



April 1984

Issue #6

*A newsletter published three times a year by the American Statistical Association-National Council of Teachers of Mathematics Joint Committee on the Curriculum in Statistics and Probability.*

### NSF AWARD ANNOUNCED

A new project for teaching statistics and probability at the precollege level has just been funded by the National Science Foundation. The award, announced in early April 1984, is to the American Statistical Association for a three-year project titled, "A Program to Improve Quantitative Literacy in the Schools." This represents a continuation and expansion of efforts begun by the ASA-NCTM Joint Committee on the Curriculum in Statistics and Probability.

The project will develop and deliver a model program of continuing education for mathematics, natural and social science teachers that will prepare them to teach statistical and probabilistic skills and concepts effectively. More specifically, project goals are:

- to develop alternative guidelines for the teaching of statistics and probability in the precollege curriculum;
- to deliver a model inservice program for training teachers to present statistical concepts;
- to produce curriculum materials to assist in the teaching of basic statistical skills.
- to develop mechanisms to evaluate the teaching of statistics and probability as to its effectiveness in teaching content in basic areas.

The project will be administered by the Continuing Education Department of the ASA office in Washington, D.C. and will include activities throughout the country. Principal investigator is Richard L. Scheaffer, Chair of the ASA-NCTM Joint Committee and also Chair of the Department of Statistics, University of Florida. Assistant principal investigators are Albert P. Shulte, Director of Mathematics for

Oakland Schools, Pontiac, Michigan, and James M. Landwehr, a statistician at AT&T Bell Laboratories, Murray Hill, N.J. Both are present or former members of the Joint Committee. They will be joined by other teachers and statisticians on project activities.

Initial efforts will concentrate on a thorough field-testing and subsequent revision of four new booklets that introduce basic skills of statistics and probability. Topics covered include ways to collect, display, and interpret small sets of data; elementary probability; using simulation to understand topics in probability and to solve probability problems that are too hard to do conveniently with mathematics; and using the ideas of random sample and confidence interval to learn about a population. Although these units will not require a computer to be used by either teachers or students, techniques and computer software will be produced that will incorporate the use of microcomputers with these materials.

Inservice training for teachers will be a major part of the project. Several two- or three-day workshops for teachers will be held, culminating in the production of videotapes for teacher training that can be used as an alternative to a formal workshop. A support group will be established for classroom teachers using the materials.

Subsequently, further units will be developed on such topics as: planning surveys and designing experiments; data presentation — tables, charts, and graphs; sampling from populations; probability II; exploring data II. The effectiveness of all the material will also be evaluated.

### Field Trial Plans

Volunteers are being sought for a field test of the four curriculum booklets that will be conducted in fall 1984. This trial will include



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**PROBABILITY AND STATISTICS  
ON THE MAA'S HIGH SCHOOL  
CONTEST EXAMINATIONS**

Each year the Mathematical Association of America, NCTM, Mu Alpha Theta, the Society of Actuaries, and the Casualty Actuarial Society sponsor three contests for high school students. Beginning in 1985, the American Statistical Association will also be a sponsor. The American High School Mathematics Examination (AHSME) is a thirty-question, one-and-one-half hour, multiple-choice exam. The top 2000 or so students on the AHSME are invited to take the American Invitational Mathematics Examination (AIME). This is a fifteen-question, two-and-one-half-hour, short-answer exam. The top 50 or so contestants on the AIME are invited to take the USA Mathematical Olympiad (USAMO), a five-question, three-and-one-half-hour, complete-answer examination.

In 1983, the following three probability and statistics problems appeared on the AHSME.

