



**The Mathematical Association of America  
AMERICAN MATHEMATICS COMPETITIONS**

**22<sup>nd</sup>** Annual Contest

# **AMC 8**

# TEACHERS' MANUAL

Instructions and Reporting Forms for  
School Contest Managers

**TUESDAY, November 14, 2006**

*Please read this booklet completely upon receipt.*

**DATES OF THE 2007 CONTESTS**

- AMC 10/AMC 12 - Tuesday, February 6, 2007 &/or  
Wednesday, February 21, 2007  
AIME - Tuesday, March 13 or Wednesday, March 28, 2007  
USAMO - Tuesday & Wednesday, April 24-25, 2007



# The MATHEMATICAL ASSOCIATION OF AMERICA

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## American Mathematics Competitions

Steven Dunbar  
Director

To All AMC 8 Managers:

Welcome to the **twenty-second** annual American Mathematics Competitions' AMC 8. You and your students will find the **2006** AMC 8 an excellent learning experience.

If this is the first year you have administered the AMC 8, please take a moment to read thoroughly this manual for the rules and regulations. Several days before the contest date fill out the School Identification Form and have the students complete the non-answer sections of the Answer Form (See Sections V. and VI., page 5.)

We again have a "window" which 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 are **November 15, 16, 17, 20, and 21**. Further rules governing the use of the "window" are found on page 6 of this manual.

Last year, the Edyth May Sliffe Award, recognizing distinguished mathematics teaching, was given regionally to fifty-three Sponsoring Teachers from high scoring AMC 8 schools. This program will be continued in **2006**. Further details for nominating a teacher from your school are on page 8. If you nominated someone at the time you registered, it will not be necessary to complete this form again.

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.

Very sincerely,

Steven Dunbar  
Director

# Table of Contents

Letter to Teachers .....	2
I. Points to Note .....	3
II. Contents of The Package .....	4
III. What Must Be Done Prior To <b>November 14, 2006</b> .....	4
IV. Instructions For The Day of The Contest .....	4
V. Instructions For Completing The School Identification Form .....	5
VI. What To Do Following The Contest .....	5
VII. Report of Results.....	5
VIII. Eligibility and Participation Schedule.....	5
IX. Policy Statements .....	6
X. Intramural Awards.....	6
XI. AMC 8 CERTIFICATION FORM <b>2006</b> .....	7
Questionnaire to Help Us Serve You Better .....	8
XII. Sliffe Nomination Form .....	8
XIII. Additional Bundles Form .....	9
XIV. Proof of Intent to Pay.....	9
XV. AMC 8 Rescoring Request Form.....	10
XVI. AMC 8 Practice Questions.....	11
XVII. Publicity.....	20
XVIII. Letter to Parents.....	21
XIX. Certificate of Participation (facing page).....	22
XX. Facsimile of the AMC 8 front cover.....	23
AMC Sponsors and Contributors .....	24

## I. Points to Note

### 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.

### Let Parents/Guardians know about this activity!

The letter found on page 21 can be duplicated and sent home with students or handed out at parent/teacher conference time or open house.

### Give your Student Scores a Boost!

You can find a sampling of good practice questions on Pages 11-19 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 “Math Club Package” line on Additional Bundles Form on page 9 to order.)

### Survey Questionnaire

Please answer the questions found on page 8. Mark responses using the grid on the back side of the school ID Form.

## II. Contents Of The Package

Your contest package contains

1. Teachers' Manual,
2. AMC 8 Report Envelope (marked with your school ID),
3. School Identification Form,
4. Contest bundles,
5. 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.)
6. Solution Pamphlet Sets (if ordered) in sets of 10,
7. Contest Manager's Envelope (contains a complimentary copy of the AMC 8 contest and solutions),
8. Complimentary materials
9. Math Messenger.

## III. What Must Be Done Prior To November 14, 2006

1. Complete the following Pre-Examination processes associated with the AMC 8 Answer Forms:

- a. Stamp or print the Name and Address of your School (including ZIP code, if applicable) in the box in the upper right-hand corner on each form. DO NOT put any type of paste-on or adhesive address label on the form. The block could be filled in by using a computer program to print the information.

