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Embaixada da Dinamarca

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EMBAIXADA REAL DA DINAMARCA  
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PELO INSTITUTO NACIONAL DE ESTUDOS  
PEDAGÓGICOS VENHO AGRADECER EXEMPLARES RELATÓRIOS SECONDARY EDUCATION  
ET PRIMARY AND LOWER SECONDARY EDUCATION E FOLK HIGH SCHOOLS DA  
DINAMARCA COM QUE ESSA EMBAIXADA VEIO SOBREMODO ENRIQUECER NOSSA  
DOCUMENTAÇÃO ROGANDO A BONDADDE DE ENVIAR VG SE POSSÍVEL VG OS MESMOS  
EXEMPLARES AO CENTRO REGIONAL PESQUISAS EDUCACIONAIS CIDADE UNIVERSITÁRIA  
SPAULO ATENCIOSAMENTE ANÍSIO TEIXEIRA

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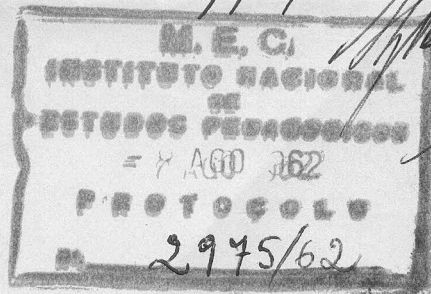
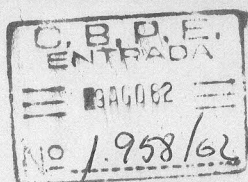
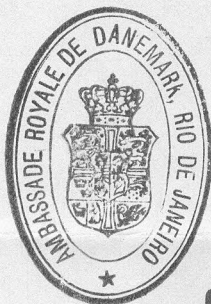
AMBASSADE ROYALE DE DANEMARK  
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A Embaixada Real da Dinamarca cumprimenta atenciosamente o Ilustríssimo Senhor Professor Anísio S. Teixeira, DD. Diretor do Instituto Nacional de Estudos Pedagógicos, e tem a honra de encaminhar, em anexo, um exemplar dos relatórios "Secondary Education in Denmark", "Primary and Lower Secondary Education in Denmark" e "Folk High Schools, Agricultural Schools and Home Economics Schools in Denmark", os quais espera possam constituir material de interêsse para êsse Instituto.

A Embaixada Real da Dinamarca vale-se da oportunidade para apresentar os protestos da sua elevada estima e consideração.

Rio de Janeiro, em 3 de agosto de 1962.



*to C.B.P.E. - at. Ronaldo Faria Souza Filho  
dia 7/8/62*

Ilustríssimo Senhor  
Professor Anísio S. Teixeira,  
DD. Diretor do  
Instituto Nacional de Estudos Pedagógicos,  
Ministério da Educação e Cultura,  
Rio de Janeiro.

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SECONDARY EDUCATION IN DENMARK

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## 1. History.

The Danish secondary school dates back to the convent and cathedral schools of the Middle Ages, and some of the oldest secondary schools, which in their names, e.g. the Ribe Cathedral School and the Roskilde Cathedral School, still recall their original attachment to the Church, were established about the middle of the 12th century.

The purpose of these convent and cathedral schools was to educate clergy for the Catholic Church, and the chief emphasis was on teaching Latin and rhetoric. The Reformation in 1536 brought no substantial change in the instruction, except that the pupils were now educated to serve the Lutheran Church. Only in 1775 was Danish introduced as a regular subject in the grammar schools; Latin and religious knowledge, however, remained the principal subjects.

The Ordinance of 1809, however, changed the character of the school; instead of being primarily devoted to the education of the clergy, the schools now became responsible for educating intending civil servants and for "fostering a true humanistic spirit", first of all through intensive study of ancient culture (Latin and Greek). Soon, however, modern languages and science were progressively introduced in the schools.

The growing technical and scientific development taking place during the 19th century led, in 1871, to a division of the upper forms of the grammar school into two sides: the science side and the arts side, in which the classical languages still predominated.

The grammar school, however, had an isolated position within the educational scheme, and the democracy, which came into existence in the latter half of the 19th century, regarded that type of school with suspicion. Following the recognition in 1901 of the parliamen-

tary principle, a complete reorganisation of the secondary school was made by the Education Act of 24th April 1903.

