our school.

Signature _____ Time _____

Title _____ Date _____

If your school did not administer the AMC 8 contest on November 17, 2015, please enter the date(s) given _____.

If the contest was taken unofficially after the "window," mark the exceptions box at the bottom and write the reason on the bottom of this page.

Certification by the Contest Manager:

I certify that the following statements are true or that, if there are any exceptions, I have checked the box below and have listed them below on the bottom of this page or on a separate sheet of paper. I understand that the absence of either signature from this form and a consideration of the exceptions may result in DISQUALIFICATION of all scores from our school. I understand that administering the AMC 8 before November 17, 2015 will lead to disqualification of our school's results.

- 1. Only students in 8th grade or below, or ages 14.5 or below participated in the Contest.
- 2. The package of Contests was not opened until just before the administration of the Contest.
- 3. The participants were continuously monitored during the Contest, and they were separated by an empty space, if possible.
- 4. Participants had exactly 40 minutes working time.
- 5. No student was permitted to proctor the Contest.
- 6. I collected all of the students' Contest booklets following the administration of the Contest.
- 7. After the Contest, the AMC 8 ANSWER FORMS were placed in the AMC 8 Report Envelope and kept secure. No changes were made in the answers. If the AMC 8 was given at more than one time, the Contest papers were kept secure until all administrations were over.
- 8. I have followed all the rules as stated in this Teachers' Manual.