*Please note that it is very important that each form is identified with your school name. We have no way to identify the answer form if the school name is omitted.*

- b. 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

For each math class participating in the AMC 8, 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 page 6).

- (5) Age, grade and gender
- c. Collect the Answer Forms for redistribution on the contest date.
  - d. 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 2006 AMC 8, found on page 23 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 FIRST CLASS MAIL.
  7. Obtain a supply of: (a) #2 lead pencils with good erasers, (b) unmarked scratch paper, and (c) calculators for your class if you wish to use them. Students may not share a calculator.

Inform students that no aids are permitted other than scratch paper,

graph paper, ruler, erasers and calculators that are accepted for use on the SAT. No problems on the contest will require the use of a calculator. (See <[http://apps.collegeboard.com/cbsearch\\_code/code-SearchHighschool.jsp](http://apps.collegeboard.com/cbsearch_code/code-SearchHighschool.jsp)> for details.)

## 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 twenty-five 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 **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.
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, www, copier or media of any type until after November 21.** Tell students that their contest will be returned to them after that date.
16. As the Answer Forms are handed in, check that each student's name is on each one.
17. **Please do not grade the answer forms.** Send them to Lincoln 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.
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."

### Mark as follows:

**Schools using U.S.A. ZIP Codes:** Blacken the circles for 0-9 in each column for the five digits and blacken one circle of the letters A-J for the letter that has been assigned uniquely to your school.

**Canadian Schools:** All schools have a School ID that follows this pattern: letter, digit, letter, blank, blank, letter. Blacken the correct circles under these 6 characters. Be sure to darken the blank circles (not the circles containing zeroes) for the two blanks in your School ID.

**Schools outside the U.S.A.:** All schools have a School ID in which the six characters are letters (A-Z), unless the 4th and/or 5th characters are blanks. Blacken the correct circles under these six characters. Be sure to blacken the blank circles (not the circles containing zeroes) for the blanks in your school ID.

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 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.**
  - b. Place no more than 200 forms in one envelope.
  - c. Do not return blank forms or teacher "practice" forms.
2. Complete the Certification Form, page 7. If you did not nominate a teacher for the Sliffe award when you registered, please do so now on the Sliffe Award Nomination Form on page 8.
  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 First Class (affix the correct postage before mailing) within 24 hours or as soon as possible after all administrations have taken place.

### Notes:

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

- a.  The AMC 8 Student ANSWER FORMS sent to Lincoln for grading will not be returned.
- b.  We charge \$5 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, www, copier or media of any type until after **November 21**.
  - b. The contest booklets must be collected from the students. They may be returned after **November 21**.

## VII. Report Of Results

The AMC 8 will be centrally scored at the AMC office at the University of Nebraska-Lincoln.

Each school report includes the following data:

1. A list of the top 20 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. A **2007** AMC 8 Registration Form for AMC 8 School Contest Managers who wish to register before the beginning of the next school year.
6. A **2007** AMC 10/AMC 12 Invitation Brochure will be included with your results. The dates of the AMC 10/AMC 12 is **Tuesday, February 6, 2007** and/or **Wednesday, February 21, 2007**. We recommend interested students study prior year AMC 10/AMC 12 exams.
7. A National Summary of Results and Awards will include the names of the top-scoring students and a listing of the national award winners. This Summary will be sent following the complete analysis of results (usually in February).

### **PLEASE NOTE:**

IF YOU DO NOT RECEIVE YOUR **2006** AMC 8 REPORT OF RESULTS BY **JANUARY 15, 2007**, PLEASE CALL THE AMC OFFICE at 800-527-3690.

ALL student answer forms returned for grading will be **RECYCLED** 80 days after the AMC 8.

## VIII. Eligibility and Participation Schedule

1. Any student 14.5 years of age or younger on the day of the contest and not enrolled in grades 9, 10, 11, or 12 or equivalent is eligible to participate.
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

### Statement 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 14<sup>th</sup> because

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

then your school may use any day between **November 15-21**. The AMC 8 should be given officially on the first day that the school is open between **Tuesday, November 14 and Tuesday, November 21**.

