DESCRIPTIVE LIST OF ELEMENTARY EXERCISES IN PHYSICS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649430109

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Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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Trieste

Helen E. Greenwood

DESCRIPTIVE LIST

OF

ELEMENTARY EXERCISES IN PHYSICS

CORRESPONDING TO THE

REQUIREMENT IN ELEMENTARY EXPERIMENTAL PHYSICS
FOR ADMISSION TO HARVARD COLLEGE AND
THE LAWRENCE SCIENTIFIC SCHOOL

BY

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CAMBRIDGE
Published by Harvard University
1897

INTRODUCTION.

The purpose of this publication, entitled a *Descriptive List of Elementary Exercises in Physics*, is explained by the following statement, recently adopted as a definition of the requirement in elementary experimental physics for admission to Harvard College and the Lawrence Scientific School:

"A course of study dealing with the leading elementary facts and principles of physics, with quantitative laboratory work by the pupil.

The instruction given in this course should include qualitative lecture-room experiments, and should direct especial attention to the illustrations and applications of physical laws to be found in everyday life. The candidate will be required to pass a written examination, the main object of which will be to determine how much he has profited by such instruction. This examination may include numerical problems. It will contain more questions than any one candidate is expected to answer, in order to make allowance for a considerable diversity of instruction in different schools.

The pupil's laboratory work should give practice in the observation and explanation of physical phenomena, some familiarity with methods of measurement and some training of the hand and the eye in the direction of precision and skill. It should also be regarded as a means of fixing in the mind of the pupil a considerable variety of facts and principles. The candidate will be required to pass a laboratory examination, the main object of which will be to determine how much he has profited by such a laboratory course.

The candidate must name as the basis for his laboratory examination at least thirty-five exercises selected from a list of about sixty described in a publication issued by the University under the title, "Descriptive List of Elementary Exercises in Physics." In this list the divisions are mechanics (including hydrostatics), light, heat, sound, and electricity (with magnetism). At least ten of the exercises selected must be in mechanics. Any one of the four other divisions may be omitted altogether, but each of the three remaining divisions must be represented by at least three exercises.

The candidate will be required to present a note-book in which he has recorded the steps and the results of his laboratory exercises, and this note-book must bear the endorsement of his teacher, certifying that the notes are a true record of the pupil's work. It should contain an index of the exercises which it describes. These exercises need not be the same as those upon which the candidate presents himself for the laboratory examination, but should be equivalent to the latter in amount and grade of quantitative work.

The note-book is required as proof that the candidate has formed the habit of keeping a full and intelligent record of laboratory work through an extended course of experiments, and that his work has been of such a character as to raise a presumption in favor of his preparation for the examination. But much greater weight will be given to the laboratory examination than to the note-book in determining the candidate's attainments in physics. Experience has shown that pupils can make the original record of their observations entirely presentable, so that copying will be unnecessary, and they should in general be required to do so.

This course, if taken in the last year of the candidate's preparation, is expected to occupy in laboratory work, recitations, and lectures, five of the ordinary school periods, about fifty minutes in length, per week for the whole year. With few exceptions exercises like those in the Descriptive List already mentioned can be performed in a single school period, but for satisfactory results it will often be necessary to repeat an exercise. Two periods per week for the year should be sufficient for the laboratory work proper. If the course is begun much earlier than the last year of the candidate's preparation, as it may well be, it will require more time."

The requirement described in the preceding quotation differs from the corresponding requirement that has existed at Harvard in several important particulars. The new requirement, as compared with the old one,

(1) includes more qualitative and descriptive work,

(2) includes less laboratory work on the part of the pupil,

(3) puts the note-book requirement on a somewhat different basis,

(4) in general, removes from the work of the pupil and of the teacher restrictions which no longer appear necessary.

A form of certificate, similar to the following, will be printed by the College on slips suitable for placing in the note-books, and these slips will be furnished on application to the College Secretary: —

This note-book contains a true record of the laboratory work of

.....

written by himself. The work was done under my supervision.

Signature of teacher.....

In determining both the substance and the form of the laboratory record the student should ask, not so much what kind of a record the Harvard examiners will require, but rather, what kind of a record will be most serviceable for himself in reviewing. He should keep the note-book in such a way that it will readily recall to his mind the purposes, methods, and results of the several exercises performed. The record should be well-ordered, plainly legible, and concise. Simple drawings are the briefest and best descriptions of most apparatus. Long repetitions of directions or descriptions given elsewhere should be avoided.

The division of the work into a First Part and a Second Part is intended to facilitate and encourage beginning the study of physics very early in the school course. Most of the exercises in the First Part have proved to be quite within the power of boys fourteen or fifteen years old. The cost of apparatus for these exercises is very small, as the estimate on the following page will show.

A list of apparatus for the whole course has been made with much care and is given in the Appendix. Well-known manufacturers* in Boston and elsewhere will undertake to furnish everything at a reasonable price and nearly everything at very short notice.

Many teachers and manufacturers, some of whom are mentioned by name in the following pages, have contributed to the form of the course or the form of the apparatus, as these now appear. A few acknowledgments previously made it has seemed unnecessary to repeat.

* The Franklin Educational Company, Harcourt Street, Boston, Mass.
The Knott Company, 14 Ashburton Place, Boston, Mass.
The Ziegler Company, 141 Franklin Street, Boston, Mass.
The Ritchie Company, Brookline, Mass.
The Olmsted Scientific Company, 215 Wabash Avenue, Chicago.

NOTE.

The following estimates of cost for apparatus and materials are only approximate. It is hardly possible to make an accurate estimate, as prices will vary from time to time and different dealers may have somewhat different grades of apparatus. The cheapest is not necessarily the best to buy.

FOR ALL EXERCISES OF THE FIRST PART.

Apparatus for a laboratory section of one	$6.00
Apparatus for a laboratory section of twelve	72.00
Tables for a laboratory section of twelve	50.00

These tables serve also for the Second Part.

FOR ALL EXERCISES OF THE SECOND PART.

Apparatus for a laboratory section of one	$90.00
Apparatus for a laboratory section of twelve	750.00

FOR THIRTY-FIVE EXERCISES OF AVERAGE EXPENSE.

Apparatus for a laboratory section of twelve	$475.00
Tables for a laboratory section of twelve	50.00

CONTENTS.

FIRST PART.

Preliminary Exercises.

[Recommended but not to be counted.]

MECHANICS AND HYDROSTATICS.

LIGHT.

SECOND PART.

MECHANICS.

HEAT.

SOUND.

ELECTRICITY AND MAGNETISM.