

**EDUCATION OF ACTUARIES**

- A. How can the Society of Actuaries encourage the study of basic mathematics in secondary schools and colleges to the end that an increasing number of college students will have the necessary academic background for an actuarial education?
- B. In what ways can the local actuarial clubs stimulate academic education in the field of mathematics?
- C. Should more colleges and universities be encouraged to establish actuarial courses?

MR. PEARCE SHEPHERD described the activities of the Society's Public Relations Committee, of which he is the chairman, in sponsoring with the New York section of the Mathematical Association of America an annual competitive mathematics examination for secondary school students. It is expected that about 45,000 students will participate in the examination, which will be held May 9 at about 1,500 schools throughout the United States and Canada. This represents an increase of about 50% over last year's participation. The examination will be conducted and graded by the mathematics teachers, who will submit the 3 top papers in each school to a committee of the sponsoring organizations for the inter-school competition. Thus, in addition to the over-all winners, there will be 3 winners in each school. William Allan and Elmer Strock are representing the Society on the committee evaluating the results.

The Public Relations Committee, with valuable assistance from the Institute of Life Insurance, is preparing promotional material to be distributed to the students through the teachers. This material is presented in a 4-page pamphlet designed to stimulate an interest in mathematics on the part of the student and to point out opportunities in the teaching profession and the actuarial profession in a low pressure way. In addition to assisting in the preparation of this pamphlet, the Institute will help us get publicity when the examinations are held and later, when the results come out. Very shortly, the Committee will mail out to all members of the Society a copy of the promotional pamphlet and details on the examination—where it will be held and when the results will come out. The Committee feels that it is the responsibility of the individual companies and Society members to follow up on the results of this sponsorship. However, the Committee plans to offer suggestions on how this follow-up might be conducted. The Committee is also trying to collect, for distribution, information on what local actuarial groups are doing along these lines. The Committee feels that activities of this kind will be helpful in developing

a greater awareness of the need for improved teaching of mathematics and in creating more interest in mathematics on the part of the younger people, so that enough of them will go to college with sufficient background to take the college mathematics courses required for the actuarial and other professions.

MR. C. H. FISCHER, discussing Section A, agreed that we should start selling the actuarial profession in the high schools. Presently, the theoretically-inclined end up in pure mathematics, while many people who might be interested in actuarial work have not taken sufficient college mathematics. We want to encourage students who major in economics and accounting to take mathematics through the calculus. He felt that our Part 2 cash prizes are not successful in encouraging students who would not otherwise take mathematics to enroll in such courses. He has made an analysis of the subsequent examination record of students who won Part 2 prizes and found that most of them did not make much further progress. Out of 90 who have received prizes, only 11 have achieved the fellowship and 8 the associateship. Of the remaining 71, 50 appear to be definitely lost as far as actuarial work is concerned and a number of others appear unlikely to continue with the examinations. He felt that Part 2 prizes attract a lot of brilliant mathematics students with no interest in actuarial work, who are simply risking \$6 to win \$100 or \$200. The results of his review are summarized in the accompanying table.

PROGRESS	PRIZE-WINNING GROUP		
	1947-50	1951-53	1954-56
Fellow . . . . .	10	1	0
Associate . . . . .	4	4	0
Part 4 . . . . .	0	2	3
Part 3 . . . . .	0	5	2
Dropped out . . . . .	22	15	13
Insufficient time for judgment	0	0	9
Total . . . . .	36	27	27

Mr. Fischer suggested that awards be offered for Part 3, not Part 2. Although finite differences and probability are not offered in a majority of colleges, prizes would stimulate more interest in and demand for these courses.

With respect to Section C, Mr. Fischer felt strongly that there should be more actuarial schools. In actuarial schools, the recruiter's problem is much simplified. The student is already completely informed about the

actuarial profession, and in most instances prospects can be preselected for the recruiter. While there should not be many such schools, there does not seem to be any possibility of an excess developing. A better regional distribution of actuarial schools would be attained by the establishment of one school in the South and by the expansion of one of the Atlantic Coast schools from a partial to a full course. Mr. Fischer advocated the offering of examination credit for courses passed with good grades in approved schools. He pointed out that this practice has been followed by the Faculty and the Institute for some years and suggested a committee of the Society to study the possibility of such a procedure.

