
The Institute

High-School Physics

THE importance of physics instruction as a basic element in the secondary-school curriculum is stressed in a new 136-page publication entitled *Physics in Your High School—A Handbook for the Improvement of Physics Courses*, which has been prepared by the American Institute of Physics for the information and guidance of school board members, school administrative officers, science teachers, and others concerned with the advancement of science education. Published by McGraw-Hill, the book was written for the Institute by William C. Kelly, director of the educational projects conducted by the AIP, and by Thomas D. Miner, instructor of physics at the Garden City High School, Long Island, N. Y.

The objectives of physics courses at the secondary-school level are reviewed and suggestions are offered concerning the steps which can be taken locally to strengthen that aspect of science education. The book contains background information for the benefit of those responsible either for evaluating an existing physics program or for organizing a new physics course. It also lists some of the existing opportunities for further study by physics teachers, items of equipment available for use in demonstrations and student experiments, and books and films considered helpful as supplementary information sources for teachers and students alike.

The handbook begins with the recommendation that communities organize their own school science committees, and it is emphasized that the membership should include school officers, science teachers, and professional scientists or engineers living in the vicinity. If none of the latter are residents of the community, it is suggested that the school science committee turn to some national scientific or engineering organization (the AIP and AAPT, for example) for help in arranging for at least occasional visits by technically informed individuals who may be able to serve as consultants to such groups. Once organized, the handbook suggests, the science committee should undertake a thorough review of the status of the school's science courses in consultation with teachers and school officials. The committee should then plan and carry out the action program found desirable, including in it goals, priorities, a time schedule, and periodic progress reviews and reports to the community.

The remainder of the book treats, in succession, the nature of physics as a science and profession, the gen-

eral usefulness of a knowledge of physics and some factors to be considered in counseling students to study physics, the preparation and competence of the physics teacher, teaching salaries and schedules, the content and level of difficulty of courses, the objectives and requirements of laboratory work and demonstration experiments, the use of books and films as teaching aids, the allotment of space and the design of physics classrooms and laboratories, and finally some distinguishing characteristics of superior teaching which are described in the hope that worthwhile contributions made by an outstanding high-school physics teacher will not be overlooked in his community.

In its comments, the handbook recognizes that physics is only one of the sciences and that the sciences themselves are only part of the well-balanced curriculum. It is also acknowledged that school districts differ from one another in many ways and that action taken to improve physics courses in the suburbs may not be equally effective in a rural district or in a large city. Alternative solutions to educational problems are suggested so that each school district can find help in meeting its special problems. Certain quite specific recommendations to school board members and others interested in education are nevertheless offered for the general raising of standards of physics instruction. A few of these recommendations are reproduced below:

If you have not recently visited a physics class in your high school, do so. Visit the school during an "open house" or "parents' night".

Urge your school to study its guidance records to make sure that all college bound students, and the top half of the class in general, will take physics before graduation.

Girls should be reassured that physics is not just a boy's subject and that they will find it an interesting course with which they can be successful.

Adults who advise pupils about courses should be made aware of the value of physics as a study. In particular, if you find that the guidance officer of your school thinks that physics is either a shop course or a special training course for future scientists and engineers, he should be enlightened.

In employing a physics teacher, you should look for a person with adequate preparation in physics.

If the physics course must be assigned to a teacher with poor preparation in physics, this should be regarded as a temporary emergency measure only.

Encourage and help your physics teacher to keep his knowledge of physics up to date, or if his training is incomplete, to add to it, by: releasing him from routine chores to allow time for study; encouraging him to join a professional society; paying his expenses for attendance at meetings of professional societies and hiring an adequate substitute to cover his classes; working out an arrangement to pay all or part of his tuition expenses when he takes courses which increase his subject matter competence; giving local public recognition to the teacher who increases his value to your school by continuing his studies; organizing the salary schedule so that an able teacher with advanced training is given salary preferment; granting your physics teacher a sabbatical leave if he has an opportunity to accept appointment to an academic-year institute.

