



MAA

MATHEMATICAL ASSOCIATION OF AMERICA

30th Annual

**American Mathematics Competitions
American Invitational
Mathematics Examination**

TEACHERS' MANUAL

Instructions and Reporting Forms
for School Contest Managers

dates to remember:

AIME - Thursday, March 15, 2012

Alternate AIME - Wednesday, March 28, 2012

Please read this booklet thoroughly upon receipt.

PLEASE NOTE: USA(J)MO TEACHERS' MANUAL ON FLIP SIDE





American Mathematics Competitions

To All AIME Managers:

Please read this manual regarding the AIME rules and regulations thoroughly. Note our policy for the official administration of the AIME. The AIME I can only be given officially on THURSDAY, March 15th, and the AIME II can only be given officially on WEDNESDAY, March 28, 2012. The contest should be scheduled from 9AM to 12 noon if possible.

All students who are in the top 5% of all American Mathematics Contest 12 (AMC 12) participants or score at least 100 points on the AMC 12 and those with a score in the top 2.5% of the American Mathematics Contest 10 (AMC 10) participants or score at least 120 points, are invited to take the AIME. The AIME is the second in the sequence of mathematics contests which leads to participation in the USA Mathematical Olympiad and the designation of Winners of the USA(J)MO. The AIME is a 15-question, 3-hour examination. All answers are integers ranging from 000 to 999, inclusive. The score is the number of correct answers. There is neither partial credit nor a penalty for wrong answers.

I call your attention to several items found in this manual which answer inquiries I frequently receive from AIME Managers:

1. All administrations of the AIME must take place on the scheduled dates.
There will be a expedited handling fee for the second AIME as follows: 1-10 students = \$25, 11+ students = \$50. We will need your payment before the answer forms can be graded. A copy of the Alternate AIME Payment Form may be found on page 11 of your AIME Teachers' Manual. All AIME answer forms must be returned by "express mail" so that they arrive in the AMC office by March 30, 2012.
2. Email requests for the second AIME may be sent to: AMCINFO@MAA.ORG
Email requests should include the school's CEEB number and complete mailing address, teacher name, teacher email address, number of students taking the AIME II, and method of payment. You may also register online using a credit card at amc-reg.maa.org
3. Under no circumstances can a student take both AIMEs.
4. In section V you will find a discussion of how and when you will receive results.
5. On the reverse side of this Manual you will find a section relating to the USAMO & USAJMO. In this section you will find all the information and forms relevant to the taking of the USA(J)MO. If you have had students qualify for the USA(J)MO in the past, or you are anticipating this to be so this year, please look over this new material. REGARDLESS, do not throw this Manual away until you have received the results of this year's AIME. You may need the USA(J)MO forms.
6. The second AIME on Wednesday, March 28, 2012 is a new set of 15 questions, completely different from, but comparable in difficulty to the AIME on March 15, 2012.
7. Selection of USAMO & USAJMO participants will depend on the AMC 10/12 score, and AIME score..

We feel that the 2012 AIME will be interesting and challenging to your student(s). On behalf of the Committee on the American Mathematics Competitions, I send my appreciation to you for assisting with the implementation of this examination.

Sincerely,

Steven R. Dunbar
Director
MAA, American Mathematics Competitions

American Mathematics Competitions

University of Nebraska - Lincoln | PO Box 880658 | 1740 Vine Street | Lincoln, NE 68588-0658
402.472.2257/phone | 402.472.6087/fax | amcinfo@maa.org | amc.maa.org

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I. List of the Sponsors

The American Mathematics Competitions	
are Sponsored by	
The Mathematical Association of America - MAA	www.maa.org
The Akamai Foundation	www.akamai.com
Contributors	
Academy of Applied Sciences - AAS.....	www.aas-world.org
American Mathematical Association of Two-Year Colleges - AMATYC	www.amatyc.org
American Mathematical Society - AMS.....	www.ams.org
American Statistical Association - ASA.....	www.amstat.org
Art of Problem Solving - AoPS.....	www.artofproblemsolving.com
Awesome Math	www.awesomemath.org
Casualty Actuarial Society - CAS.....	www.casact.org
D.E. Shaw & Co.	www.deshaw.com
IDEA Math.....	www.ideamath.org
Jane Street	www.janestreet.com
Math for America.....	www.mathforamerica.org
Mu Alpha Theta - MAT	www.mualphatheta.org
National Council of Teachers of Mathematics - NCTM.....	www.nctm.org
Pi Mu Epsilon - PME	www.pme-math.org
Society for Industrial and Applied Math - SIAM.....	www.siam.org
W.H. Freeman and Company	www.whfreeman.com

II. Contents of Package

You will find enclosed, in addition to this Teachers' Manual, the following material:

- A list of your qualified AIME students.
- A sealed envelope containing one AIME for each of your qualified students and an extra copy for you. The envelope must NOT be opened until just before the examination is given on the authorized date.
- AIME Answer Forms. One for each participating student.
- One AIME School Identification Form.
- One AIME Report Envelope.
- One Alternate AIME Payment Form (page 11 in this Manual) and Return Envelope

We will mail the Solutions for the AIME with your AIME school report.