This Act, which remained unchanged until 1958, established a special type of school for academically minded children between 11 and 15 years of age. This school, known as the middle school, which was a junior department of the secondary school but which might also be established in connection with the primary school, consisted of four forms; at the end of the fourth year the middle-school examination was taken. Provided they had the necessary abilities and wishes to continue their education, the pupils might, after that examination, pass on to a three-year senior department, which is completed by the matriculation examination at the age of 18 or 19, or to a one-year "Real" form, which is completed by the "Real" examination at the age of 16 or 17. The matriculation certificate gives access to the universities and other institutes of higher education, while the "Real" certificate qualifies, say, for the post of employee in commercial undertakings, banks, and the Government services, and for admission to training colleges. The Education Act thus provided for the direct transition from the first form of the primary school via the junior and senior departments to a final university examination.

In addition to bringing the instruction on the science side up to date, the Education Act provided for a division of the arts side into one for classical languages and one for modern languages. The industrial revolution and the closer contact between countries had shifted the emphasis from the culture of antiquity to the study of human nature and technical development of modern times, as it was reflected in the modern languages; it was found that the study of modern world languages and their literature could give the pupils the same intellectual training and high degree of general

education as the study of classical languages.

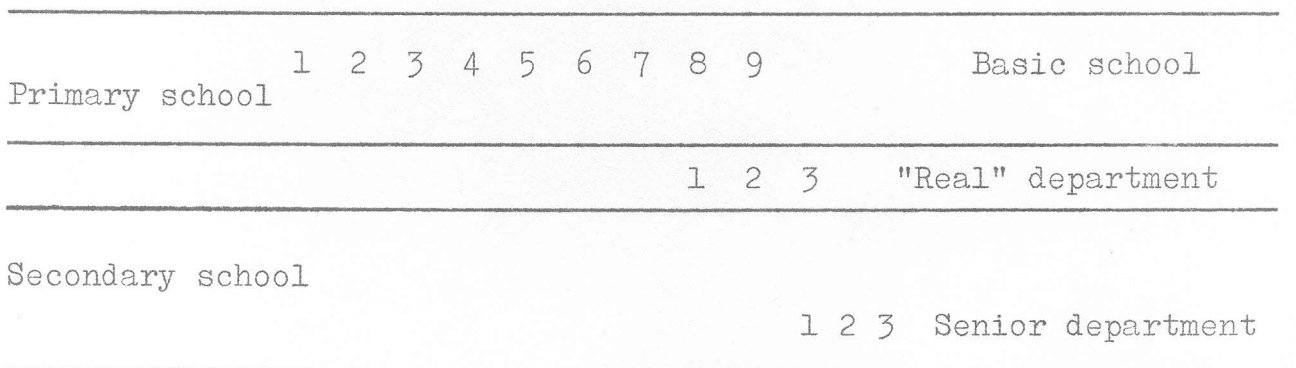
The middle school became very popular in the course of time; many pupils who actually proved unsuited for that type of school were admitted, while it became increasingly difficult to provide satisfactory instruction in the parallel department of the primary school, since virtually all able children attended the middle school and because of the absence of any final examination in the department parallel to the middle school. In addition, because of inadequate funds and an insufficient number of pupils, the small schools in the rural areas were not able to establish middle-school classes, which resulted in unequal opportunities for higher education between the urban and rural population.

The school reform carried through in 1958, which is designed to remedy these conditions, has abolished the middle school and introduced a seven-year basic school where in principle all pupils are taught together from their seventh to their fourteenth year of age (the period of compulsory school age). A foreign language, normally English, is started in the sixth school year, followed up in the seventh year by a second foreign language, normally German, and mathematics for pupils who are considered to be suited for that subject and whose parents so wish. In schools with more than one class for children of the same age-group, pupils of the sixth and seventh school years are divided into classes for children with a practical turn of mind and classes for academically minded children, on the basis of the school's judgment and the parents' wishes. Where a majority of parents so wish, however, no such division takes place, apart from the periods in which the second foreign language and mathematics are taught in the seventh school year.

On completion of the seventh year, the pupils may leave school, continue in an eighth and, possibly, a ninth form where the education

may be divided into lines aiming at the pupils' future occupation in the working community, or continue in a three-year "Real" department, which is found both in connection with primary and secondary schools. On completion of the second form of the "Real" department, a written internal examination is held in Danish, arithmetic and mathematics, after which the pupils may choose to seek admission to the three-year senior department, or to continue in the third form of the "Real" department, being completed by a "Real" examination. With a view to facilitating admission to higher education for the rural population, "Real" departments are established at the central schools in the rural areas.

