

Questions proposed by the Sub-Commission A, with regard to the position now occupied by the Elements of Differential & Integral Calculus in the programmes of Public & Secondary Schools.

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tial und Integralrechnung? Empfindet man sie als einen entschiedenen Fortschritt? In welchem Masse findet sie Zustimmung und Widerspruch im allgemeinen? Wie im besonderen stellen sich die Vertreter der Mathematik und auch der Physik in dieser Hinsicht?

Sollten Sie noch von anderen eigenartigen und befolgenswerten Einzelheiten des Unterrichtsganges in der Differential- und Integralrechnung Kenntnis haben, so wird ersucht, solche in Ihrem Referate zu erwähnen.

An welchen Stellen der IMUK-Abhandlungen Ihres Landes findet man zusammenhängende Ausführungen über die Frage der Differential- und Integralrechnung?

N. B. — Man bittet dringend, die Antwort auf den Fragebogen bis spätestens zum 1. Dezember 1913 an den Haupt-Berichtserstatter Herrn Prof. Dr. E. BEKE, Bimbó utca, 26, Budapest II, zu senden. — Es wird gebeten, bei den Antworten nur eine Seite der Bogen zu beschreiben.

Der Bericht wird im April 1914 zu Paris erstattet werden.

**Questions proposed by the Sub-Commission A,
with regard to the position now occupied by the Elements
of Differential & Integral Calculus in the programmes
of Public & Secondary Schools.**

Note 1. — The object of the Central Committee in formulating these inquiries has been solely that of acquiring information. The Committee does not itself take up any definite standpoint in the matter as to how far the teaching of the subject in the schools is desirable.

2. — By the term « Public & Secondary Schools » is to be understood those Day & Boarding Schools which correspond to the French Lycées & the German Gymnasia and Real-Gymnasia. Information is however also desired, whenever possible, with regard to what is being done in the Teachers' Training Colleges. The particular type or types of school in the district considered should always be mentioned, & it should be stated whether the Calculus is part of the official curriculum, or included, or not, at the option of the individual teacher. The percentage of schools in which the Calculus is taught should also be given. It should also be mentioned whether all the pupils are taught the subject, or only some of the more advanced ones.

I. — *How much of the Differential & Integral Calculus is taught in the Schools of the country under observation?*

In particular.

a) Is the Differential Calculus applied only to functions of a single variable, or are functions of several variables also treated?

b) To what specific functions is the Differential Calculus applied?

c) Is the Integral Calculus studied? If so, within what limits?

d) Is Taylor's Theorem discussed?

e) Are simple Differential Equations solved? If so, what?

II. — *How far is the treatment of the subject rigid, both as to the mode in which the fundamental concepts are introduced, & as to the demonstrations employed?*

a) Is it considered sufficient to introduce the notions of the Differential Calculus geometrically, without expressly using the idea of a limit, or is this idea explicitly employed? In the latter case, is there an attempt at a rigid presentation of the subject, or are theorems like $\text{Lt. } \frac{1}{a} = \frac{1}{\text{Lt. } a}$ taken for granted?

b) Are differentials used? If so, is the Differential Calculus employed as a sort of calculus of approximations, or are infinitely small quantities treated as if they were small quantities which really exist?

c) In Taylor's Theorem is the remainder considered, or not?

d) Is attention called to the fact that there are non-differentiable functions?

e) Is the idea of an irrational number logically & systematically introduced, or is it considered sufficient to speak incidentally of irrational numbers, for instance in the extraction of square roots?

III. — *How is the pupil introduced to the ideas of the Differential & Integral Calculus?*

a) Does he receive a preliminary training in the lower classes of the school, based on the study of appropriate simple functions & their graphs, so that the new matter appears to arise naturally out of the subjects already studied & not to constitute a supplementary course?

b) Is Leibniz's notation employed? If not, what symbols are used for the differential coefficient & integral?

c) Which is considered first, the Differential or the Integral Calculus, or are they taught simultaneously?

d) Is the integral introduced as the limit of a summation (definite integral), or as primitive function (inverse differential coefficient)? If in both senses, in what order & in what connection with one another are the two points of view considered?

e) Is a text-book used? If so, the exact title, publisher & edition should be quoted.

IV. — *What applications of the Differential & Integral Calculus are considered?*

What questions of analysis (Higher Algebra & Trigonometry),

geometry or physics involving the idea of a limit, otherwise wholly or partially present in the programmes of the schools are utilised to illustrate & explain the Differential & Integral Calculus, so that there may be an economy in the treatment of the subjects studied?

In particular

- a) Is the Calculus applied to the theory of maxima & minima?
- b) When Taylor's Theorem is considered, what are the functions whose developments in power series are obtained by means of it.
- c) In the cases where the remainder form of Taylor's Theorem is discussed, are power series used for purposes of interpolation, extrapolation & the calculation of errors?
- d) When the Integral Calculus is taught, is it applied to the calculation of areas (in the cases, for instance, of the parabola & ellipse), & of volumes?
- e) In connection with what fundamental concepts of Mechanics (velocity, acceleration, work, moment of inertia, etc.) is use made of the Differential & Integral Calculus?
- f) The corresponding questions for Physics, & in particular for Optics (curves envelopes, etc.) & for Electrodynamics (lines of force, etc.) should be answered.

V. — *Has the introduction of the Differential & Integral Calculus been at the expense of other branches of study? If so, of which?*

VI. — *What has been the result of the recent introduction of the Differential & Integral Calculus into the school programmes? Is the introduction felt to have been an inevitable advance? How far has it found support, or the contrary? In particular what is the attitude of mathematicians & physicists towards the innovation?*

Should any other details of interest concerning the teaching of the Differential & Integral Calculus have come to the knowledge of the observer, it is requested that they may be chronicled at this stage of the report.

A list should also be made of the passages in the reports published by the sub-commission in the country in question which relate to the teaching of the Differential & Integral Calculus.

N. B. — Answers to these questions are requested to be sent before December 1st, 1913, to the Reporter-in-Chief, Professor Dr. E. BEKE, Bimbó utcza, 26, Budapest II. — Please only write on one side of the paper.

The Report is to be presented in April 1914 at Paris.