III. Preparation Instructions

1. Please study the contents of this Teachers' Manual.
 2. Reserve a room for 3 1/2 hours from 8:45 AM - 12:15 PM to administer the AIME on Thursday, March 15, 2012 from 9AM - 12 noon. This allows 15 minutes for pre- and post-examination activities and 3 hours for the examination itself. In extreme cases where you cannot administer the AIME between 7:00 am and 3:00 pm, please complete the academic integrity pledge form on page 13.
 3. Inform the students well in advance of the time and place. Urge them to prepare for the AIME by studying past AIME exams and solutions and other challenging problems. Refer to Form C- PUBLICATION ORDER FORM on Page 10 in this manual for ordering information relating to prior year AIME exams.
 4. Review the Examination Rules printed on the sealed envelope which contains the examination.
 5. Obtain a supply of:
 - a. Number 2 lead pencils with good erasers
 - b. Unmarked scratch paper
 - c. Rulers, compasses, protractors, and graph paper.
 6. Calculators and Computers are NOT permitted.
 7. Complete the AIME School Identification Form using the instructions found on the Form.
 8. Please study the AIME STUDENT ANSWER FORM. Have each student complete Side 1 of the Form using the instructions found on the Form. Please carefully follow the marking instructions printed on both the identification and student answer forms, and double check to see that all the items are filled out correctly. Students may not complete the personal information after the time allowed for the test. Only the information which has been properly blackened will be read by the Opscan reader. Be sure to mark the AMC 10 or AMC 12 score in the appropriate area, including decimals if needed.
 9. The AIME Answer Form is now ready for distribution to your qualified students on Thursday, March 15th.
 10. Make arrangements to mail your AIME Report Envelope by First Class Mail (or Express Mail if taking the alternate date). Please note that this is an oversized envelope and thus requires special postage even if it weighs one ounce or less.
1. Sign the Certification Form to certify that the package was opened within an hour before the contest (on page 7).
 2. Seat participants in alternate seats.
 3. Ensure that each participant has the supplies listed on Item 5 under Section III.
 4. Inform the students that they are not to open the exam booklet until instructed to do so.
 5. Pass out the examination and have the students read the instructions on the front cover.
 6. Next, distribute the AIME Answer Forms (which you or your students previously marked) to the students. Inform them that their answers should be marked with a pencil on SIDE 2 of the Form and that each problem has only one correct answer, an integer between 000 and 999 inclusive.
 7. Read aloud the following instructions for recording answers to the problems:
 - a. For each question you answer, USING A #2 PENCIL, for your reference write your answer at the top of the problem answer columns using 3 digits, then in each of these columns blacken the one circle which is labeled with the digit you have written at the top. PLEASE NOTE: A single digit answer, such as 7, should be written and blackened as 007 and a two digit answer, such as 43, should be written and blackened as 043.
 - b. DO NOT BLACKEN ANSWERS UNTIL YOU ARE CERTAIN OF YOUR FINAL CHOICE. AVOID, IF POSSIBLE, ERASURES IN THE CIRCLES.
 - c. The results will be graded by computer. Only the blackened circles will be graded.
 8. Ask the students if they have any questions about using the AIME Answer Form or about the instructions for the examination.
 9. Start the Examination.
 10. Check to see if each student is marking his/her Answer Form properly.
 11. Allow exactly 3 hours working time.
 12. If there is an urgent need to use a bathroom, inform the students that only one student may leave at one time and the AIME answer form and exam should be retained by you during the departure period. If there is a health or medical emergency a backup exam manager should be available for such a contingency.
 13. At the end of 3 hours, instruct the students to:
 - a. STOP.
 - b. Put aside the booklet and scratch paper and look again to be sure the AIME Answer Form has been filled out correctly.
 - c. Be sure the written answers on the top of the AIME Answer Form are in agreement with the blackened circles' coded answers.
 - d. Sign their name on Side 2 of the answer form.
 - e. Hand in the AIME Answer Form.
 - f. Keep the examination booklet for their reference in conjunction with your review of the Solutions. Inform the students that they may now leave the examination room.
 14. Complete the Certification Form (form A) and USA(J)MO Information Form (form B) found on pages 7 and 8.

IV. Day of the AIME Instructions

15. The following material should be sealed in the AIME Report Envelope, postmarked NO LATER THAN 24 hours after the examination is given, and sent to the AMC Office:
 - a. Signed AIME Certification Form A and USA(J)MO Information Form B.
 - b. AIME School Identification Form.
 - c. One AIME Answer Form for each participating student. Please do not paper clip or staple the forms together. Do not fold the forms.APO/FPO AND USA EMBASSY SCHOOLS must return materials by AIR EXPRESS MAIL (DHL, Federal Express, etc.).
16. Please note that if you have requested the “Alternate” AIME you will need to send your payment separately and in advance of the Wednesday, March 28th test date.

V. Report of the AIME Results

The AIME score of your student(s), Certificates of Participation, an AIME Solutions Pamphlet and the list of USA(J)MO selectees will be sent to you.

Please retain this report for future reference, either in your files or with the student counselor’s office. Many students cite these scores on college applications.

VI. Eligibility

Any student who is officially enrolled in high school (or below) and is taking at least one course at the school, and has not graduated, is eligible to take the AIME (with qualifying score). US and Canadian Citizens and students residing in the United States (with qualifying scores) are eligible to take the USA(J)MO.

Home School Students age 19.5 and under are eligible for the AIME (with qualifying score).

Students learning “English as a Second Language” (ESL) 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 AIME. The dictionary must be given to the school contest manager to examine and retain for the 24-hour period preceding the contest. The proctor must announce to other students that the student(s) has/have been given special permission to use the dictionary during the contest.

VII. Policy on AIME Administration

You must give the AIME on the official date (March 15th) to all students in the same place and at the same time; invited students who cannot be there miss this opportunity. Be advised that if students miss the exam, Thursday, March 15, 2012, they may take the alternate sitting of the exam, Wednesday, March 28, 2012. The second AIME on Wednesday, March 28, 2012 is a new set of 15 questions completely different from, but comparable to the AIME on March 15, 2012.

If you need to have a student or students sit for the second exam on March 28th, read below for the applicable details and then contact the AMC office if you have questions. There is a minimal charge for the second exam due to compressed shipping considerations. These two dates will be the only dates acceptable for qualifying for the USA(J)MO.

There is a processing fee for the second AIME as follows: 1-10 students = \$25, 11+ students = \$50. We need your payment before

we grade the answer forms. The Alternate AIME payment form can be found on page 11 of this manual. All Alternate AIME (AIME II) answer forms must be returned by “express mail” so that they arrive in the AMC office by March 30, 2012.