Diagram of the Educational Structure Following the 1958 Reform



The school is at present in a transitional stage, the last first-year classes of the middle school being established at the beginning of the school year 1958/59, and the first sixth-year classes during the school year 1959/60. In 1960/61, only the third- and fourth-year classes of the middle school exist, and in 1961/62 the first 1st-year classes of the "Real" department will be set up. The senior department will for another few years continue on the lines established by the Education Act, 1903; senior-school education, however, is subject to revision (see Part 8), and a new senior-school system will come into force in 1963/64, when the first pupils from the new "Real" department are admitted to the first form of the senior department, while the last pupils under the old system will leave the third form of the senior department with the matriculation exami-



nation in 1965.

## 2. Number of Secondary Schools and Pupils.

When the Education Act came into force in 1903, there existed 33 secondary schools run by the State, local authorities or private persons or societies. By way of comparison, the number of secondary schools at 1st January 1959 was 76, being made up of 39 State schools, 25 municipal schools, and 12 private schools. 11 secondary schools are partly boarding-schools, seven for boys, two for girls, and two mixed schools.

The number of secondary schools is increasing yearly; between 1960-62, another four municipal and one private secondary school will be opened.

At 1st January 1959, the number of pupils in the three forms of the senior department was 12,755, 7,060 being boys and 5,695 girls, and in 1958 the matriculation examination was passed by 3,970 pupils, viz. 2,235 boys and 1,735 girls, the science side accounting for 2,112, the modern languages side for 1,711, and the classical languages side for 147. By way of comparison, the total number in 1903 was 394. After taking into account the increase in population, this means that the number of pupils passing the matriculation examination is now five times as large, having risen from one per cent of 18 to 19 year-olds to five per cent. According to a provisional estimate, the number will in 1970 amount to some 11 per cent of 18 to 19 year olds.

## 3. Administration and Economy.

### (a) State secondary schools.

The State schools come directly under the Minister of Education, who appoints teachers, attends to the appropriation on the annual budget of the funds required for running the schools and for

investment in buildings and collections, and lays down the general rules governing the schools. The instruction is free, and text-books, etc., are made available to the pupils free of charge; the local authorities of the home areas of the pupils, however, pay ten per cent of the gross cost of each pupil less expenses on payment of interest and provision for depreciation.

For the erection of new State schools, the local authority or authorities concerned pay 75 per cent of the cost of site, buildings, equipment and collections.

(b) Municipal secondary schools.

Municipal schools, the erection of which shall be approved by the Minister of Education, are administered by the local authorities under an educational plan approved by the Minister. Appointment and dismissal of permanent teachers are subject to the Minister's approval, while appointment and dismissal of headmasters are made by the Crown, as in the case of State schools. Salary scales are the same as in State schools.

A State grant corresponding to 90 per cent of the gross cost per capita for the State schools less the cost of salaries for teachers, payment of interest and provision for depreciation is paid towards the running of the municipal schools per capita in the senior department and per capita in the middle school (the "Real" department) with up to two classes for pupils of the same age-group.

The State makes a grant corresponding to 25 per cent of the cost of site, buildings, equipment and collections towards the cost of erecting new municipal schools.

(c) Private secondary schools.

To assist in the running of private schools, a State grant is paid per lesson period at the individual school, corresponding to 80 per cent of the gross cost, including payment of interest and

provision for depreciation, per lesson period in the State and municipal schools. If the school is not an independent institution, however, the State grant must not exceed the actual net cost.

A four per cent State loan, subject to no repayment, is granted for the establishment of private schools to meet up to one-half of the initial expenditure. In the case of major alterations and extensions, a State loan of up to 75 per cent of the actual expenses may be granted, subject to a maximum of 50 per cent of the total value of the school.

The payment of State grants to a private school is subject to the following conditions: (1) that the instruction given compares with that provided by the State and municipal school; (2) that the school has the right of holding external examinations; (3) that the school submits to inspection on the part of the Chief Inspector of Secondary Schools; (4) that its accounts are audited by the auditors of the Ministry of Education; and (5) that the teachers are paid the same scales of salary as teachers in State and municipal secondary schools.

#### 4. Inspection of Schools.

The Chief Inspector of Secondary Schools is educational adviser to the Ministry of Education and to the local education authorities concerned with the administration of the municipal secondary schools; in addition, he inspects the instruction given by each secondary school and tenders advice and guidance to the schools.

A number of secondary-school teachers are attached to the School Inspection Service, one for each subject taught in the senior department. They are elected for a term of one year from the best qualified teachers and are granted a reduction in the prescribed number of lesson periods to one-third against being available to

the Inspection Service for three days a week. They act as professional advisers to the Chief Inspector and tender advice and guidance to their colleagues through regular visits to the schools.