*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 21**.*

*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 21** 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 15, 2006.**

### Statement 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.*

### Statement 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.

### Statement 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.**

### Statement 5

### **Learning Disabilities**

Students with learning disabilities have a 70-minute time allowance to take the AMC 8. All such administrations must be documented on the reverse side of the Certification Form, by listing the student's name and circumstance.

### Statement 6

### **Braille or Large Print Exams**

- The time limit set by the Committee on the American Mathematics Competitions for visually impaired students is 70 MINUTES.
- 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.

### Statement 7

### **English Language Learners**

English Language Learners may use a book or electronic type 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.

## 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 Pin** — given to the student(s) in each school with the highest score.
- Certificate for 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 in (approximately) the top 40%.
- A Certificate of Participation** is included in this Teachers manual, and will be included in your school results. This may be reproduced and given to the other students so that every student taking the AMC 8 will receive recognition. An Order Form will be included with your results in case you wish to purchase a set of these Certificates.
- Achievement Award Pins, Certificates of Merit and T-Shirts are available for purchase if your school wishes to recognize other outstanding students. Ordering information for these awards will be sent along with your school's results.

# XI. AMC 8 CERTIFICATION FORM 2006

To be eligible, a student should be 14.5 years of age or younger on the day of the contest and not enrolled in grades 9, 10, 11, or 12 or equivalent. 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/home 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), the Complimentary Solutions Envelope and/or the Solution Packets 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 14, 2006**, 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 or 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 14, 2006**, 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. The instructions relating to the opening of the "Complimentary Solutions Envelope" and/or Solution Packets were followed.
- 9. I have followed all the rules as stated in this Teachers' Manual.

SIGNATURE \_\_\_\_\_

School Name \_\_\_\_\_

City \_\_\_\_\_

E-mail (please print clearly): \_\_\_\_\_

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

DAY & DATE  
TEST WAS GIVEN \_\_\_\_\_

Telephone \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

School Grade Level: \_\_\_\_\_ through \_\_\_\_\_

EXCEPTIONS

## Questionnaire to Help Us Serve You Better

- I have used the AMC 8 Math Club Package in its current paper booklet format  
(1) Yes (2) No
- I prefer having the Math Club materials in a paper booklet form in contrast to having a Web-based version of the booklet available by log-in.  
(1) Strongly Agree (2) Agree (3) Neutral (4) Disagree (5) Strongly Disagree
- I would buy a printed book of prior year's AMC 8 contests with explanation and commentary (similar to the AHSME/AMC 10/AMC 12 Contest Problem Books, Volume I-VII)  
(1) Yes (2) No
- I would use on-line (Web) resources and practice materials to prepare my students for the AMC 8 only if they are free.  
(1) Strongly Agree (2) Agree (3) Neutral (4) Disagree (5) Strongly Disagree
- I would be willing to pay for a subscription to an electronic version of the Math Club Package.  
(1) Yes (2) No
- Mark only one of the following to indicate your preference for electronically presenting prior versions of AMC 8 contests:
  - I prefer a Compact Disk with an electronic collection of previous contests available in their entirety as originally published for use in my class or math club.
  - I prefer an electronic collection of previous contests available in their entirety on the Web for use in my class or math club.
  - I prefer a collection of individual questions, drawn from previous contests that could be searched by topic and printed, complete with hint and solution.
  - I prefer a collection of individual questions, drawn from previous contests, that are interactive and present a hint or a solution only when clicked.
  - I prefer a collection of individual problems, adapted from previous contests, that use new numbers in each instance to create a slightly new problem each time.
  - Other: Please explain on the Certification Form.
- I prefer on-line (Web) resources (mark only one)
  - In HTML format (printing is less clear, loading is usually faster, requires no helper applications, easier to implement search capability)
  - In PDF format (printing is clearer, appearance is identical to printed version, loading is usually slower, requires Adobe Reader, harder to implement search and interactive capability)
  - Interactive format (allows hidden answers, disabling or enabling hints, printing is less clear)
- Is mathematical problem solving taught at your school?
  - Yes, as a class on its own
  - Yes, as a part of several math classes
  - Sometimes, only touched on when there is time
  - Seldom, we do not practice problem solving unless the curriculum includes it.
  - No, not at all.