Email requests for the second AIME may be sent to:

AMCINFO@MAA.ORG

Email requests should include the school’s CEEB number and complete mailing address, teacher name, teacher email address, number of students taking the AIME II, and method of payment. Or, you may wish to register online using a credit card at amc-reg.maa.org. The AMC office will send a confirmation of registration for the AIME II. Please note that you will be billed for all AIME II shipped, unless you cancel your order before March 15, 2012.

Under no circumstances can a student take both AIME’s.

VIII. Visually Impaired and Learning Disabled Students

If one of your AIME qualified students is visually impaired and/or learning disabled please call the AMC office and we will discuss the options available to you. We do not have copies available in braille. The time allowance for students with learning disabilities is 4.5 hours.

IX. Request for Student Names

The following statement appears on the student answer forms for the AMC 10 and AMC 12:

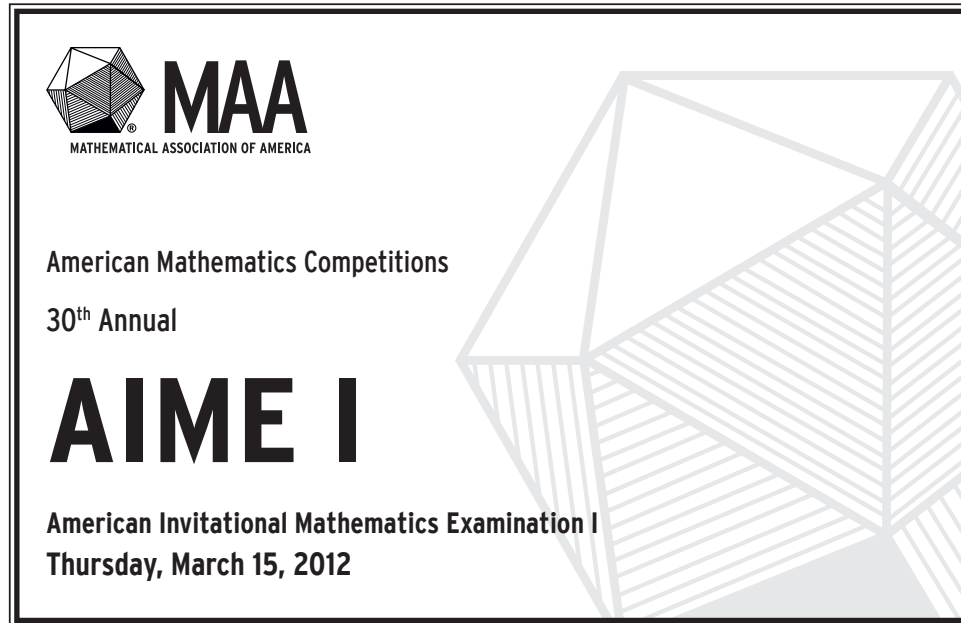
1. The American Mathematics Competitions (AMC) receives requests from educational institutions and organizations for the names, addresses and grade levels of high scoring students. This information is used for recruiting and academic purposes.
2. Blacken this circle if you give the AMC permission to release this information to these organizations. (Your score will not be affected if you do not blacken the circle.)

Receiving information is an “opt-in” decision for each individual student.

The AMC handles requests from institutions and organizations on a case-by-case basis and evaluates each individually for appropriateness. We provide legitimate educational institutions of all levels, both secondary and collegiate/university level, with one-time use of selected names and addresses for postal mailings. We also provide professional and scholarly organizations such as those listed as contributors to the AMC with one-time use of names and addresses for postal mailings, generally for professional or career information.

The only information we provide is the name, address, city, state, and zip code necessary for a postal mailing. We do not list individual scores or awards.

X. Fascimile of the March 15, 2012 AIME Front Cover



1. DO NOT OPEN THIS BOOKLET UNTIL YOUR PROCTOR GIVES THE SIGNAL TO BEGIN.
2. This is a 15-question, 3-hour examination. All answers are integers ranging from 000 to 999, inclusive. Your score will be the number of correct answers; i.e., there is neither partial credit nor a penalty for wrong answers.
3. No aids other than scratch paper, graph paper, ruler, compass, and protractor are permitted. In particular, **calculators and computers are not permitted.**
4. A combination of the AIME and the American Mathematics Contest 12 are used to determine eligibility for participation in the USA Mathematical Olympiad (USAMO). A combination of the AIME and the American Mathematics Contest 10 are used to determine eligibility for participation in the USA Junior Mathematical Olympiad (USAJMO). The USAMO & the USAJMO will be given in your school on TUESDAY and WEDNESDAY, April 24 & 25, 2012.
5. Record all of your answers, and certain other information, on the AIME answer form. Only the answer form will be collected from you.

After the contest period, permission to make copies of individual problems in paper or electronic form including posting on web pages 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.

FORM A - Examination Certification 2012 AIME

Certification by the Examination Manager:

I certify that the 2012 American Invitational Mathematics Examination was given today, Thursday, March 15, 2012 / Wednesday, March 28, 2012 (circle appropriate date); that all students who took it did so at the same time and place; that only invited students took it; that the 3-hour time limit was strictly enforced; that the test envelope was sealed until the time of the test; that no student had access to the test questions in advance; that the students were continually supervised by a proctor while they were taking the test; that I am returning those materials as required in Section IV; and that all other rules for administering the test were followed.

YES NO If no, describe the exceptions on a separate sheet of paper.

I also certify that I understand and accept the following for our school. The Committee on the American Mathematics Competitions reserves the right to:

1. Disqualify all scores from our school if it is determined that the required security procedures were not followed.
2. Re-examine students if, after an inquiry, there is a reasonable basis to believe that the scores do not validly represent the ability of the students. (The procedures for disqualification, follow-up inquiries and re-examination are similar to those for the AMC 10 and AMC 12, as outlined in the AMC 10/12 Teachers' Manual.)