Thanks to the small area of the country, the Chief Inspector has, in part through personal contact, in part through his technical advisers, an intimate knowledge of the whole teaching staff of secondary schools. Accordingly, all questions concerning appointment, promotion and dismissal of teachers, grant of leave, etc., are submitted to the Chief Inspector.

#### 5. Teachers and Their Training.

The teachers are normally graduates, having taken the M.A. degree in a principal and a subsidiary subject. Teachers who have studied at a training college, however, may also obtain appointment in secondary schools; but if so, they will primarily teach children of the junior department (or "Real" department).

A graduate teacher shall, in order to obtain permanent appointment, attend a theoretical course in pedagogics and school hygiene, to be completed by a test, and a practical educational course extending over six months, where under the guidance of a senior colleague and under the inspection of the professional adviser to the Chief Inspector he teaches two subjects in a secondary school. A test is held also on completion of that course.

After two years' satisfactory service a graduate obtains permanent appointment, and he is given the title of "adjunkt". After 13 years' satisfactory service, he is appointed "lektor" (senior master). Masters and senior masters who have made a special professional and educational contribution may be promoted to a higher grade.

The commencing gross salary of a graduate is 15,540 kr. per year, rising every three years until after 24 years he obtains a final gross salary as "lektor" of 27,972 kr. The gross salary of particularly well-qualified senior masters is 30,780 kr., rising every three years to 33,252 kr.

The commencing gross salary of headmasters is 34,188 kr. per year, rising every three years to 36,360 kr., to which are added supplementary pay and entertainment allowance.

The training-college teachers, who have the title of "gymnasie-lærer", are paid a gross salary of 13,248 kr., rising in the course of 27 years to 22,692 kr.

These scales of salary, in operation at 1st October 1960, are subject to cost-of-living adjustment. In addition, a local allowance of between 300 kr. and 948 kr. a year is paid according to the area.

The prescribed number of weekly periods is 27, subject to a reduction to 24 at age 55, for graduates (masters and senior masters); 12 for headmasters; and 30 for non-graduates, subject to a reduction to 27 at age 55. For periods in excess of the prescribed number and for marking of work, masters, senior masters and headmasters receive at present 73.85 kr. a month for each weekly hour, and non-graduates 64.13 kr.

6. Curricula of the Senior Department (Time-table and Examination Requirements).

STANDARD TIME-TABLE

for the Danish Secondary School ("gymnasieskole"), consisting of a four-year junior department ("mellemskole"), age group 11/12-15/16, and a three-year senior department ("gymnasium"), age group 15/16-18/19, which is divided into a classical language side (C), a modern language side (M), and a science side (S). The grade marked R leads to "realeksamen".

	Middle School				R.	Senior School								Total			
	1.	2.	3.	4.		IC	IM	IS	IIC	IIM	IIS	IIIC	IIIM	IJIS	C	M	S
Religious knowledge	2	2	2	1		1	1	1	1	1	1	1	1	1	10	10	10
Danish	5	4	4	5	(4)	4	4	4	4	4	4	4	4	4	30	30	30
History	3	2	3	2	(2)	3	3	3	3	3	3	4	4	4	20	20	20
Ancient Literature and Art <sub>1)</sub>							1	1		1	1	1	1	1	1	3	3
English <sub>1)</sub>	6	3	3	3	(4)	3	5	2	3	6	2		5		21 <sup>1)</sup>	31 <sup>1)</sup>	19 <sup>1)</sup>
German		5	4	4	(4)		5			4			4		13 <sup>1)</sup>	26 <sup>1)</sup>	13 <sup>1)</sup>
French						5	5	5	5	5	5	4	4	4	14	14	14
Latin				(4) <sup>2)</sup>		6	4		6	4		6	3		22	15	
Greek						6			6			6			18		
Geography	2	2	2	2	(2)										(8)	(8)	(8)
Nature Study (mostly zoology & botany)	2	2	2	2	(2)										(8)	(8)	(8)
General Science <sub>3)</sub>						2	2	2	2	2	2	4	4	4	8	8	8
Physics (and chemistry)	2	2	2	2	(2)			6			6			6	(8)	(8)	26
Mathematics	4	5	6	7	(5)			6			6			6	(22)	(22)	40
Physical Education	4	4	4	4	(4)	4	4	4	4	4	4	4	4	4	28	28	28
Writing (penmanship)	2	1	1	1											(5)	(5)	(5)
Drawing	2	2	1	1											(6)	(6)	(6)
Singing (and Music)	2	2	2			2	2	2	2	2	2	2	2	2	10	10	10
	36	36	36	34	29	36	36	36	36	36	36	36	36	36			

1) Please see the following side.