Signature _____

Day & Date
Test was given _____

School Name _____

Telephone _____

City _____

State _____ Zip _____

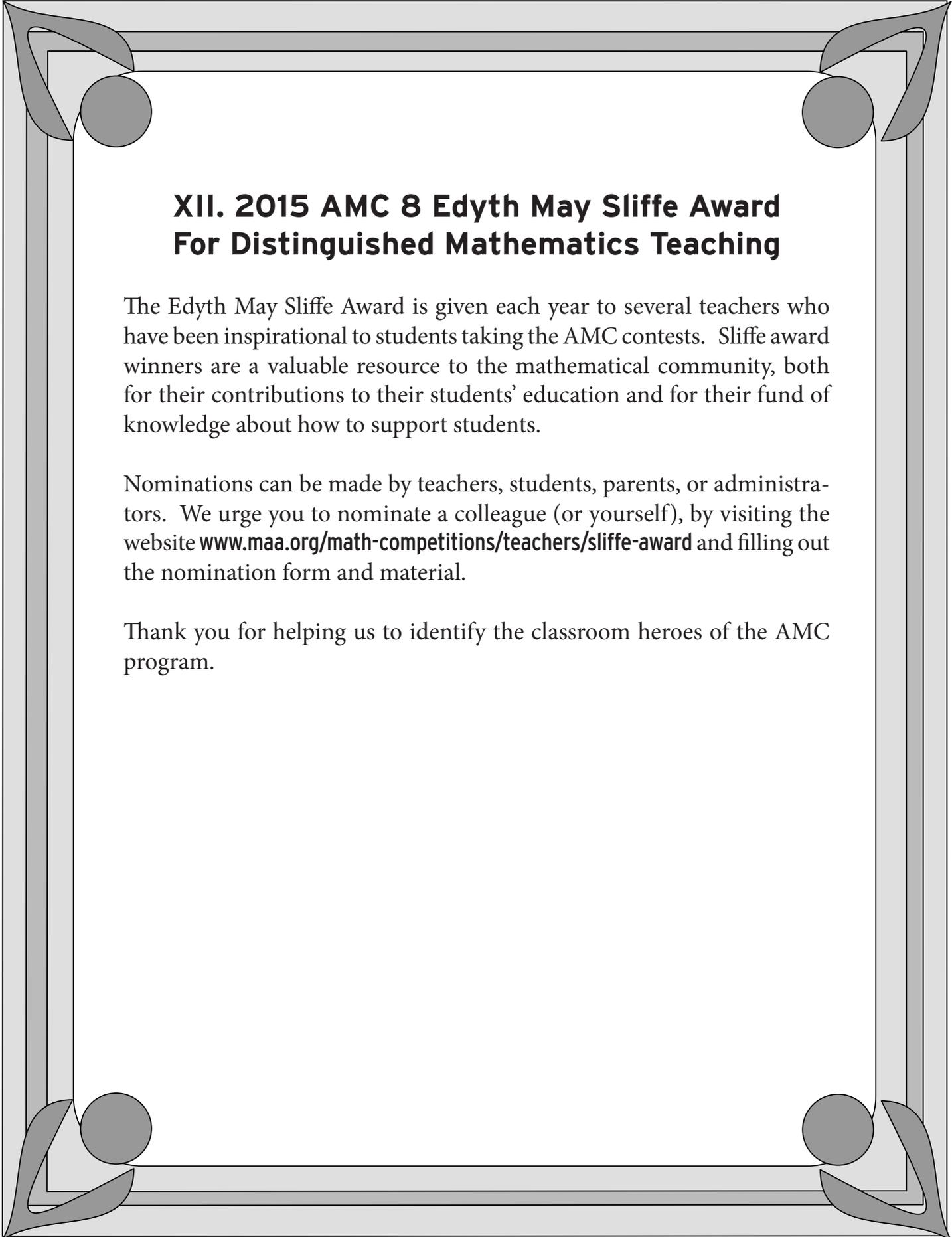
Email (please print clearly): _____

School Grade Level: _____ through _____

PLEASE INDICATE THE EXACT NUMBER OF
AMC 8 ANSWER FORMS RETURNED FOR GRADING: _____

EXCEPTIONS

If accommodations for a Learning Disability were made, please list student name(s):



XII. 2015 AMC 8 Edyth May Sliffe Award For Distinguished Mathematics Teaching

The Edyth May Sliffe Award is given each year to several teachers who have been inspirational to students taking the AMC contests. Sliffe award winners are a valuable resource to the mathematical community, both for their contributions to their students' education and for their fund of knowledge about how to support students.

Nominations can be made by teachers, students, parents, or administrators. We urge you to nominate a colleague (or yourself), by visiting the website www.maa.org/math-competitions/teachers/sliffe-award and filling out the nomination form and material.

Thank you for helping us to identify the classroom heroes of the AMC program.

XIII. Additional Bundles Form

Please fill in the information below and FAX your order or go online (amc-reg.maa.org) to order additional bundles. The administrator, authorized person, or person ordering for the school agrees to pay the American Mathematics Competitions for the following materials:

School Name _____ Phone # _____

Address _____

City _____ State _____ Zip _____

Name of person placing the order _____

Email address _____

AMC 8	Contest Bundles of ten # _____ @ \$21/bundle =\$ _____
	Solutions, Sets of ten (optional)..... # _____ @ \$ 9/set =\$ _____

Postage/Processing Fee (see box below) \$ _____

Total \$ _____

VISA/MC# : _____ Exp. Date: _____ Sec. Code: _____

Name (Please Print): _____ Phone # _____

Email (needed for email receipt): _____

Shipping Charges

<ol style="list-style-type: none"> 1. VISA, MasterCard, American Express, & Discover accepted. 2. Make checks (accepted from U.S. residents only) payable to: Mathematical Association of America 3. PAYMENT IN U.S. FUNDS ONLY. 4. USA: A one time processing fee of \$5 plus applicable domestic shipping charges. 5. OUTSIDE USA: Add \$35 to your order, plus a processing fee of \$5. Payment via credit card or wire transfer only. <p>*Orders for Additional Bundles will be accepted until November 2, 2015.</p>	<p>SCAN and EMAIL to: amcinfo@maa.org</p> <p>FAX to: 240.396.5647</p> <p>MAIL your order to:</p> <p style="text-align: center;">MAA American Mathematics Competitions ATTN: AMC 8 Additional Bundles 9050 Junction Drive Annapolis Junction, MD 20701</p>
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XIV. Proof of Intent to Pay

Billed P.O. Number _____

Complete billing address: _____

XV. AMC 8 Rescoring Request Form

I would like to have the following student's answer form re-scored. I understand that there is a \$25.00 charge for each student answer form rescored.