Signature of AIME School Manager _____

Email _____

Date _____ School Telephone # _____

Name of School _____

State _____ School Identification Number (CEEB) _____

The AIME was administered on (circle correct date) March 15, 2012 March 28, 2012

Starting Time _____ Ending Time _____

Student(s) who qualified for the AIME at multiple locations:

Student Name: _____

Reg.attended school: CEEB#: _____ Name: _____

Other location: CEEB#: _____ Name: _____

Student Name: _____

Reg.attended school: CEEB#: _____ Name: _____

Other location: CEEB#: _____ Name: _____

If there are more than 2 students, please attach a separate page with this information listed for each student.

The Examination Manager and the Principal, Vice Principal, or Headmaster must sign this form. Return it with your student Answer Forms.

Certification by the Principal, Official or person with comparable title:

I agree that the contest manager followed all the rules and procedures listed above.

Signature _____ Time _____

Title _____ Date _____

Please also complete the OLYMPIAD INFORMATION Form B, found on Page 8.

FORM B - USAMO/USAJMO Information Form

When a student qualifies for the United States of America Mathematical Olympiad (USA(J)MO), both the student and the USA(J)MO School Manager are notified at least one week before the USA(J)MO date. Don't worry about an invitation getting lost in the mail. When a USA(J)MO invitation is extended, both the student and the USA(J)MO School Manager must complete and return a USA(J)MO Response Form. If the Form is not returned, we do a follow-up.

Please provide the information requested below if you agree to administer the USA(J)MO. There is no fee for participating in the USA(J)MO.

AGREEMENT STATEMENT:

In the event that I have a qualifying student(s), I or my designee (indicated below) agree to:

1. Serve as the USA(J)MO School Manager.
2. Administer the USA(J)MO on Tuesday, April 24th, and Wednesday, April 25th, 2012 to the student(s) in my school who qualify and not to any other students.
3. Arrange for the exclusive use of a room for four and a half hours (from 12:30pm to 5:00pm, eastern daylight time or your time zone equivalent, see below) on the designated days which will be used to administer the USA(J)MO.
4. Have a proctor present in the room to supervise the student(s) during the entire nine hours duration of the examination.
5. Have the ability to fax the students answer sheets to the AMC fax number immediately, to be graded with the rest of the papers by the AMC.

I understand that results of my participating USA(J)MO students could be voided if the rules and procedures associated with the administration of the USA(J)MO are not followed.

Signature _____

Telephone Number _____ Date _____

Name of USA(J)MO School Manager _____

eMail _____

School _____ CEEB#: _____

City _____ State _____ Zip _____

PLEASE NOTE THIS YEARS 4.5 HOURS PER DAY TIME LENGTH AND 2 DAYS LENGTH FOR THE 2012 USA(J)MO:

TUESDAY, April 24, 2012

12:30-5:00 p.m., Eastern Daylight Time
 11:30-4:00 p.m., Central Daylight Time
 10:30-3:00 p.m., Mountain Daylight Time
 9:30-2:00 p.m., Pacific Daylight Time

WEDNESDAY, April 25, 2012

12:30-5:00 p.m., Eastern Daylight Time
 11:30-4:00 p.m., Central Daylight Time
 10:30-3:00 p.m., Mountain Daylight Time
 9:30-2:00 p.m., Pacific Daylight Time

All other time zones, contact the AMC office at amcinfo@maa.org



American Mathematics Competitions

Available Publications - Descriptions

For more complete descriptions please see our web site:
amc.maa.org

For additional publications please visit the MAA online store at: www.maa.org

AMC Middle School Publications

- 1. Individual AJHSME/AMC 8 Practice Sets
Please refer to #10, the AJHSME & AMC 8 CD or #16, the MAA AMC 8 Math Club Package.
- 2. AMC 8 Summary of Results.....\$6.00 each
Contains a listing of school and student award recipients, etc., and statistical tables.

AMC High School Publications

- 3. Individual AMC 10 Practice Sets.....\$2.00 each
AMC 10A or AMC 10B. Each set contains an exam booklet and a solutions pamphlet.
- 4. Individual AHSME/AMC 12 Practice Set.....\$2.00 each
AMC 12A or AMC 12B. Each set contains an exam booklet and a solutions pamphlet.
- 5. Individual AIME Practice Sets.....\$2.00 each
AIME I or AIME II. Each set contains an exam booklet and a solutions pamphlet.
- 6. AMC 10/12 Summary of Results\$11.00 each
Contains a listing of school and student award recipients, etc., and statistical tables.

School Awards

- 7. Recognition for Achievement Award Pin.....\$3.50 each
- 8. AMC 8 Merit Certificate.....\$3.00/set
Contains 10 certificates per set.
- 9. AMC 10/12 Merit Certificate.....\$3.00/set
Contains 10 certificates per set.

Other Items

- 10. CD -- AJHSME & AMC 8 (1985-2007)\$20 each
Contains all the Junior High/Middle School contests, from the first AJHSME in 1985 through the name change in 2000 to AMC 8. Includes all the class worksheets currently developed, 1999- 2007.
- 11. CD -- AHSME 1 (1950-1974)\$20 each
Contains the first 25 years of the original Annual high school contests, from the first Math Contest in 1950, through the name change to Annual High School Math Examinations (AHSME) in 1956 to 1974.
- 12. CD -- AHSME 2 (1975-1999)\$20 each
Contains the second 25 years of the Annual High School Math Examinations (AHSME), from 1975 to 1999.
- 13. CD -- AIME (1983-2008), USAMO (1972-2008), MOSP (2006-07)\$20 each
Contains AIME and USAMO contests and solutions for stated years along with selected Math Olympiad Summer Program materials.
- 14. MAA AMC T-Shirt\$15 each
Choose from a black t-shirt with the theme, "6 Decades of the American Mathematics Competitions." Design on back, logo on front left chest, or choose a light blue t-shirt featuring the new MAA logo. Design on front chest and upper back. Men's sizes available: Small, Medium, Large and X-Large. Quantities are limited in black.