2) " " " "

3) " " " "

- 1) Only the normal figures are given. Regulations place English and German on a par so that it is possible to take German instead of English on the science side (the individual pupil has the option). The classical side can take both languages or only one of them. Here, the choice is made by the school.
- 2) Obligatory for those pupils only who are candidates for one of the two language sides of the "gymnasium".
- 3) This subject includes biology, physiology, geography, astronomy, and - for the two language sides - some elements of physics.

To illustrate the annual number of lesson periods, it should be noted that a school week covers six days and a school year 40 weeks.

As regards the syllabus of individual subjects taught in the three sides of the senior department, the following brief data may be given; reference may also be made to the publication issued by the Ministry of Education entitled "The Danish Gymnasium", which is a translation of the provisions in force governing senior-school education, and to the annual reports of the various schools, containing information on aspects of individual subjects which have actually been studied in the course of the year.

#### I. Religious knowledge:

The instruction, which is factual and not directly edifying, covers scripture, history of the Christian Church and fundamental features of Christian ethics. In this connection, brief reference is made to non-Christian religions.

No examination is held in this subject.

## II. Danish:

The instruction covers reading of literature with literary history, Danish grammar, Norwegian and Swedish, and training in oral and written expression.

Nine principal literary works are studied, three of them being specially prepared. One work shall be Norwegian, and two of the works for general reading may be from world literature.

In addition, at least 400 pages of representative samples of literature are required, 150 pages being specially prepared, and 100 pages of Swedish and 35 pages of Norwegian literature.

The pupils are given a thorough knowledge of the principal features of Danish grammar (phonetics, morphology, and syntax) and of the various forms of the language: spoken language, written language, standard Danish, and dialects.

Through discourses given by the pupils and papers on set subjects, the pupils are trained to express themselves clearly and intelligibly in speech and in writing.

Both oral and written examinations are held in this subject.

## III. English:

### A. Modern languages side.

The aim is, on the one hand, to give the pupils an important insight in characteristic aspects of English culture and, on the other, to develop the knowledge and command of the language acquired in the junior department.

The syllabus includes 175 pages covering a play by Shakespeare and poetry from the 19th and 20th centuries; 325 pages of difficult



prose from the 19th and 20th centuries, 75 pages of which being rational and social matter; and 300 pages of modern prose of medium difficulty that may give the pupils a knowledge of the living language of do-day. Finally, pupils shall read by themselves some 250 pages covering one or more works or parts of works by the principal authors of the 19th and 20th centuries.

The pupils are trained in speaking the language through conversation and verbal reproductions, and in writing it through translations and through set and free compositions.

Written and oral examinations are held in this subject.

#### B. Classical languages side and science side.

The syllabus covers some 300 pages. The aim is to keep up good pronunciation and to develop reading ability.

Oral examination is held in this subject.

#### IV. German:

##### A. Modern languages side.

The aim is, on the one hand, to give the pupils an important insight in characteristic aspects of German culture and, on the other, to develop the knowledge and command of the language acquired in the junior department.

The syllabus covers 400 pages, one-half of which comes from the period prior to 1850, including one work by Goethe, one by Schiller or Lessing, a selection of epic and lyrical poems, more difficult prose of lasting value, 75 pages of which being rational, social matter; further, 300 pages of modern prose of medium difficulty designed to give the pupils a knowledge of the living language of to-day.

Grammar is taught up to a standard necessary for the linguistic understanding of the texts and for proficiency in written and oral use

of the language.

The pupils are trained in speaking the language through conversation and verbal reproduction, and in writing it through translations and through set and free compositions.

Oral and written examinations are held in this subject.

B. Classical languages side and science side.

The syllabus covers some 300 pages.

The aim is to keep up good pronunciation and to develop reading ability.

V. French:

The syllabus covers some 500 pages.

The aim is to teach the pupils to understand and with good pronunciation read out a modern French text.

Oral examination is held in this subject.

VI. Greek:

Classical languages side.

The syllabus covers 3,000 verses, at least 2,000 of which are by Homer, and 135 pages of prose by Xenophon, Herodotus and Plato.

The aim is to teach the pupils to read fairly easy Greek poetry and prose by themselves, and to give them an impression of essential aspects of classical Greek culture.