	\$ 25.00 each
Student Name _____	\$ _____
Grand Total _____	\$ _____

Teacher's Name _____ School ID # _____
School Name _____ Phone # _____
Address _____
City _____ State _____ Zip _____
Email where re-score should be sent _____

Method of Payment: (Rescores will not be processed until payment is received.)

Check (**accepted for U.S. registrants only**) made payable to the Mathematical Association of America and mailed with this form to the:

MAA AMERICAN MATHEMATICS COMPETITIONS
PO Box 471
Annapolis Junction, MD 20701

Charge to Visa/Mastercard/Discover/American Express #: _____

Name on card (print): _____

Signature _____

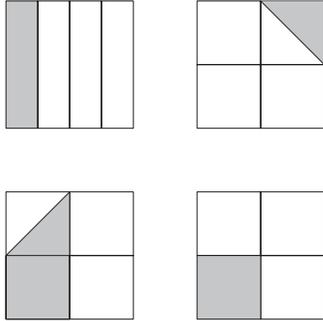
Expiration Date: _____ Sec. Code: _____ Telephone: _____

Email for electronic credit card receipt: _____

SCAN and EMAIL completed form to: amcinfo@maa.org or FAX to: 240.396.5647

XVI. AMC 8 Practice Questions Example

Each of the following four large congruent squares is subdivided into combinations of congruent triangles or rectangles and is partially shaded. What percent of the total area is partially shaded?



- (A) $12\frac{1}{2}$ (B) 20 (C) 25 (D) $33\frac{1}{3}$ (E) $37\frac{1}{2}$

The original problem and choices from the 2011 AMC 8 contest

2011 AMC 8, Problem #7—
“Find the shaded portion of each square separately. ”

Problem number
Hint

Solution

Answer (C): The upper left and the lower right squares are each one-fourth shaded, for a total of one-half square. The shaded portions of the upper right and lower left squares make up one-half square. So the total shaded area is one full square, which is 25% of the total area.

Solution from official solutions

Difficulty: Medium

SMP-CCSS: 2, 7

CCSS-M: 6G.1, 6RP.3C

Standards for Math Practice
Common Core State Standard

Difficulty, Percent correct

Easy	100-80%
Med Easy	80-60%
Medium	60-40%
Med Hard	40-20%
Hard	20-0%

AMC 8 Practice Questions Continued

13-01

Danica wants to arrange her model cars in rows with exactly 6 cars in each row. She now has 23 model cars. What is the smallest number of additional cars she must buy in order to be able to arrange her cars in this way?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

2013 AMC 8, Problem #1—

“What is the smallest multiple of 6 that is at least 24?”

Solution

Answer (A): The smallest multiple of 6 that is at least 23 is 24, so Danica must buy 1 additional car.

Difficulty: Easy

SMP-CCSS: 1. Make sense of problems and persevere in solving them; 7. Look for and make use of structure.

CCSS-M: 6.NS.B. Compute fluently with multi-digit numbers and find common factors and multiples.

AMC 8 Practice Questions Continued
13-02

A sign at the fish market says, “50% off, today only: half-pound packages for just \$3 per package.” What is the regular price for a full pound of fish, in dollars?

- (A) 6 (B) 9 (C) 10 (D) 12 (E) 15

2013 AMC 8, Problem #2—

“How much does a half-pound package cost at the regular price?”

Solution

Answer (D): A half-pound package costs \$3 at the sale price, so it would cost \$6 at the regular price. A whole pound would cost \$12 at the regular price.

Difficulty: Medium Easy

SMP-CCSS: 1. Make sense of problems and persevere in solving them; 4. Model with mathematics.

CCSS-M: 7.RP.A. Analyze proportional relationships and use them to solve real-world and mathematical problems.

AMC 8 Practice Questions Continued
13-03

What is the value of $4 \cdot (-1 + 2 - 3 + 4 - 5 + 6 - 7 + \cdots + 1000)$?