front

back



back of black shirt

- 15. MAA AMC Men's Dress Ties\$12 each
Navy blue with mathematical terms.
- 16. MAA AMC 8 Math Club Package\$25 each
Tips and ideas for Middle School - use with your Math Club or Circle, or with students in class. Includes 50 new question worksheets and an appendix on "Elusive Formulas." Contains a CD of the AMC contests for the 21st century AMC 8, AMC 10, and AMC 12 and for the AIME and USAMO. The CD also includes problem worksheets from the AMC 8 and the AMC 10 and AMC 12.
- 17. MAA AMC 10/12 Math Club Package\$25 each
Tips and ideas for High School - use with your Math Club or Circle, or with students in class. Includes 50 new question worksheets and an appendix on "Elusive Formulas" Contains a CD of the AMC contests for the 21st century AMC 8, AMC 10, and AMC 12 and for the AIME and USAMO. The CD also includes problem worksheets from the AMC 8 and the AMC 10 and AMC 12.

Publications Order Form

FAX: 402-472-6087 | 1-800-527-3690 | amcinfo@maa.org

- Years not listed are sold out -

AMC Middle School Publications

- Individual Practice Set (exams & solutions) for AHSME/AMC 8
Please refer to #10 the AHSME & AMC 8 CD or #16 the MAA AMC 8 Math Club Package.

2. AMC 8 Summary of Results # ____ @ \$ 6/ea = \$ ____
08 ____ 09 ____

AMC High School Publications

- Individual Practice Set (exams & solutions) for AMC 10 A/B # ____ @ \$ 2/ea = \$ ____

11A ____
11B ____

- Individual Practice Set (exams & solutions) for AHSME/AMC 12 A/B

07 ____ 08 ____ 09 ____ # ____ @ \$ 2/ea = \$ ____
11A ____
04B ____ 08B ____ 10B ____ 11B ____

- AIME /Alternate AIME (includes exams & solutions) # ____ @ \$ 2/ea = \$ ____

91 ____ 93 ____ 95 ____ 96 ____ 97 ____ 98 ____ 99 ____
AIME I 00 ____ 01 ____ 03 ____ 04 ____ 05 ____ 07 ____ 08 ____ 09 ____ 10 ____ 11 ____
AIME II 00 ____ 01 ____ 03 ____ 04 ____ 05 ____ 06 ____ 07 ____ 08 ____ 09 ____ 10 ____

- AMC 10/12 Summary of Results # ____ @ \$11/ea = \$ ____
00 ____ 01 ____ 02 ____ 03 ____ 04 ____ 05 ____ 10 ____

School Awards

- Recognition for Achievement Award Pin # ____ @ \$ 3.50/ea = \$ ____
- AMC 8 Merit Certificate (10 per set) # ____ @ \$ 3/ea = \$ ____
- AMC 10/12 Merit Certificate (10 per set) # ____ @ \$ 3/ea = \$ ____

Other Items

- CD-AHSME/AMC 8 1985-2007, *contests, solutions & worksheets* # ____ @ \$20/ea = \$ ____
- CD-AHSME 1, 1950-1974, *contests & solutions* # ____ @ \$20/ea = \$ ____
- CD-AHSME 2, 1975-1999, *contests & solutions* # ____ @ \$20/ea = \$ ____
- CD-AIME, 1983-2008 + USAMO, 1972-2008 # ____ @ \$20/ea = \$ ____
- MAA AMC T-Shirt # ____ @ \$15/ea = \$ ____
Men's sizes: Small ____ Medium ____ Large ____ X-Large ____
Colors: Black ____ Light Blue ____
- MAA AMC Men's Navy Blue Dress Ties # ____ @ \$12/ea = \$ ____
- MAA AMC 8 Math Club Package w/ decade CD # ____ @ \$25/ea = \$ ____
- MAA AMC 10/12 Math Club Package w/ decade CD # ____ @ \$25/ea = \$ ____
- 2009-2010 MAA AMC 10/12 Math Club Package w/ CD # ____ @ \$25/ea = \$ ____

TOTAL (Minimum order \$10)\$ ____

Postage & Handling (See TERMS at right)\$ ____

GRAND TOTAL.....\$ ____

Please fill in ALL of the requested information
Shipping/Billing Address

(If other than a school, please strike out school and any other irrelevant headers and fill in the name, and ship-to address.)
(Please Print)

Teacher/Contest manager: _____

School Name: _____

School Street Address: _____

City: _____ State: _____ Zip: _____

School Phone #: _____

Email address: _____

CHARGE INFORMATION:

Print name on card: _____

VISA/MC #: _____

Exp. Date: _____

Email address: _____

Address: _____

MAA AMC Publications Ordering – TERMS

- Minimum order \$10 is required.
- VISA and MasterCard accepted.
- Make checks payable to: **American Mathematics Competitions**
- Payment in U.S. Funds Only.**
- U.S. Contiguous 48 States Only:** There is no additional fee for shipping.
- All others, including Canadian and International Orders:**
Additional shipping required for International/overseas addresses, please contact the AMC office at amcinfo@maa.org for more information.
- Purchase Orders, and checks in U.S. funds will also be accepted.
- Prices good until September 1, 2012.
- Please allow 2-3 weeks for delivery.

FAX: 402-472-6087 or 1-800-527-3690 *Please fax or send your order to:*

MAA American Mathematics Competitions

ATTN: AMC Publications

PO Box 81606

Lincoln, NE 68501-1606

FORM D - Alternate AIME Payment Form

2012 Alternate AIME

Wednesday, March 28, 2012

The Alternate AIME on Wednesday, March 28, 2012 is a new set of 15 questions, completely different from, but comparable to the AIME on March 15, 2012. Please send payment before March 23, 2012. If you are using a credit card, you may register online at amc-reg.maa.org

PLEASE PRINT

School CEEB # _ _ _ _ _

Contest Manager: _____

School Name: _____

School Address: _____

City: _____ State: _____ Zip: _____

School Phone #: _____

Email: _____

There will be a processing fee for the second AIME as follows: 1-10 students = \$25, 11+ students = \$50. We will need your payment before the answer forms can be graded. A special envelope and payment form has been included with your AIME material. All AIME answer forms must be returned by "express mail" so that they arrive in the AMC office by March 30, 2012.