1. In a certain population the ratio of the number of women to the number of men is 11 to 10. If the average (arithmetic mean) age of the women is 34 and the average age of the men is 32, then the average age of the population is
  - A.  $32 \frac{9}{10}$
  - B.  $32 \frac{20}{21}$
  - C. 33
  - D.  $33 \frac{1}{21}$
  - E.  $33 \frac{1}{10}$
2. Three balls marked 1, 2, and 3 are placed in an urn. One ball is drawn, its number is recorded, and then the ball is returned to the urn. This process is repeated and then repeated once more, and each ball is equally likely to be drawn on each occasion. If the sum of the numbers recorded is 6, what is the probability that ball numbered 2 was drawn all three times?
  - A.  $\frac{1}{27}$
  - B.  $\frac{1}{8}$
  - C.  $\frac{1}{7}$
  - D.  $\frac{1}{6}$
  - E.  $\frac{1}{3}$
3. The probability that event  $A$  occurs is  $\frac{3}{4}$ ; the probability that event  $B$  occurs is  $\frac{2}{3}$ .

Let  $p$  be the probability that both  $A$  and  $B$  occur. The smallest interval necessarily containing  $p$  is the interval

- A.  $[\frac{1}{12}, \frac{1}{2}]$
- B.  $[\frac{5}{12}, \frac{1}{2}]$
- C.  $[\frac{1}{2}, \frac{2}{3}]$
- D.  $[\frac{5}{12}, \frac{2}{3}]$
- E.  $[\frac{1}{12}, \frac{2}{3}]$

The 1983 AIME contained one question:

4. Twenty-five of King Arthur's knights are seated at their customary round table. Three of them are chosen — all choices of three being equally likely — and are sent off to slay a troublesome dragon. Let  $P$  be the probability that at least two of the three had been sitting next to each other. If  $P$  is written as a fraction in lowest terms, what is the sum of the numerator and denominator?

One of the five questions on the USAMO concerned probability:

5. On a given circle, six points  $A, B, C, D, E$  and  $F$  are chosen at random, independently and uniformly with respect to arc length. Determine the probability that the two triangles  $ABC$  and  $DEF$  are disjoint, i.e., having no common points.

Requests for information about the contests should be sent to

— Dr. Walter E. Mientka, Executive Director  
MAA Committee on High School Contests  
Department of Mathematics and Statistics  
University of Nebraska  
Lincoln, NE 68588

Are you ready for the answers to the problems? They are 1) D, 2) C, 3) D, 4) 57, and 5)  $\frac{3}{10}$ . Complete solutions can be purchased from Dr. Mientka.

**HELP!**

I have been doing a bit of research into the history of statistics teaching, and can find virtually nothing written on the subject. Can any readers of this newsletter help? Alternatively, someone may be able to point me in the direction of original sources concerning teachers, textbooks, syllabuses, etc. before 1910 or so.

— John Bibby  
33 Haugh Shaw Road  
Halifax, HX1 3AH ENGLAND

I am doing a research paper at Northwest Missouri State University on using computers to teach statistical concepts. Where could I obtain material pertinent to this topic?

— Brother Stephen Kietzman, CFX  
Xaverian High School  
7100 Shore Road  
Brooklyn, New York 11209

### NEW PUBLICATIONS AND PRODUCTS

*Industry Related Problems  
for Mathematics Students*  
Jeanne Agnew and Marvin Keener  
Oklahoma State University

Jeanne Agnew and Marvin Keener of Oklahoma State University have put together a collection of industry-related problems for mathematics students. A catalogue which lists each problem, its source, general level, the mathematical prerequisites, price, and a summary is available for \$3.00. The problems themselves are sold for the cost of copying them and range in price from \$.50 to \$2.00 each. The class time required for each problem varies from 1 hour to 5 weeks. Many of the problems are statistical in nature, such as "A Statistical Study of Student Opinion Regarding Sports" and "Radar Failures in a Group of Air Bases." Although these problems were mostly written for use in colleges, the authors say that there has been interest shown in their high school level material and they plan to separate the high school level portions of the more advanced problems and thus increase their offerings at the high school level.

To get on their mailing list, write

— Jeanne Agnew  
Department of Mathematics  
Oklahoma State University  
Stillwater, Oklahoma 74078.

*International Statistical Education Newsletter*  
International Statistical Institute

This newsletter includes information on teaching statistics at both pre-college and college levels. It publishes information about committees, programs, and projects from around the world. Any announcements that you would like to submit are welcome.