- (A) -10 (B) 0 (C) 1 (D) 500 (E) 2000

2013 AMC 8, Problem #3—
“Find the sum inside the parentheses.”

Solution

Answer (E): Inside the parentheses are 500 pairs of numbers, each with a sum of 1. Therefore the expression equals $4 \cdot 500 = 2000$.

Difficulty: Medium

SMP-CCSS: 1. Make sense of problems and persevere in solving them; 7. Look for and make use of structure.

CCSS-M: 7.EE.A. Use properties of operations to generate equivalent expressions.

AMC 8 Practice Questions Continued
13-08

A fair coin is tossed 3 times. What is the probability of at least two consecutive heads?

- (A) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{3}{8}$ (D) $\frac{1}{2}$ (E) $\frac{3}{4}$

2013 AMC 8, Problem #8—

“List the number of possible equally likely outcomes.”

Solution

Answer (C): List the 8 possible equally likely outcomes: HHH, HHT, HTH, HTT, THH, THT, TTH, TTT. Only HHH, HHT, THH have at least 2 consecutive heads, so the probability of at least 2 consecutive heads is $\frac{3}{8}$.

Difficulty: Medium Hard

SMP-CCSS: 1. Make sense of problems and persevere in solving them; 4. Model with mathematics.

CCSS-M: 7.SP.C. Investigate chance processes and develop, use, and evaluate probability models.

AMC 8 Practice Questions Continued
13-10

What is the ratio of the least common multiple of 180 and 594 to the greatest common factor of 180 and 594?

- (A) 110 (B) 165 (C) 330 (D) 625 (E) 660

2013 AMC 8, Problem #10—
“Find the prime factorization of 180 and 594.”

Solution

Answer (C): Because the prime factorizations of 180 and 594 are $2^2 \cdot 3^2 \cdot 5$ and $2 \cdot 3^3 \cdot 11$, respectively, the least common multiple of 180 and 594 is $2^2 \cdot 3^3 \cdot 5 \cdot 11$, and their greatest common factor is $2 \cdot 3^2$. The ratio of their least common multiple to their greatest common factor is $\frac{2^2 \cdot 3^3 \cdot 5 \cdot 11}{2 \cdot 3^2} = 2 \cdot 3 \cdot 5 \cdot 11 = 330$.

Difficulty: Medium Hard

SMP-CCSS: 1. Make sense of problems and persevere in solving them.

CCSS-M: 6.NS.B. Compute fluently with multi-digit numbers and find common factors and multiples.

AMC 8 Practice Questions Continued
13-15

If $3^p + 3^4 = 90$, $2^r + 44 = 76$, and $5^3 + 6^s = 1421$, what is the product of p , r , and s ?

- (A) 27 (B) 40 (C) 50 (D) 70 (E) 90

2013 AMC 8, Problem #15—

“Find the value for p , r and s from the equations given.”

Solution

Answer (B): From the first equation, $3^p + 81 = 90$, so $3^p = 9$, and $p = 2$. From the second equation, $2^r = 32$, so $r = 5$. From the third equation, $6^s + 125 = 1421$, so $6^s = 1296$, and $s = 4$. The product of p , r , and s is $2 \cdot 5 \cdot 4 = 40$.

Difficulty: Medium

SMP-CCSS: 1. Make sense of problems and persevere in solving them.

CCSS-M: 8.EE.A Work with radicals and integer exponents.

AMC 8 Practice Questions Continued
13-20

A 1×2 rectangle is inscribed in a semicircle with the longer side on the diameter. What is the area of the semicircle?

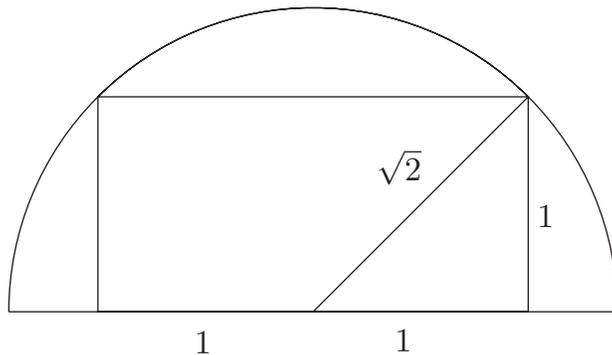
- (A) $\frac{\pi}{2}$ (B) $\frac{2\pi}{3}$ (C) π (D) $\frac{4\pi}{3}$ (E) $\frac{5\pi}{3}$

2013 AMC 8, Problem #20—

“Use the Pythagorean Theorem to find the radius of the semicircle.”