Oral examination is held in this subject.

VII. Latin:

A. Classical languages side.

The syllabus covers at least 210 pages of prose, much of which shall be taken equally from Caesar and Cicero, and at least 1,800 verses by various authors, in particular Horace.

Further, in the third form of the senior department, one weekly period is devoted to unprepared translation of easy texts.

The aim is to give the pupils an impression of essential aspects of Roman culture, and to teach to read easy poetry and fairly easy prose in Latin, somewhat more emphasis being placed on the linguistic aspect of the subject (morphology and syntax) than is the case in Greek.

The pupils are trained in preparing fairly easy translations from Latin.

Written and oral examinations are held in this subject.

B. Modern languages side.

The syllabus covers at least 150 pages, much of which shall be taken equally from Caesar and Cicero, and which may cover fairly easy poetic literature.

The aim is to teach the pupils to read fairly easy Latin texts with grammatical understanding and to make them acquainted with essential aspects of Roman culture.

Oral examination is held in this subject.

VIII. Classical civilization.

A. Modern languages side and science side

The syllabus covers the study of Greek authors in translation (at least 2,000 verses by Homer, two dramas and at least 125 pages of prose, half of it by Plato). A representative selection of classical works of art is also studied.

The aim is to give the pupils an insight into the most important aspects of classical culture.

Oral examination is held in this subject.

B. Classical languages side

In addition to the study of classical works of art as indicated under A, the syllabus covers a selection of such Greek authors as are not read in the original language.

IX! History:

The syllabus covers up to 700 pages, viz. some 375 pages of world history, some 225 pages of the history of the Northern countries, and some 100 pages of civics.

The aim is to give the pupils an objective knowledge of the principal features of the economic, political, social and cultural development of mankind from the earliest times to the present day.

The history of Denmark and of other Northern countries is studied in greater detail than is world history, and is viewed in relation to the latter. The time from the middle of the 19th century receives most attention.

In civics, pupils are made acquainted with the Constitution of Denmark, its central and local government, and the existing economic and political organisation of to-day, including international organisations.

In connection with the text-books, a study is made of historical sources, pictorial material, statistical tables, etc., about one-fifth of the time being spent on that study. Within this fifth, 25 or 50 periods may be devoted to a special study of one or two naturally defined subjects.

Oral examination is held in this subject.

X. Geography:

A. The language side

The syllabus covers:

Physics and chemistry to the extent required for instruction in geography and nature study.

Astronomy to the extent required for the understanding of physical geography and the world-picture through the ages.

A brief exposition of the geology of Denmark.

A brief survey of the climatic and plant regions of the earth.

Cultural and industrial geography.

Oral examination is held in this subject.

B. The science side

The syllabus covers:

Geology with mineralogy.

Principal features of physical geography, biogeography, and cultural and industrial geography with emphasis on causality.

XI. Nature study:

The syllabus covers:

Structure and reactions of unicellular or multicellular organisms, in particular characteristics of the structure and functions of the human body, with hygiene. A historical outline of the theory of evolution illustrated by a number of examples from comparative anatomy, paleontology and embryology selected so as to permit of understanding the scientific conception of the mutual connection of the organisms and their biological adaptation; and genetics.

XII. General science:

The science side

The aim is to give the pupils such knowledge of nature and its laws as to enable them to understand the significance of science both in the practical and to spiritual life of to-day, while

training them in scientific method through a combination of experiment and reasoning.

The syllabus covers:

A. Physics with astronomy

(1) Mechanical physics. Equilibrium and movement of bodies, including movement under the influence of a constant power, central movement, circular movement. Energy, momentum, systems of measurement, friction, elasticity, elastic fluctuations, pendulum. Pressure of liquids and gases. Wave motion, acoustics. General attraction. Molecular forces.

(2) Thermology. Temperature, thermal expansion, equation of state of gases. Specific heat, melting heat, heat of evaporation. Steam pressure, hygrometry. Liquefaction of gases. Kinetic theory.

(3) Optics. Reflection of the light, mirrors. Refraction of light, prisms, lenses. Microscope, astronomical telescope, sextant. Spectres. Velocity of light. Light as wave motion.

(4) Electrotechnology. Magnetism, electrostatics. Electric current, Ohm's law, electrical energy. Electrolysis, elements, accumulator. Electromagnetism. Induction. Alternating current. Electrical measurements. Electric current in air, electrical radiations. Electric fluctuations. Electromagnetic waves, the electromagnetic spectrum. Radioactivity, structure of the atom.