Number of AIME qualifiers who will be taking the Alternate AIME on Wednesday, March 28, 2012:

Number of Alternate Exams Requested: # _____

1-10 student qualifiers @ \$25.00 = \$ _____
OR

11+ student qualifiers @ \$50.00 = \$ _____

Method of Payment:

Check enclosed (US funds only) made payable and mailed with this form

AMERICAN MATHEMATICS COMPETITIONS
University of Nebraska-Lincoln
PO Box 880658
Lincoln, NE 68588-0658

Charge to Visa/Mastercard #: _____

Name on card (print): _____

Signed: _____

Expiration Date: _____ Telephone: _____

Email: _____

Form E - Rescoring Request Form

I would like to have the following student's answer form rescored. I understand that there is a \$10.00 charge for each student answer form rescored.

\$ 10.00/each

Student Name _____ \$ _____

Contest taken: AMC 10-A AMC 10-B AMC12-A AMC12-B AIME AIME II

Student Name _____ \$ _____

Contest taken: AMC 10-A AMC 10-B AMC12-A AMC12-B AIME AIME II

Student Name _____ \$ _____

Contest taken: AMC 10-A AMC 10-B AMC12-A AMC12-B AIME AIME II

Grand Total _____ \$ _____

School Name _____ CEEB # _____

Name: _____

Email: _____

Address: _____

City _____ State: _____ Zip _____

Method of Payment:

Check (US funds only) made payable and mailed with this form to:

AMERICAN MATHEMATICS COMPETITIONS

University of Nebraska-Lincoln

P.O. Box 81606

Lincoln, NE 68501-1606

Charge to Visa/Mastercard#: _____

Name on card (print): _____

Signed _____

Expiration Date: _____ Telephone: _____

FAX to: 402-472-6087

FORM F – AMC Academic Integrity Form

ETS/CEEB # _____

American Invitational Mathematics Examination (AIME)*On-site Official***Section 1 – Student**

This disclaimer statement is to be completed by all students taking the AIME in their school on the scheduled date of the contest, but at a later time from the other students, due to the requirement of attendance at an official academic function, which conflicted with the regularly scheduled time of the administration of the AIME. Reexamination may be requested if, after an inquiry, there is a reasonable basis to believe that a high score is well beyond a student's ability due to extremely lucky guessing, dishonesty or some other circumstance.

I certify that prior to my taking of the 2012 AIME on Thursday, March 15, 2012, I had absolutely no contact or communication with any student who participated in the contest, nor had I seen any of this year's contest questions.

Signed: _____ Date: _____

Name of School: _____

Section 2 – Contest Administrator

This section is to be completed by the teacher who administered the AIME on the day of the contest (Thursday, March 15, 2012) but at a time different from the regularly scheduled time.

This student (these students) participated in an officially sanctioned academic function. The student(s) had no contact or communication with any student who participated in the contest, nor had they seen any of this year's AIME. All contest papers were collected after any previous administrations, and students were instructed not to discuss the questions.

I administered the AIME to the student(s) indicated in Section 1 on (DATE): _____

Contest time period: From _____ to _____

Name (please print): _____

Title (please print): _____

Signature: _____

School name and address: _____

Date this form completed: _____

PLEASE INCLUDE THIS FORM WITH THE ANSWER FORMS OF THE STUDENTS.

IX. EXAM AUXILIARY MATERIAL

Practice Worksheets

Jar A contains four liters of a solution that is 45% acid. Jar B contains five liters of a solution that is 48% acid. Jar C contains one liter of a solution that is $k\%$ acid. From jar C, $\frac{m}{n}$ liters of the solution is added to jar A, and the remainder of the solution in jar C is added to jar B. At the end both jar A and jar B contain solutions that are 50% acid. Given that m and n are relatively prime positive integers, find $k + m + n$.

2011 AIME I, Problem #1—

“ How much acid is in the mixture of all three jars? ”

Solution

Answer (085): If the contents of all three jars were mixed together, the mixture would be ten liters that is 50% acid. Thus the total amount of acid in the three solutions is $4 \cdot 0.45 + 5 \cdot 0.48 + 0.01k = 5$, so $k = 80$. When x liters from jar C are added to jar A, the final proportion of acid in jar A is $0.5 = \frac{4 \cdot 0.45 + 0.8x}{4+x}$. Solving gives $x = \frac{2}{3}$, and so the requested sum is $80 + 2 + 3 = 85$.

CCSS-M: N-Q.1. Use units as a way to understand problems and to guide the solution of multi-step problems;

Problem Worksheets, continued

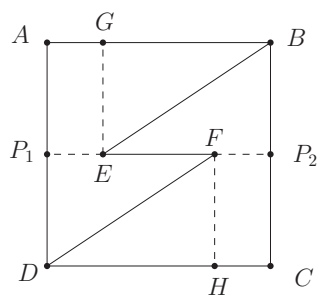
In rectangle $ABCD$, $AB = 12$ and $BC = 10$. Points E and F lie inside rectangle $ABCD$ so that $BE = 9$, $DF = 8$, $\overline{BE} \parallel \overline{DF}$, $\overline{EF} \parallel \overline{AB}$, and line BE intersects segment \overline{AD} . The length EF can be expressed in the form $m\sqrt{n} - p$, where m, n , and p are positive integers and n is not divisible by the square of any prime. Find $m + n + p$.