MR. V. B. GLUNTS felt it is necessary to encourage an increase in the number of competent students who consider early in their formative years the desirability of actuarial work as their life career. If we can publicize the actuarial profession before the students make their college curricula decisions, a greater number of them will be influenced to plan their courses to include those subjects which are necessary for an actuary. Specifically, we can make the guidance departments in secondary schools better aware of our profession so they can discuss it with their students and recommend a proper choice of subjects for those boys who have the potential to succeed. Final vocation decisions, of course, can be deferred. Local actuarial clubs can hold forums for parents and students in the high schools. We can invite secondary students to visit our companies to see for themselves what actuarial work is all about.

MR. E. B. WHITTAKER emphasized the importance of personal contact in selling the attractions of an actuarial career.

In the thirties, we recruited all the candidates we needed from college graduates. After the war, we started going after undergraduates—first the juniors, then sophomores, and freshmen. Now we find we have to stimulate interest in mathematics and our profession at the high school level if we hope to meet future needs. Actuaries should get acquainted with mathematics teachers in their local communities, and sell them on the need and opportunities for actuaries. This can lead to talks before groups of high school students.

While starting salaries for actuarial students are modest, their future salary prospects are bright. Mr. Whittaker has found that the high salary potential of the actuary is the most convincing argument in selling the profession. An actual salary distribution of Fellows by years of service has been an extremely useful aid in this regard.

PROF. C. W. JORDAN mentioned the great need for mathematicians being created by the rapidly expanding use of electronic computers. Many mathematics students who would normally be interested in actuarial work

will be attracted in increasingly greater numbers by the booming computer field. The answer is to increase the over-all number of mathematics students by stimulating student interest in mathematics through prize awards and scholarships and by giving support to the cause of better teaching of mathematics. Summer institutes in mathematics for teachers in secondary schools and colleges, like those sponsored by the National Science Foundation, can acquaint teachers with recent developments in their fields and send them back to their schools and colleges better equipped to interest students in the subject. The Society could participate in the support of these institutes, which can also provide a forum for speakers on actuarial subjects. At the Williams Institute last summer, where an effective program was presented by Mr. Whittaker and Mr. Rathgeber, many teachers present heard for the first time about the opportunities in actuarial work. Donations of books on mathematics to school and college libraries, many of which are poorly supplied with such texts, is another worth-while project. The Society should also consider endowing college libraries with subscriptions to its *Transactions*, together with actuarial texts. Mr. Jordan felt the above suggestions could also be implemented by regional actuarial groups, working through high schools and colleges. They can offer scholarships and prizes, give books to the college and school libraries, supply speakers to discuss vocational opportunities in mathematics, and help the mathematics clubs in planning and presenting programs. Many of the actuarial clubs are already participating successfully in activities of this nature.

MR. J. C. SIBIGTROTH, discussing Section A, suggested that the Society make every effort, through the mathematics departments of the colleges, to encourage undergraduates (particularly freshmen) to take Part 1. As a further inducement, he felt that the examination fee might be reduced to perhaps \$3.00. The Society should follow up by sending out promotional literature to each candidate passing Part 1, which would include detailed syllabus information for the later examinations, stress the importance of passing examinations while at college, review the types of work done by actuaries and give the long-range financial outlook for actuaries and the additional opportunities in administrative and executive work. He felt that, by this means, complete information would reach more prospects.

With respect to Section C, Mr. Sibigtroth felt that while a special curriculum for actuarial work alone was not justified, a curriculum in applied mathematics offering work in several fields including actuarial science might be practical. These other fields might include operations research, electronic computer work and business statistics. He felt that curricula

of this type would be especially desirable in colleges now offering both liberal arts and engineering courses. A definite curriculum in applied mathematics would tend to attract some candidates who would otherwise go into engineering. Also, the opportunities in actuarial work as well as in the other fields would be better publicized through the existence of an applied mathematics course. Mr. Sibigroth mentioned that an applied mathematics course has been established in one school he visited, and early indications are that this curriculum has attracted some good students who would otherwise have gone into engineering.

MR. F. E. RATHGEBER described a current examination sponsorship project of the New Jersey companies.

For the past four years, Rutgers—The State University of New Jersey—and the Association of Mathematics Teachers of New Jersey have sponsored annual State Mathematics Days. Two pupils, juniors or seniors, from each of the secondary schools in New Jersey are permitted to enter. About 100 schools currently are sending contestants. The life insurance companies of New Jersey have decided to participate in the State Mathematics Day this year by offering 10 cash prizes totaling \$750 to the top students. This, of course, is very similar to the program started last year by the Massachusetts life insurance companies.