(please disregard this form if your school nominated a teacher when you registered)

## **XII. 2006 AMC 8 SLIFFE NOMINATION FORM FOR THE EDYTH MAY SLIFFE AWARD FOR DISTINGUISHED MATHEMATICS TEACHING**

(please print all information clearly)

Name of School Nominated Mathematics Teacher: \_\_\_\_\_

Only one name may be submitted from your 2006 AMC 8 registered school, and it should be the mathematics teacher who has been identified with the success of the students on the AMC 8. If you nominated a teacher during the registration process, you do not need to fill this out now. The teacher must be currently employed by the participating school from which the student answer forms have been submitted. **Please do not hesitate to list your own name. Past recipients are ineligible.**

School ID #: \_\_\_\_\_ Teacher's Email: \_\_\_\_\_

School Name: \_\_\_\_\_

City, State, & Zip: \_\_\_\_\_

School Telephone: \_\_\_\_\_

*NOTE: Teachers are eligible for the Sliffe Award, provided their school has participated in the AMC 8 for three consecutive years. Approximately fifty awards (five from each of ten USA regions) are given. The award includes \$100, a Sliffe pin, a certificate and a 1-year membership in the National Council of Teachers of Mathematics. Selection is based on averaging the scores of the top three students in each participating school over a three year period.*

# XIII. Additional Bundles Form

Please fill in the information below and FAX your order. The administrator or authorized person of the school agrees to pay the American Mathematics Competitions for the following materials:

School Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Teacher placing the order \_\_\_\_\_



Contest Bundles of ten ..... # \_\_\_\_\_ @ \$11/bundle = ..... \$ \_\_\_\_\_

Solutions Sets of ten (optional) ..... # \_\_\_\_\_ @ \$ 6/set = ..... \$ \_\_\_\_\_

AMC 8 Math Club Package - (Study Guide, Web Material) - @ \$15 per Study Guide ..... \$ \_\_\_\_\_

Postage/handling Fee (see chart below) ..... \$ \_\_\_\_\_

Total ..... \$ \_\_\_\_\_

P.O. Number \_\_\_\_\_

VISA/MC# : \_\_\_\_\_

Address: \_\_\_\_\_

Name (Please Print): \_\_\_\_\_

Exp. Date: \_\_\_\_\_

Telephone # \_\_\_\_\_

### AMC ORDERING -- TERMS

- |  |                         |                         |                    |        |                    |        |                    |         |               |         |  |
|--|-------------------------|-------------------------|--------------------|--------|--------------------|--------|--------------------|---------|---------------|---------|--|
| <p>1. VISA &amp; MasterCard accepted.</p> <p>2. Make checks payable to:<br/><b>AMERICAN MATHEMATICS COMPETITIONS</b></p> <p>3. PAYMENT IN U.S. FUNDS ONLY.</p> <p>4. U.S.A.:</p> <table border="0" style="margin-left: 20px;"> <tr> <td style="text-align: left;"><u>Order TOTAL</u></td> <td style="text-align: left;"><u>Shipping Charge*</u></td> </tr> <tr> <td>\$10.00 -- \$40.00</td> <td>\$7.00</td> </tr> <tr> <td>\$40.01 -- \$50.00</td> <td>\$9.00</td> </tr> <tr> <td>\$50.01 -- \$75.00</td> <td>\$12.00</td> </tr> <tr> <td>\$75.01 -- UP</td> <td>\$15.00</td> </tr> </table> | <u>Order TOTAL</u>      | <u>Shipping Charge*</u> | \$10.00 -- \$40.00 | \$7.00 | \$40.01 -- \$50.00 | \$9.00 | \$50.01 -- \$75.00 | \$12.00 | \$75.01 -- UP | \$15.00 | <p>5. <b>OUTSIDE U. S. A.:</b> Add additional \$10 to U.S.A. shipping costs.</p> <p style="text-align: center;">FAX 402-472-6087 or Call 1-800-527-3690</p> <p style="text-align: center;">Please Send Your Order To:</p> <p style="text-align: center;"><u>American Mathematics Competitions</u><br/>ATTN: AMC 8 Additional Bundles<br/>P.O. Box 81606<br/>Lincoln, NE 68501-1606</p> |
| <u>Order TOTAL</u>   | <u>Shipping Charge*</u> |                         |                    |        |                    |        |                    |         |               |         |  |
| \$10.00 -- \$40.00   | \$7.00                  |                         |                    |        |                    |        |                    |         |               |         |  |
| \$40.01 -- \$50.00   | \$9.00                  |                         |                    |        |                    |        |                    |         |               |         |  |
| \$50.01 -- \$75.00   | \$12.00                 |                         |                    |        |                    |        |                    |         |               |         |  |
| \$75.01 -- UP  | \$15.00                 |                         |                    |        |                    |        |                    |         |               |         |  |