Raise your salary schedule so that in starting point and in rate of advance it compares with salaries paid to physicists in industry.

In planning the physics teacher's schedule, assign him to no more than 25 teaching and laboratory periods a week, preferably five each day.

It is more important for pupils to understand the physics they know than for them to know a great many facts about physics. Thus the physics course should emphasize understanding and make no effort to be encyclopedic.

You should require successful completion of elementary algebra as a minimum prerequisite for taking physics. Geometry is recommended, and further study of mathematics, including trigonometry, highly desirable.

The physics course in your high school should meet no less than six, preferably seven, 45-minute periods a week, for a full year. This should include at least one double laboratory period each week.

Review with your physics teachers and within your School Science Committee the content of your present physics course.

Obtain information about the physics course being developed by the Physical Science Study Committee, about the film-television course prepared by Professor White, and about other new approaches to the teaching of physics.

Encourage your physics teachers to review the present physics laboratory program. If it is not meeting the desired objectives, discuss what action needs to be taken: Different experiments? More time for laboratory? Additional equipment? Better room facilities?

Explore the possibility of providing a petty cash fund so that your physics teacher can purchase small parts and supplies without long delays.

If your school is considering remodeling existing physics quarters or planning new ones, obtain the services of consultants including an architect and scientists on the staffs of nearby colleges, universities, and industrial companies, who have had experience in designing instructional laboratories.

During the preparation of the handbook, the Institute's Advisory Committee on Education offered valuable assistance by discussing the aims and contents of

the manuscript. V. E. Eaton, W. C. Michels, L. O. Olsen, C. J. Overbeck, and F. W. Sears were members of the Committee while this work was going on and they made many helpful suggestions. In addition, much time and effort were given by the members of the AAPT Committee on Apparatus for Education Institutions in reviewing the requirements of high-school physics courses for apparatus and in compiling an up-to-date list of apparatus. Members of that Committee are S. C. Brown, V. E. Eaton, H. Jensen, and H. A. Robinson.

To insure widespread knowledge of the book's contents and availability, several thousand prepublication copies have been sent to various organizations and individuals known to be actively involved in educational matters. Following this initial distribution, copies of *Physics in Your High School* have been offered for sale by the McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y. The book is priced at \$1.50 per copy in paper covers and \$3.00 in hard covers.

Placement Service

EMPLOYMENT openings in physics outnumbered available physicists by at least four to one at the employment register organized in late January by the Placement Service of the American Institute of Physics during the annual joint meeting of the American Physical Society and the American Association of Physics Teachers in New York City. Of the 333 physicists who registered in advance of the meeting, 259 showed up in person and were interviewed an average of more than a dozen times apiece by personnel recruiters representing a total of 211 industrial, academic, and government organizations. The range of salaries offered this year extended from a low of \$4500 to a high of \$16 000. The following summary of data comes from records of Placement Service operations at APS-AAPT meetings in New York from 1956 through 1960:

	1956	1957	1958	1959	1960
Registrants	308	332	433	350	333
Employers	269	193	162	232	211
Openings*:					
Industrial	1096 ₊₁₈₆	520 ₊₈₃	94 ₊₂₅	860 ₊₇₈	885 ₊₅₁
Government	367 ₊₅₆	171 ₊₁₅	86 ₊₇	217 ₊₁₉	227
Academic	292 ₊₆₄	229 ₊₁₈	108 ₊₁₃	315 ₊₃₉	176 ₊₃₃

* Subscripts refer to employers listing no specific number of available positions but implying two or more openings.

The AIP Placement Register will also be in operation in Washington, D. C., during the annual Spring Meeting of the American Physical Society this month. Facilities for arranging and holding interviews will be located in the exhibit hall at the Hotel Sheraton-Park from April 25 to 27. Lists of employment openings will be posted and a complete file of applicants will be available upon request.



The new AIP handbook, *Physics in Your High School*, was prepared for the Institute by W. C. Kelly, left, and T. D. Miner, shown at right with a student.