Rutgers and the Association of Mathematics Teachers of New Jersey have also been sponsoring a Mathematics Institute for the past four years. This Institute, which lasts 10 days, is open to both elementary and secondary school teachers of mathematics. The purposes of the Institute are to gain an understanding of more effective ideas in the teaching of elementary and high school mathematics and a broader concept of the place of mathematics in science and industry as well as education. The number of teachers attending the Institute has ranged from 55 to 80. Here again, the life insurance companies of New Jersey have decided to participate by providing 10 scholarships of \$75 each to cover the expenses of some of these teachers.

In both the State Mathematics Day program and the Mathematics Institute, opportunities will be available for representatives of the life insurance companies to stress the desirability of studying mathematics in college and the advantages of actuarial careers.

Mr. Rathgeber added a comment concerning Professor Fischer's conclusion that Part 2 prizes are probably not worth while since there are only 19 Fellows and Associates out of the 90 who have won prizes. Mr. Rathgeber reached the opposite conclusion—that the number of actuaries arising out of the prize-winners is very satisfactory. He believed that even if there is just a handful of these men who first become interested in the

actuarial profession because of the prizes, the money has been well spent. A collateral value of the prizes is creation of interest to take the examinations even though the students may not be prize-winners. It would be almost impossible to assess this value, but it is undoubtedly there, and it will increase as programs are pursued to spread the actuarial story among high school students. We can look forward hopefully to more college freshmen and sophomores studying mathematics with an eye toward an actuarial future. If this happens, retention of the Part 2 prizes will be most important.

MR. J. S. HILL said that his company is planning to invite high school mathematics and science clubs from the local area in to see their electronic computer installation. They will use the opportunity to stress career opportunities in life insurance, especially the actuarial profession. He felt this type of project will stimulate needed interest in mathematics at the precollege level among those who are most likely to be influenced. While he felt that inviting students in is more efficient than going to the schools, he would like to learn of other companies' experience with this type of program.

MR. W. L. RUGLAND, discussing Section A, said that the inconvenience and cost of writing the examinations may cause some good prospects to forgo writing the preliminary examinations while in college. Unless the importance of getting these examinations out of the way early is stressed and the student has already decided on an actuarial career, the prospect of missing classes or other campus activities, paying \$12 and perhaps traveling to another city are too much to expect from many students. Mr. Rugland felt the examination fees should be reduced, that the examinations should be given at most colleges having one or more applicants and that some discretion should be allowed the mathematics departments in setting the hours for the examinations.

MR. C. H. TOOKEY, discussing Section A, described the work of the Los Angeles Actuarial Club. This club formed a committee to stimulate the interest of high school students in mathematics and disseminate information about the actuarial profession to high school mathematics teachers and their students. Funds were raised from local insurance companies and pension brokers who need actuarial students, to be used as prizes for mathematics contests. Occidental College in Los Angeles, which has actuarial courses, held a mathematical field day in which 400 students participated. A 40 minute actuarial talk was given the California Mathematics Council in conjunction with this event. The talk, which covered opportunities in the actuarial profession, the type of persons who might qualify and a brief description of the work of the Society, was well re-

ceived. One reaction from the high school teachers was that students with outstanding ability in mathematics should be encouraged to continue the study of mathematics, even though their present intent was to go into a nonmathematical line of work. One of the younger actuaries, who participated in the planning and supervision of the contest, offered the following advice for similar ventures:

1. Get the teachers to participate in the planning.
2. Help sell the program by using terms appealing to high school students, such as calling a rapid computation test a "mad-hatter marathon."
3. Although cash prizes are important, the idea of winning and public recognition are the important things.
4. Make the most of the award presentation.
5. Have an attractive actuarial exhibit.
6. Be careful and sympathetic in your dealings with the teachers. In order to work effectively with them, they have to be met at least halfway. It would be helpful to get acquainted with the mathematics teacher and his family socially and let him know that you feel his work is important.

With respect to Section C, Mr. Tookey felt that more colleges and universities with specialized actuarial courses would help recruiting. Actuarial courses speed up the attainment of the fellowship, and if this happens, the employees are more productive and earn more remuneration, which makes the profession more attractive to the prospects.

Although there probably are not enough instructors available to greatly increase the number of schools giving actuarial courses, the real problem is to find students to fill the classes which are currently available. To do this, recruiting and publicity must be started at the high school level. With the recent addition of an actuarial course in Los Angeles, the nine colleges and universities giving actuarial courses are fairly well distributed, except for the Atlantic coast and the southern states.

Once we can recruit enough students to fill the courses now available, we should next work to improve the geographical distribution of colleges and universities giving actuarial courses. Further expansion will come automatically when the profession becomes so well known that schools will voluntarily set up actuarial courses for prestige and as an attraction to students.