\* Orders after November 1st will be charged \$5.00 for 2 day or \$10.00 for 1 day shipping.

## XIV. Proof of Intent to Pay

This document is intended to be used in lieu of pre-payment when phoning or faxing an order. Please indicate if you wish to be billed or will be sending a "check in the mail" (to be received within 2 weeks of order or you will be billed). Mail orders not wishing to be billed should include a check when returning this form. The person who signs this form must be authorized to pay the order that is placed by the teacher.

Billed

Name of Person Authorized to Pay (please print): \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Email: \_\_\_\_\_

## XV. AMC 8 Rescoring Request Form

I would like to have the following student's answer form rescored. I understand that there is a \$5.00 charge for each student answer form rescored

	\$ 5.00/each
Student Name _____	\$ _____
Student Name _____	\$ _____
Student Name _____	\$ _____
Grand Total _____	\$ _____

Teacher's Name \_\_\_\_\_ Zip ID # \_\_\_\_\_

School Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Method of Payment:

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

AMERICAN MATHEMATICS COMPETITIONS

University of Nebraska-Lincoln

P.O. Box 81606

Lincoln, NE 68501-1606

Charge to Visa/Mastercard#: \_\_\_\_\_

Name on card (print): \_\_\_\_\_

Signed

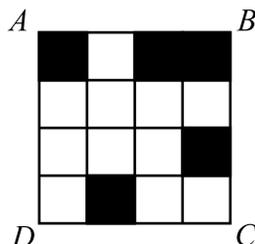
Expiration Date: \_\_\_\_\_ Telephone: \_\_\_\_\_

FAX to: 402/472-6087

## XVI. AMC 8 Practice Questions

### 05-03

What is the minimum number of small squares that must be colored black so the large square has diagonal  $BD$  as a line of symmetry?



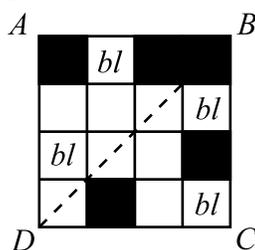
- (A) 1            (B) 2            (C) 3            (D) 4            (E) 5

**2005 AMC 8, Problem #3—**

**“Look at each of the existing 5 black squares. How many of them need another black square to be symmetric about  $BD$ ?”**

**Solution**

**(D)** For diagonal  $BD$  to be a line of symmetry in square  $ABCD$ , the four small squares labeled  $bl$  must be colored black.



**Difficulty:** Medium

**NCTM Standard:** Geometry Standard for Grades 6–8: apply transformations and use symmetry to analyze mathematical situations

**Mathworld.com Classification:** Geometry > Symmetry > Symmetry

## AMC 8 Practice Questions Continued

05-04

A square and a triangle have equal perimeters. The lengths of the three sides of the triangle are 6.1 cm, 8.2 cm and 9.7 cm. What is the area of the square in square centimeters?

- (A) 24      (B) 25      (C) 36      (D) 48      (E) 64

**2005 AMC 8, Problem #4—**

**“What is the length of the side of the square?”**

**Solution**

(C) The perimeter of the triangle is  $6.1 + 8.2 + 9.7 = 24$  cm. The perimeter of the square is also 24 cm. Each side of the square is  $24 \div 4 = 6$  cm. The area of the square is  $6^2 = 36$  square centimeters.

**Difficulty:** Medium

**NCTM Standard:** Geometry Standard for Grades 6–8: analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

**Mathworld.com Classification:** Calculus and Analysis > Differential Geometry > Differential Geometry of Curves > Perimeter

**AMC 8 Practice Questions Continued**  
**05-05**

Soda is sold in packs of 6, 12 and 24 cans. What is the minimum number of packs needed to buy exactly 90 cans of soda?