Solution

Answer (C):



By the Pythagorean Theorem, the radius of the semicircle is $\sqrt{2}$, so its area is $\frac{\pi(\sqrt{2})^2}{2} = \pi$.

Difficulty: Hard

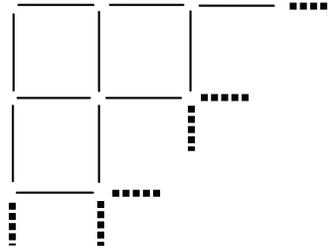
SMP-CCSS: 1. Make sense of problems and persevere in solving them.

CCSS-M: 8.G.B. Understand and apply the Pythagorean Theorem.

AMC 8 Practice Questions Continued

13-22

Toothpicks are used to make a grid that is 60 toothpicks long and 32 toothpicks high. How many toothpicks are used altogether?



- (A) 1920 (B) 1952 (C) 1980 (D) 2013 (E) 3932

2013 AMC 8, Problem #22—

“Find the number of columns and rows for 60 toothpicks long and 32 toothpicks high.”

Solution

Answer (E): A grid 60 toothpicks long and 32 toothpicks high needs 61 columns of 32 toothpicks and 33 rows of 60 toothpicks. Therefore a total of $(61 \times 32) + (33 \times 60) = 3932$ toothpicks are needed.

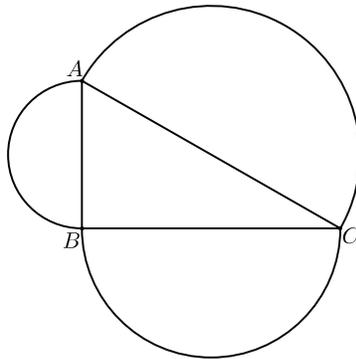
Difficulty: Hard

SMP-CCSS: 1. Make sense of problems and persevere in solving them; 7. Look for and make use of structure.

CCSS-M: None

AMC 8 Practice Questions Continued
13-23

Angle ABC of $\triangle ABC$ is a right angle. The sides of $\triangle ABC$ are the diameters of semicircles as shown. The area of the semicircle on \overline{AB} equals 8π , and the arc of the semicircle on \overline{AC} has length 8.5π . What is the radius of the semicircle on \overline{BC} ?



- (A) 7 (B) 7.5 (C) 8 (D) 8.5 (E) 9

2013 AMC 8, Problem #23—

“Find the area for the circle with diameter \overline{AB} .”

Solution

Answer (B): The circle with diameter \overline{AB} has twice the area of the corresponding semicircle; thus the area of the circle is 16π and its radius is 4. Consequently $AB = 8$. The circle with diameter \overline{AC} has circumference 17π , so $AC = 17$. \overline{AC} is the hypotenuse of the right triangle. By the Pythagorean Theorem, $17^2 = 8^2 + (BC)^2$. Therefore $BC = 15$, and the radius is 7.5.

Difficulty: Medium Hard

SMP-CCSS: 1. Make sense of problems and persevere in solving them.

CCSS-M: 8.G.B. Understand and apply the Pythagorean Theorem.

XVII. Publicity

If possible the sample Contest Announcement and Results Announcement news releases should be prepared and distributed to the newspapers, radio and television stations in your region. See the AMC website for statistics and figures from the the 2015 contest available in December.

(School or School District)

FOR IMMEDIATE RELEASE

(School) STUDENTS INVITED TO WORLD-WIDE COMPETITION

(#) students at (School) participated in the 31st annual MAA American Mathematics Competitions 8, held on Tuesday, November 17, 2015. They competed for local and national student and school awards. The contest, which covers middle school mathematics, is given at participating schools. Its purpose is to spur interest in mathematics and develop talent through the excitement of friendly competition at problem solving in a timed format. In 2014 over 150,000 students from over 2,300 schools participated in the AMC 8 contest including (#) students from (#) schools in (State).