2011 AIME I, Problem #2—

“ Take advantage of the Pythagorean Theorem. ”

Solution

Answer (036):



Let G be the foot of the perpendicular from E to \overline{AB} , and let H be the foot of the perpendicular from F to \overline{CD} . Note that $\triangle BEG$ is similar to $\triangle DFH$, thus $\frac{EG}{FH} = \frac{BE}{DF}$. Therefore $\frac{10 - FH}{FH} = \frac{9}{8}$, and $FH = \frac{80}{17}$. Note that

$$\begin{aligned}
 EF &= P_1P_2 - P_1E - P_2F \\
 &= AB - AG - CH \\
 &= AB - (AB - BG) - (CD - DH) \\
 &= BG + DH - CD \\
 &= \frac{9}{8} \cdot DH + DH - CD \\
 &= \frac{17}{8} \cdot DH - CD \\
 &= \frac{17}{8} \sqrt{DF^2 - FH^2} - CD \\
 &= \frac{17}{8} \sqrt{8^2 - \left(\frac{80}{17}\right)^2} - 12 \\
 &= 3\sqrt{21} - 12.
 \end{aligned}$$

Thus $m + n + p = 36$.

CCSS-M: G-SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

AIME 2012 Teacher Manual
Problem Worksheets, continued

Let L be the line with slope $\frac{5}{12}$ that contains the point $A = (24, -1)$, and let M be the line perpendicular to line L that contains the point $B = (5, 6)$. The original coordinate axes are erased, and line L is made the x -axis and line M the y -axis. In the new coordinate system, point A is on the positive x -axis, and point B is on the positive y -axis. The point P with coordinates $(-14, 27)$ in the original system has coordinates (α, β) in the new coordinate system. Find $\alpha + \beta$.

2011 AIME I, Problem #3—
“ What are the equations for L and M ? ”

Solution

Answer (031): The equations for L and M are $5x - 12y - 132 = 0$ and $12x + 5y - 90 = 0$, respectively. Because P lies in the second quadrant in the new coordinate system, it follows that

$$\alpha = \text{negative distance from } P \text{ to } M = \frac{-|12 \cdot (-14) + 5 \cdot 27 - 90|}{\sqrt{12^2 + 5^2}} = \frac{-123}{13}, \text{ and}$$

$$\beta = \text{positive distance from } P \text{ to } L = \frac{|5 \cdot (-14) - 12 \cdot 27 - 132|}{\sqrt{12^2 + 5^2}} = \frac{526}{13}.$$

$$\text{Thus } \alpha + \beta = -\frac{123}{13} + \frac{526}{13} = 31.$$

CCSS-M: A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Problem Worksheets, continued

In triangle ABC , $AB = 125$, $AC = 117$, and $BC = 120$. The angle bisector of angle A intersects \overline{BC} at point L , and the angle bisector of angle B intersects \overline{AC} at point K . Let M and N be the feet of the perpendiculars from C to \overline{BK} and \overline{AL} , respectively. Find MN .

2011 AIME I, Problem #4—

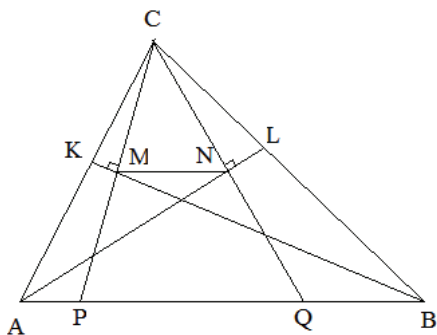
“ Try to extend \overline{CM} and \overline{CN} to meet \overline{AB} . ”

Solution

Answer (056): Extend \overline{CM} and \overline{CN} to meet \overline{AB} at points P and Q , respectively. Triangles BPM and BCM are congruent. Thus M is the midpoint of \overline{PC} . Analogously, N is the midpoint of \overline{QC} . Hence \overline{MN} is a midline of triangle PQC , and $MN = \frac{PQ}{2}$. Furthermore,

$$PQ = AQ + BP - AB = AC + BC - AB = 112.$$

Thus $MN = 56$.



CCSS-M:G-SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Problem Worksheets, continued

The vertices of a regular nonagon (9-sided polygon) are to be labeled with the digits 1 through 9 in such a way that the sum of the numbers on every three consecutive vertices is a multiple of 3. Two acceptable arrangements are considered to be indistinguishable if one can be obtained from the other by rotating the nonagon in the plane. Find the number of distinguishable acceptable arrangements.

2011 AIME I, Problem #5—

“What are the digits at the vertices adjacent to the vertex labeled 1”

Solution

Answer (144): Let the nonagon be $ABCDEFGHIJ$, and let the digits on the vertices be $a, b, c, d, e, f, g, h,$ and j , respectively. It may be assumed that $a = 1$, so $b + c \equiv 2 \pmod{3}$. If $\{b, c\} = \{4, 7\}$, it is impossible for $b + c + d$ to be a multiple of 3. Therefore one of b and c belongs to the set $\{2, 5, 8\}$, and the other belongs to $\{3, 6, 9\}$. It follows that the only possible sequences of digits (mod 3) are $(1, 2, 0, 1, 2, 0, 1, 2, 0)$ and $(1, 0, 2, 1, 0, 2, 1, 0, 2)$. In each of the two sequences, there are 2 possible choices for the ordered pair (d, g) and 6 possible choices for each of the ordered triples (b, e, h) and (c, f, j) . Thus the total number of distinguishable acceptable arrangements is $2 \cdot 2 \cdot 6 \cdot 6 = 144$.

CCSS-M: S-CP.9. Use permutations and combinations

Press Release

The sample Contest Announcement news release below, should be prepared and distributed to the newspapers, radio and television stations in your region. To make preparation of the news release easier, visit our web site, and download the text from the online copy of the AIME Teachers' Manual. See the AMC website, or the 2011 Summary of Results for statistics and figures from the 2011 contest. Statistics and figures for the 2012 Contest will be available on our website in late March and early April 2012. Printing this on a sheet of school stationery gives an official look to the page.