- (A) 4            (B) 5            (C) 6            (D) 8            (E) 15

**2005 AMC 8, Problem #5—**

**“First buy as many 24-packs as possible, then 12, and lastly 6.”**

**Solution**

(B) To get the minimum total number, purchase as many 24-packs as possible: three 24-packs contain 72 cans, and  $90 - 72 = 18$ . To get the remaining 18 cans, purchase one 12-pack and one 6-pack. The minimum total number of packs is 5.

**Difficulty:** Medium-Easy

**NCTM Standard:** Problem Solving Standard for Grades 6–8: solve problems that arise in mathematics and in other contexts

**Mathworld.com Classification:** Number Theory > Congruences > Mod

**AMC 8 Practice Questions Continued**  
**05-07**

Bill walks  $\frac{1}{2}$  mile south, then  $\frac{3}{4}$  mile east, and finally  $\frac{1}{2}$  mile south. How many miles is he, in a direct line, from his starting point?

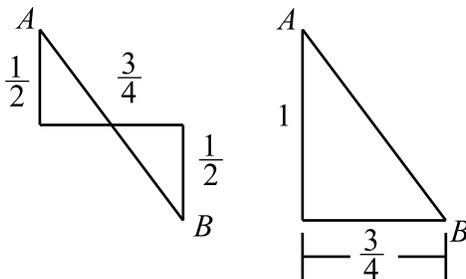
- (A) 1      (B)  $1\frac{1}{4}$       (C)  $1\frac{1}{2}$       (D)  $1\frac{3}{4}$       (E) 2

**2005 AMC 8, Problem #7—**

**“Find the hypotenuse of a triangle with legs  $\frac{1}{2} + \frac{1}{2}$  and  $\frac{3}{4}$ .”**

**Solution**

(B) The diagram on the left shows the path of Bill’s walk. As the diagram on the right illustrates, he could also have walked from  $A$  to  $B$  by first walking 1 mile south then  $\frac{3}{4}$  mile east.



By the Pythagorean Theorem,

$$(AB)^2 = 1^2 + \left(\frac{3}{4}\right)^2 = 1 + \frac{9}{16} = \frac{25}{16},$$

so  $AB = \frac{5}{4} = 1\frac{1}{4}$ .

**Difficulty:** Medium-hard

**NCTM Standard:** Geometry Standard for Grades 6–8: analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

**Mathworld.com Classification:** Geometry > Plane Geometry > Triangles > Special Triangles > Other Triangles > Right Triangle

**AMC 8 Practice Questions Continued**  
**05-10**

Joe had walked half way from home to school when he realized he was late. He ran the rest of the way to school. He ran 3 times as fast as he walked. Joe took 6 minutes to walk half way to school. How many minutes did it take Joe to get from home to school?

- (A) 7      (B) 7.3      (C) 7.7      (D) 8      (E) 8.3

**2005 AMC 8, Problem #10—**

**“Covering the same distance three times as fast takes one-third the time.”**

**Solution**

(D) Covering the same distance three times as fast takes one-third the time. So Joe ran for 2 minutes. His total time was  $6 + 2 = 8$  minutes.

**Difficulty:** Easy

**NCTM Standard:** Problem Solving Standard for Grades 6–8: solve problems that arise in mathematics and in other contexts

**Mathworld.com Classification:**

Calculus and Analysis > Differential Geometry > Differential Geometry of Curves > Velocity

**AMC 8 Practice Questions Continued**  
**05-12**

Big Al, the ape, ate 100 bananas from May 1 through May 5. Each day he ate six more bananas than on the previous day. How many bananas did Big Al eat on May 5?

- (A) 20            (B) 22            (C) 30            (D) 32            (E) 34

**2005 AMC 8, Problem #12—**

**“If Big Al had eaten 10 bananas on May 1, how many would he have eaten on May 2?”**

**Solution**

(D) If Big Al had eaten 10 bananas on May 1, then he would have eaten  $10 + 16 + 22 + 28 + 34 = 110$  bananas. This is 10 bananas too many, so he actually ate 2 fewer bananas each day. Thus, Big Al ate 8 bananas on May 1 and 32 bananas on May 5.