(5) Astronomy. The firmament. The movements of the sun, the moon and the planets. Fixing of place and time. Physical conditions of the celestial bodies. The universe of stars.

As far as possible, the instruction is based on experiments. The time devoted to practical exercises corresponds to two periods a week during one year.

## B. Chemistry

1. Inorganic chemistry. With the application of the chemical symbols the teacher will go through hydrogen, oxygen, halogen, sulphur, nitrogen, phosphorus, carbon, silicon, and some of the most important metals and some of their compounds.
2. Organic chemistry. Typical examples from the chief groups of aliphatic compounds: hydrocarbons, alcohols, aldehydes, acids, esters, carbohydrates. Some cyclic compounds.
3. Physical and theoretical chemistry. The most important general theories and physico-chemical laws to the extent required for a deeper and a more comprehensive understanding of the chemical processes dealt with in connection with exposition of the individual substances.

Exercises form a necessary part of the experimental instruction.

Oral examination is held in science.

## XIII. Mathematics:

### The science side

The aim is to give the pupils a knowledge of a fundamental sphere of mathematics, and to develop and train their powers of logical thinking and clarity of expression, and to ensure that they attain mastery and proficiency in the use of mathematical formulae and in the execution of numerical calculations.

The syllabus covers:

- (1) The real numbers. The concept of sequence. Inequality calculation and calculation with numerical values.
- (2) Whole numbers.
- (3) Inductive proof.
- (4) Permutations and combinations.

- (5) Arithmetical and geometrical progressions. Infinite geometrical progressions.
- (6) Compound interest and annuities.
- (7) Polynomials.
- (8) The binomial theorem.
- (9) Sign discussion of polynomials of first and second degrees.
- (10) Solution of one equation with one unknown quantity.
- (11) Solution of equation systems with several unknown quantities.
- (12) Complex numbers; solution of the quadratic equation and the binomial equation.
- (13) System of rectangular co-ordinates and parallel displacement of the same.
- (14) The functional concept in the sphere of real numbers (graphical delineation). Direct and inverse proportionality. The functions  $y = ax + b$  and  $y = ax^2 + bx + c$ .
- (15) Limit of a function; rules of arithmetic relating to limits; asymptotes.
- (16) Continuous functions. Inverse function.
- (17) Differential functions.
- (18) The indefinite integral; integration of quantity of several terms; integration by substitution; integration by parts; the definite integral with application to determination of the area of plane territories and the volume of solids of revolution.
- (19)
  - (a) Rational functions;
  - (b) The trigonometrical functions  $\sin x$ ,  $\cos x$ ,  $\operatorname{tg} x$  and  $\operatorname{cot} x$ ;
  - (c) The logarithmic functions  $\ln x$  and  $\log x$ ;
  - (d) The exponential functions  $a^x$  with the chief emphasis on  $e^x$ ;
  - (e) The powers of  $x$  ( $x \neq 0$ ) with particular reference to  $x^{\frac{1}{n}} = \sqrt[n]{x}$  ( $x \geq 0$ ) for  $n \neq 2$  and whole. For  $n$  odd also  $\sqrt[n]{-x}$ .
- (20) Division of a given line segment in a given proportion. Harmonically connected points.
- (21) General doctrine of similitude; areas of similar polygons; centres of similarity of two circles.



- (22) Length of circle and circular arc; area, sector and segment of a circle.
- (23) Construction on the basis of -
  - (a) the loci known from the junior department;
  - (b) the locus of the points whose distances from two given points have a given proportion;
  - (c) the locus of the points whose distances from two given lines have a given proportion;
  - (d) the doctrine of similar figures.
- (24) The trigonometrical functions ( $\sin$ ,  $\cos$ ,  $\text{tg}$ , and  $\text{cot}$ ) of arbitrary angles; relations between the trigonometrical functions; formulae of the functions of the sum and the difference of two angles, of the functions of the double and half angles; chord calculation.
- (25) Basic formulae of the right-angled and oblique-angled triangles.
- (26) Principal forms of the equation of the straight line; parametric construction of the straight line; pencils of rays.
- (27) Equation and parametric construction of the circle; equation of the tangent; the power of a point in regard to a circle; the radical axis of two circles.
- (28) Equation and parametric construction of the parabola in relation to the symmetry axis and the vertex tangent as co-ordinate axes; equation of tangent, normal diameter and the diameter corresponding to a given chord system; principal theorems on the tangent with application to constructions.
- (29) Equation of ellipse and hyperbola in relation to the symmetry axes as co-ordinate axes; equation of tangent, normal, the asymptotes of the hyperbola and the diameter corresponding to a given chord system; conjugate diameters; principal theorems on the tangent with application to constructions; parametric construction of the ellipse; directrices.