The AMC 8, first offered in 1985, is an annual project sponsored by the Mathematical Association of America, and is located in Washington, DC. The MAA American Mathematics Competitions receives support from The Akamai Foundation, American Mathematical Society, American Statistical Association, Art of Problem Solving, Casualty Actuarial Society, Collaborator's Circle, Conference Board of the Mathematical Sciences, The D.E. Shaw Group, ExpII, IDEA MATH, Jane Street Capital, MathWorks, Mu Alpha Theta, National Council of Teachers of Mathematics, Simons Foundation, Society for Industrial and Applied Mathematics, Star League, Tudor Investment Corporation, and Two Sigma. The Contest is given across the USA, Canada, and in many schools abroad.

Details concerning the 2015–2016 AMC contests for Middle School and High School are available on the AMC web site: maa.org/math-competitions. Entries for the AMC 10/12 2016 contest close on January 19, 2016 for the February 2nd exam, and on February 3, 2016 for the February 17th contest.

For further information contact the AMC — email us at amcinfo@maa.org.



MATHEMATICAL ASSOCIATION OF AMERICA
CELEBRATING A CENTURY OF ADVANCING MATHEMATICS

MAA100

American Mathematics Competitions

Fall 2015

Dear Parent or Guardian:

On November 17, 2015 your son or daughter will participate in the 31st annual American Mathematics Competitions 8 (AMC 8) contest being offered in your school. Last year the AMC 8 contest involved over 150,000 students worldwide.

With these contests, there are awards in each school for the student with the highest score, certificates for high-scoring students in each school, and state-wide awards. The AMC 8 contest can lead to other more selective math contests, even all the way to the United States of America team sent to the International Mathematical Olympiad, the premier international high school level mathematical problem solving contest. But the real rewards come from challenging each student with mathematics that is new, different, and “outside of the box.” The problems on the contest are difficult, but designed to be within the reach of students. Even so, if your son or daughter managed to solve only one or two problems, this should be an encouragement to learn more, because these problems are meant to be more challenging than students routinely encounter in their mathematics courses.

Mathematics is increasingly important in our technological and scientific age. Taking enough mathematics in school is the gateway to jobs and careers of all kinds, even those that are not explicitly mathematical, scientific or technological. We hope that by offering these contests, we can challenge and inspire students to want to learn more mathematics. We hope that your son or daughter enjoys the contests and will continue to take mathematics courses in middle school, high school and beyond.

Sincerely,

Mark Saul, Ph.D.
Director, MAA American Mathematics Competitions

American Mathematics Competitions

PO Box 471 | Annapolis Junction, MD 20701

800.527.3690/phone | 240.396.5647/fax | amcinfo@maa.org | maa.org/math-competitions



MAA American Mathematics Competitions
CERTIFICATE

Awarded to

for participating in the

MAA American Mathematics Contest 8
(AMC 8)

2015

Mark Saul, Ph.D., Director
MAA American Mathematics Competitions

Dr. Norbert J. Kuenzi, Chair
AMC 8 Subcommittee



MAA American Mathematics Competitions
CERTIFICATE

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(AMC 8)