OR

The average number of bananas eaten per day was  $\frac{100}{5} = 20$ . On May 4, Big Al ate six more bananas than on May 3, and on May 2 he ate six fewer bananas than on May 3. Similarly, on May 5 Big Al ate twelve more bananas than on May 3, and on May 1 he ate twelve fewer bananas. Therefore, the average number of bananas he ate per day, 20, is equal to the number of bananas he ate on May 3. So on May 5 Big Al ate  $20 + 12 = 32$  bananas.

OR

Let  $x$  be the number of bananas that Big Al ate on May 5. The following chart documents his banana intake for the five days.

May 5	May 4	May 3	May 2	May 1
$x$	$x - 6$	$x - 12$	$x - 18$	$x - 24$

The total number of bananas Big Al ate was  $5x - 60$ , which must be 100. So Big Al ate  $x = \frac{160}{5} = 32$  bananas on May 5.

**Difficulty:** Medium

**NCTM Standard:** Algebra Standard for Grades 6–8: understand patterns, relations, and functions

**Mathworld.com Classification:** Number Theory > Sequences > Sequence

**AMC 8 Practice Questions Continued**  
**05-14**

The Little Twelve Basketball Conference has two divisions, with six teams in each division. Each team plays each of the other teams in its own division twice and every team in the other division once. How many conference games are scheduled?

- (A) 80      (B) 96      (C) 100      (D) 108      (E) 192

**2005 AMC 8, Problem #14—**  
**“How many total games does each team play?”**

**Solution**

**(B)** Each team plays 10 games in its own division and 6 games against teams in the other division. So each of the 12 teams plays 16 conference games. Because each game involves two teams, there are  $\frac{12 \times 16}{2} = 96$  games scheduled.

**Difficulty:** Medium-hard

**NCTM Standard:** Problem Solving Standard for Grades 6–8: use solve problems that arise in mathematics and in other contexts

**Mathworld.com Classification:** Discrete Mathematics > Combinatorics > Permutations > Combination

**AMC 8 Practice Questions Continued**  
**05-16**

A five-legged Martian has a drawer full of socks, each of which is red, white or blue, and there are at least five socks of each color. The Martian pulls out one sock at a time without looking. How many socks must the Martian remove from the drawer to be certain there will be 5 socks of the same color?

- (A) 6            (B) 9            (C) 12            (D) 13            (E) 15

**2005 AMC 8, Problem #16—**

**“At most, how many socks of each color can the Martian pull out without having a set?”**

**Solution**

(D) It is possible for the Martian to pull out at most 4 red, 4 white and 4 blue socks without having a matched set. The next sock it pulls out must be red, white or blue, which gives a matched set. So the Martian must select  $4 \times 3 + 1 = 13$  socks to be guaranteed a matched set of five socks.

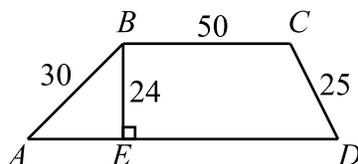
**Difficulty:** Hard

**NCTM Standard:** Data Analysis and Probability Standard for Grades 6–8: use understand and apply basic concepts of probability

**Mathworld.com Classification:** Probability and Statistics > Probability > Probability

**AMC 8 Practice Questions Continued**  
**05-19**

What is the perimeter of trapezoid  $ABCD$ ?

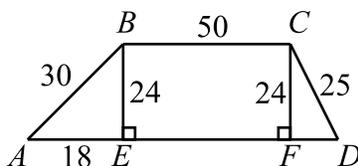


- (A) 180      (B) 188      (C) 196      (D) 200      (E) 204

**2005 AMC 8, Problem #19—**

**“Use the Pythagorean Theorem to solve for  $AE$ .”**

**Solution**  
**(A)**



By the Pythagorean Theorem,  $AE = \sqrt{30^2 - 24^2} = \sqrt{324} = 18$ . (Or note that triangle  $AEB$  is similar to a 3-4-5 right triangle, so  $AE = 3 \times 6 = 18$ .)

