

# **Physics by Experiment**

Edward R. Shaw

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An excerpt from the Preface:

PURPOSE.—This book is intended to lead pupils to acquire, by means of experiments, an elementary knowledge of Physics. It seeks to bring directly under the pupil's observation the reality itself, thus training him to observe for himself, to reason for himself, to rely upon himself, and to test the accuracy of his inferences and observations by new experiments, and by the comparison of his work with the work of others.

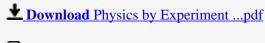
PLAN.—The book is inductive in its plan, yet it is not inductive to that rigid degree that a pupil must perform an experiment, and then make the inference without being told what to look for. The experiment is first performed, then comes the statement of the law involved. In performing the experiment, however, the pupil is guided by directions and questions. He must think; and, therefore, when he gives the statement of a principle, he has the knowledge of actual experience behind that statement.

INDIVIDUAL WORK.—The book will be found to give large scope for individual work. Its method is believed to be in accord with Mr. Herbert Spencer's idea, that in education the process of self-development should be encouraged to the fullest extent. The plan of the book is such, that each pupil may gain his knowledge of the subject in that way of learning which is peculiar and natural to him. In other words, he comes into a knowledge of the subject in his own individual way. It was Faraday's appreciation of the value of individual work which led him to say that he always wished to perform experiments for himself, because in this way he learned something that the description in words could not convey to him.

MENTAL TRAINING.—No other subject of study in the school course gives such breadth of development to the mind as Physics; and the knowledge of the subject which a pupil gains by experiment is a living knowledge, applicable in untold ways, which the discerning power of his training will always point out.

Scope.—This book is elementary in its character. The author concludes from his own experience, and from that of a great number of teachers with whom he has consulted, that, as a rule, text-books upon Physics are too difficult for beginners. Not until the average student has gained by experiments a knowledge of the elementary facts and laws of Physics, and acquired thereby a firm basis on which to build, is he able to take up the more abstract treatment of the subject. The author believes, as the result of his experience in the classroom, that the amount given in this book, and the method of acquiring it, will be found the shortest, the easiest, and the surest preparation to the study of advanced Physics.

APPARATUS. — The experiments require no expensive apparatus. Except for the air-pump, the actual outlay for apparatus need not exceed fifteen dollars. The book, though, does not preclude the use of fine apparatus if a school possesses such an equipment. It must be remembered, however, that it is largely what the pupil does for himself that gives him interest in the subject and a love for it.



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