2015

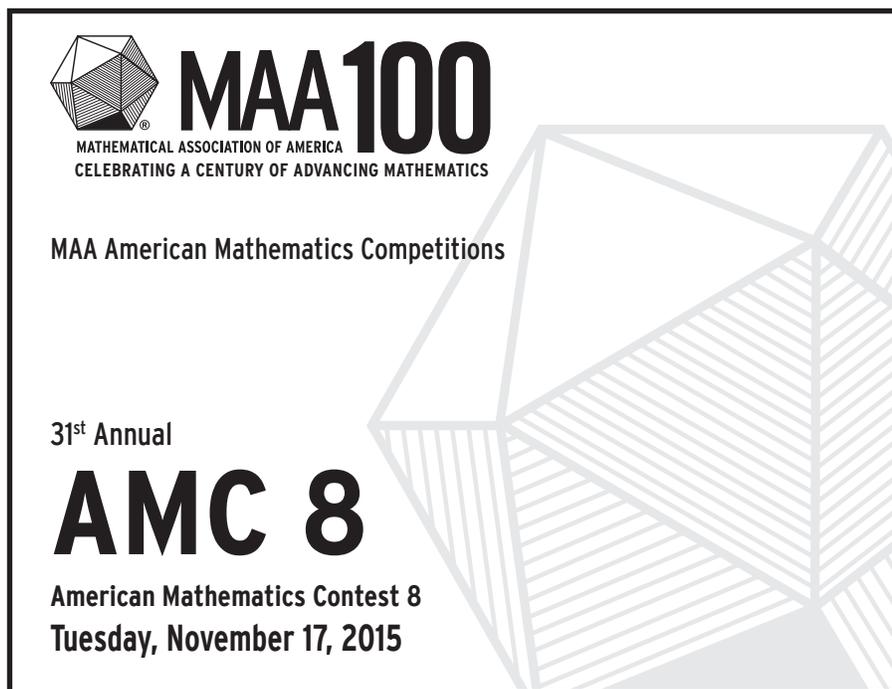
Mark Saul, Ph.D., Director
MAA American Mathematics Competitions

Dr. Norbert J. Kuenzi, Chair
AMC 8 Subcommittee

XIX. Certificate of Participation

(for reproduction, page 25)

XX. Facsimile of the AMC 8 front cover



INSTRUCTIONS

1. DO NOT OPEN THIS BOOKLET UNTIL YOUR PROCTOR TELLS YOU.
2. This is a twenty-five question multiple choice test. For each question, only one answer choice is correct.
3. Mark your answer to each problem on the AMC 8 Answer Form with a #2 pencil. Check the blackened circles for accuracy and erase errors and stray marks completely. Only answers properly marked on the answer form will be graded.
4. There is no penalty for guessing. Your score is the number of correct answers.
5. Only scratch paper, graph paper, rulers, protractors, and erasers are allowed as aids. Calculators are NOT allowed. No problems on the test *require* the use of a calculator.
6. Figures are not necessarily drawn to scale.
7. Before beginning the test, your proctor will ask you to record your information on the answer form.
8. You will have 40 minutes to complete the test once your proctor tells you to begin.
9. When you finish the exam, *sign your name* in the space provided on the answer form.

The Committee on the American Mathematics Competitions reserves the right to re-examine students before deciding whether to grant official status to their scores. The Committee also reserves the right to disqualify all scores from a school if it determines that the required security procedures were not followed.

The publication, reproduction or communication of the problems or solutions of the AMC 8 during the period when students are eligible to participate seriously jeopardizes the integrity of the results. Dissemination via copier, telephone, email, internet or media of any type during this period is a violation of the competition rules. After the contest period, permission to make copies of individual problems in **paper form only** for educational use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear the copyright notice.

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SOLUTIONS

Your School Manager will be sent an electronic copy of the 2015 AMC 8 Solutions Pamphlet. Please print one copy and keep it secure.

WRITE TO US

Comments about the problems and solutions for this AMC 8 should be addressed to:

Prof. Norbert Kuenzi, AMC 8 Chair
934 Nicolet Ave
Oshkosh, WI 54901-1634

Comments about administrative arrangements should be addressed to:

MAA American Mathematics Competitions / amcinfo@maa.org

MAA American Mathematics Competitions
PO Box 471
Annapolis Junction, MD 20701

AMC 10 & AMC 12

The AMC 10 and AMC 12 are 25-question, 75-minute, multiple choice contests. All schools participating in the AMC 8 receive a brochure and registration form for the 2015 AMC 10. Schools with high scoring students on the AMC 8 should consider administering the AMC 10. The best way to prepare for these contests is to study exams from previous years. Orders for all publications listed below should be addressed to:

MAA American Mathematics Competitions
PO Box 471
Annapolis Junction, MD 20701

PUBLICATIONS

A complete listing of the current publications for sale can be found on our web site:
maa.org/math-competitions