It follows that  $CF = 24$  and  $FD = \sqrt{25^2 - 24^2} = \sqrt{49} = 7$ . The perimeter of the trapezoid is  $50 + 30 + 18 + 50 + 7 + 25 = 180$ .

**Difficulty:** Medium-hard

**NCTM Standard:** Geometry Standard for Grades 6–8: analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

**Mathworld.com Classification:** Geometry > Plane Geometry > Quadrilaterals > Trapezoid

## **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, or the 2005 Summary of Results for statistics and figures from the the 2005 contest. Statistics and figures for the 2006 Contest will be available on our website in early 2007.

(School or School District)

FOR IMMEDIATE RELEASE

(School) STUDENTS INVITED TO WORLD-WIDE COMPETITION

(#) students at (School) participated in the 22<sup>nd</sup> annual American Mathematics Competitions 8, held on Tuesday, **November 14, 2006**. 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 2005 over **150,000** students from **2,500** 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 at the University of Nebraska - Lincoln. The AMC receives support from the Akamai Foundation, American Mathematical Association of Two Year Colleges, American Mathematical Society, American Society of Pension Actuaries, American Statistical Association, Art of Problem Solving, Awesome Math, Canada/USA Mathpath & Mathcamp, Casualty Actuarial Society, Clay Mathematics Institute, Institute for Operations Research and the Management Sciences, L. G. Balfour Company, Mu Alpha Theta, National Council of Teachers of Mathematics, National Assessment & Testing, Pedagoguery Software Inc., Pi Mu Epsilon, the Society of Actuaries, U.S.A. Math Talent Search, W. H. Freeman & Company, and Wolfram Research, Inc. The Contest is given across the U.S.A., Canada, and in many schools abroad.

Details concerning the **2006-2007** AMC contests for Middle School and High School are available on the AMC web site: [www.unl.edu/amc](http://www.unl.edu/amc). Entries for the **2007** contest close on **January 30, 2007** for the **February 6<sup>th</sup>** exam, and **February 14, 2007** for the **February 21<sup>st</sup>** contest.

For further information contact the AMC -- telephone: 800/527-3690, email: [amcinfo@unl.edu](mailto:amcinfo@unl.edu).

## XVIII. Letter to Parents



# The MATHEMATICAL ASSOCIATION OF AMERICA

## American Mathematics Competitions

Steven Dunbar  
Director

Fall, 2006

Dear Parent or Guardian:

On **November 14, 2006** your son or daughter will participate in the **22<sup>nd</sup>** 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, you can consider that satisfactory, 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,

Dr. Steven R. Dunbar  
Director, MAA American Mathematics Competitions

The Mathematical Association of America  
American Mathematics Competitions

# CERTIFICATE

Awarded to

for participating in the

American Mathematics Contest 8  
(AMC 8)

**2006**

*Steven R. Dunbar*

Director

American Mathematics Competitions



*Bonnie Letice*

Chair

AMC 8 Subcommittee

The Mathematical Association of America  
American Mathematics Competitions

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**2006**

*Steven R. Dunbar*

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American Mathematics Competitions



*Bonnie Letice*

Chair

AMC 8 Subcommittee



## **XIX. Certificate of Participation (facing page)**

(for reproduction, page 22)

## **XX. Facsimile of the AMC 8 front cover**



THE MATHEMATICAL ASSOCIATION OF AMERICA  
American Mathematics Competitions

  
22<sup>nd</sup> Annual

**AMC 8**  
(American Mathematics Contest 8)  
Tuesday, NOVEMBER 14, 2006

**INSTRUCTIONS**

1. DO NOT OPEN THIS BOOKLET UNTIL YOUR PROCTOR TELLS YOU.
2. This is a twenty-five question multiple choice test. Each question is followed by answers marked A, B, C, D and E. Only one of these 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 on this test is the number of correct answers.
5. No aids are permitted other than scratch paper, graph paper, rulers, erasers, and calculators that are accepted for use on the SAT. No problems on the test will 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 certain information on the answer form.
8. When your proctor gives the signal, begin working on the problems. You will have 40 minutes to complete the test.
9. When you finish the exam, *sign your name* in the space provided on the Answer Form.

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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.

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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, e-mail, World Wide Web 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 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.

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