(School or School District)
FOR IMMEDIATE RELEASE

(School) STUDENTS PARTICIPATE IN NATIONAL MATHEMATICS COMPETITION

(#) students at (School) participated in the 30th annual American Invitational Mathematics Examination (AIME). (Student names) qualified for the AIME by scoring in the top 2.5% of the American Mathematics Contest 10 (AMC 10, 10th grade and below). (Student names) qualified for the AIME by scoring 100 or more out of a possible 150 (approximately the top 5%) on the American Mathematics Contest 12 (AMC 12, 12th grade and below).

The AIME was held on Thursday, March 15, 2012, (or Wednesday, March 28, 2012). This contest was established in 1973 as an intermediate step between the high school (AMC 10 and AMC 12) contests and the U. S. A. Mathematical Olympiad (USA(J)MO). The AIME is a 15 question, 3 hour examination in which each answer is an integer number from 0 to 999, students are very unlikely to obtain the correct answer by guessing. The questions on the AIME cover high school mathematics, and are much more difficult than those on the AMC 10 and AMC 12. All problems on the AIME can be solved by pre-calculus methods. The use of calculators is not allowed. This contest leads to the USA(J)MO, MOSP (Mathematical Olympiad Summer Program) and the selection of the USA team sent to the International Mathematical Olympiad (IMO), the premier international high school level problem solving contest. This year the IMO will be held in Mar del Plata, Argentina, July 8-16, 2012.

According to Prof. Steven Dunbar, who serves as Director of the American Mathematics Competitions, the AIME is one of a series of contests sponsored each year by The Mathematical Association of America, through their program, the American Mathematics Competitions (AMC). The AMC offers the only math competition series in the country leading to the USA(J)MO and the Mathematical Olympiad Summer Program (MOSP). From this group of students, the AMC sends the highly competitive USA Team to the prestigious annual International Mathematical Olympiad. The AMC program includes:

American Mathematics Contest 8 (AMC8)	Grades 6- 8	November
American Mathematics Contest 10 (AMC 10)	Grades 10 & below	2 dates in January/February
American Mathematics Contest 12 (AMC 12)	Grades 12 & below	2 dates in January/February
American Invitational Mathematics Examination (AIME)	All who qualify	2 dates in March
USA Mathematical Olympiad (USAMO)	All who qualify	mid- to late-April
USA Junior Mathematical Olympiad (USAJMO)	All who qualify	mid- to late-April
Mathematical Olympiad Summer Program (MOSP)	Qualify thru USA(J)MO	June
International Mathematical Olympiad (IMO)	Top six from USA(J)MO, MOSP	July

The AMC is located at the University of Nebraska - Lincoln. and receives direct financial contributions from The Mathematical Association of America, The Akamai Foundation, Academy of Applied Sciences, American Mathematical Association of Two-Year Colleges, American Mathematical Society, American Statistical Association, Art of Problem Solving, Awesome Math, Casualty Actuarial Society, IDEA Math, Jane Street, Math For America, Mu Alpha Theta, National Council of Teachers of Mathematics, Pi Mu Epsilon and W. H. Freeman and Company.. The Contests are given across the U.S.A, Canada, and in many schools abroad.

Details concerning the 2012 AIME contests for High School, as well as the rest of AMC's programs are available on the AMC web site: amc.maa.org.

American Mathematics Competitions

University of Nebraska - Lincoln | PO Box 880658 | 1740 Vine Street | Lincoln, NE 68588-0658
 402.472.2257/phone | 402.472.6087/fax | amcinfo@maa.org | amc.maa.org



American Mathematics Competitions

March 2012

Dear Parent or Guardian:

On March 15, 2012 or March 28, 2012 your son or daughter participated in the 30th annual American Invitational Mathematics Examination (AIME). This contest was established in 1973 as an intermediate step between the high school (AHSME) contest and the USA Mathematical Olympiad (USA(J)MO). The AIME is taken by students who achieved a score of 100 or more out of a possible 150 (approximately the top 5%) on the AMC 12, and students who achieve a score of 120 or more (approximately the top 2.5%) on the AMC 10 .

The AIME is a 15 question, 3 hour examination in which each answer is an integer number from 0 to 999. The questions on the AIME are much more difficult than those on the AMC 10 and AMC 12, and students are very unlikely to obtain the correct answer by guessing. All problems on the AIME can be solved by pre-calculus methods. The use of calculators is not allowed.

This contest leads to the USAJMO, USAMO, MOSP (Mathematical Olympiad Summer Program) and the selection of the USA team sent to the International Mathematical Olympiad (IMO), the premier international high school level problem solving contest. This year the IMO will be held in Mar del Plata, Argentina, July 8-16, 2012.

The AIME provides the exceptional students who are invited to take it with yet another opportunity to challenge their mathematical abilities. Like all examinations, it is but a means towards furthering mathematical development and interest. The real value of the examination is in the learning that can come from the preparation beforehand and from further thought and discussion of the solutions.

Our organization regularly receives requests from well-known colleges and universities for the names of high scoring students. A few colleges offer scholarships to students in their region with high scores on the contests. 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 hard, but designed to be within reach. Even so, if your son or daughter managed to solve only one or two problems, one should still feel that they accomplished something, because these problems are meant to be more challenging than they routinely encounter in their mathematics courses.

Mathematics is increasingly important in our technological and scientific age. Taking enough mathematics in high 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 enjoyed the contests, and will continue to take mathematics courses and competitions in high school and beyond.

Sincerely,

Dr. Steven R. Dunbar

Director

MAA American Mathematics Competitions

American Mathematics Competitions

University of Nebraska - Lincoln | PO Box 880658 | 1740 Vine Street | Lincoln, NE 68588-0658
402.472.2257/phone | 402.472.6087/fax | amcinfo@maa.org | amc.maa.org