For further information, contact

— Professor R. M. Loynes, Editor

International Statistical Education Newsletter  
Department of Statistics  
University of Sheffield  
Sheffield S3 7RH England.

*Math Topics: Statistics*

A BBC production

Videocassettes, \$240 each or rent for \$50 each.

The BBC has produced a series of twenty minute videocassettes on statistics. They are designed for high ability students aged 13 to 16. The five cassettes are titled "Data Collection," "Data Representation," "Data Reduction," "Probability I," and "Probability II." They use a documentary approach together with animation. For further information, contact

— Films Incorporated  
733 Green Bay Road  
Wilmette, IL 60091  
or phone (312) 256-6600.

*Applications of Mathematics to Medicine*  
Committee on Enrichment Modules,  
University of Delaware, 1982,  
91 pages, paper, \$4.50  
(a few complimentary copies are available).

This module is one of five developed under an NSF grant to serve as enrichment materials for secondary students. The other four modules include dynamic programming, queues, graph theory, and glyphs. Evaluation and testing involved more than one hundred talented secondary students from the Middle Atlantic States.

The module *Applications of Mathematics to Medicine* consists of four sections on evaluating the condition of accident victims, each with discussion of a medical topic, student exercises, and answers. The topics are statistical in nature with the student first learning how to construct a trauma score — an index of injury severity. This trauma index is then used to develop procedures for "sorting" patients to various treatment centers. Finally students learn about two indices used for tracking critically ill patients in order to estimate probability of survival and to determine and evaluate medical actions. Real data from trauma patients have been used to create the tables and indices.

To order, write to

— Clifford W. Sloyer  
Department of Mathematical Sciences  
University of Delaware  
Newark, Delaware 19711.

### *Probability and Statistics*

Richard D. Armstrong and Pamela Pedersen, Eds.  
128 pages, paper, \$10.75.

This booklet is a collection of eight papers on the teaching of probability and statistics in the Comprehensive School Mathematics Program's elementary school curriculum. Titles of articles include, "Probability and Statistics in Grades 1 to 3," "Population Growth," "An Area Model for Solving Probability Problems," and "Breaking a Stick: Probability without Counting." There are many descriptions of games and activities, all with illustrations.

To order, write to

— Harper and Row, Publishers, Inc.,  
Attn.: Order Services Department  
Keystone Industrial Park  
Scranton, Pennsylvania 18512

Shipping charges are additional.

### CALENDAR

#### *NCTM Annual Meeting*

The Annual Meeting of the National Council of Teachers of Mathematics will be held April 25-28, 1984 in San Francisco. As usual, the ASA-NCTM Joint Committee on the Curriculum in Statistics and Probability will have a booth in the commercial exhibits hall. Come by and meet other teachers interested in improving statistical education in elementary and secondary schools.

This year there will be 20 sessions on probability and statistics. Check your program booklet for sessions #56, 87, 99, 106, 126, 155, 210, 217, 248, 255, 272, 300, 336, 367, 386, 424, 443, 502, 558, and 564. From 3:15 to 4:15 on Wednesday in Room 105, Richard Scheaffer, Chair of the Joint Committee, will discuss the work of the Committee and its plans for the future.

#### *ICOTS 2*

The Second International Congress on Teaching Statistics will be held at the University of Victoria in British Columbia on August 11-16, 1986. Jim Swift is chairman of the local organization committee. The first announcement will be out in June 1984. To get a copy, write to

— Tom Lietaer  
University Extension Conference Office  
University of Victoria  
Box 1700  
Victoria, BC V8W 242.

The program committee met in February and sessions are now being organized. If you would like to speak or can suggest speakers, write to the chairman of the program committee,

— Robert Hogg  
Department of Statistics and Actuarial Science  
University of Iowa  
Iowa City, Iowa 52242.

### WHERE TO WRITE

Send all letters, announcements, questions, and requests to get on the mailing list for the newsletter to the editor,

— Ann Watkins  
Department of Mathematics  
Los Angeles Pierce College  
6201 Winnetka Avenue  
Woodland Hills, CA 91371

Please share this newsletter with other teachers interested in statistics. You may photocopy anything in it you wish.