- (30) Loci in analytical treatment.
- (31) Discussion of the quadratic equation  $ax^2 + by^2 + cx + dy + e = 0$ .
- (32) In solid geometry, principal theorems on straight line and plane; the triangular corner; convex corners.
- (33) Congruence, symmetry, and similarity in space.
- (34) Polyhedra, including prism, pyramid and frustum of a pyramid, as well as the five regular polyhedra with detailed treatment of tetrahedron, cube and octahedron; cylinder, cone of frustum of a cone; the sphere.
- (35) Spherical geometry with reference to treatment of spherical triangles; the trigonometrical basic formulae of the right-angled triangle, as well as the cos and sin theorems of the obliqueangled triangle.
- (36) The area of the curved surface of the cylinder of revolution, of the cone of revolution, and of the frustum of a cone of revolution, and of the spherical surface, of the zone of the spherical segment.
- (37) Volume of prism, pyramid, frustum of a pyramid, cylinder of revolution, cone of revolution, frustum of a cone of revolution, sphere, sector of a sphere, and segment of a sphere.
- (38) Determination of plane sections in cylinder surface of revolution and conic surface of revolution.

Written and oral examinations are held in this subject.

#### XIV. Physical Education:

The aim is to promote harmonious physical development in the pupils, to train their command of their motor system, and develop their physical strength and stamina. Full advantage shall be taken of the opportunities provided by physical training for encouraging self-discipline and developing character.

The syllabus covers:

Free movement, games (including ball games) and, where circumstances permit, athletics and swimming.

Besides, occasionally, winter sports, in particular skating.

No examination is held in this subject.

XV. Singing (Music):

The instruction is designed to impart to pupils a sense of musical values which will enable them to experience the music of different ages as a manifestation of a feeling common to mankind. The aim is to foster and develop the power and the spontaneous pleasure of singing and listening to or practising music.

The syllabus covers singing in unison, choral singing, vocal culture, musical knowledge, introduction to musical works, and ensemble playing.

No examination is held in this subject.

7. Matriculation Examination and Marking System.

All pupils sitting for the matriculation examination are examined in Danish essay (a choice between three subjects); modern languages pupils are examined in English translation and English précis, German translation and German précis; classical languages pupils in two translations from Latin; and science pupils in two sets of mathematical problems. The papers are assessed by two external examiners appointed by the Chief Inspector of Schools.

The pupils are examined in five or six subjects, as directed by the Chief Inspector of Schools. One test may be held on completion of the second year of the senior department in one of the subjects in which instruction ceases at that stage. The teacher examines and assesses the achievements together with an external examiner appointed by the Chief Inspector of Schools.

The examination quotient is calculated on the basis of the average of the marks obtained at internal tests and the average of the external examination marks + the internal examination marks in the subjects in which no external examination is held.

The assessment of the pupils' achievements is expressed by means of the following marking scale:

<u>Marks</u>	<u>Translation</u>	<u>Numerical value</u>
Udmærket godt (ug)	excellent	15
Udmærket godt ÷ (ug÷)	excellent -	14 2/3
Meget godt + (mg+)	good +	14 1/3
Meget godt (mg)	good	14
Meget godt ÷ (mg÷)	good -	13 1/3
Godt + (g+)	fair +	12 2/3
Godt (g)	fair	12
Godt ÷ (g÷)	fair -	10 2/3
Temmelig godt + (tg+)	poor +	9 1/3
Temmelig godt (tg)	poor	8
Temmelig godt ÷ (tg÷)	poor -	5 1/3
Mådeligt + (mdl.+)	bad +	2 2/3
Mådeligt (mdl)	bad	0
Slet	very bad	- 16

An average of 11,25 is required to obtain a pass.

#### 8. The Future Senior Department System.

In February 1959, a committee was appointed for the purpose of preparing new schemes of work for the senior department of secondary schools. The committee completed their work at the end of 1960, and the new syllabi of instruction will come into operation in 1963, when the first pupils from the new "Real" department enter

the first form of the senior department.

The Committee recommend a change in the division of the senior department so that, on entry to the first form of that department, the pupils will have to choose between an arts side and a science side. When entering the second form, the pupils of the two sides have the choice between three branches, viz.: for the arts side, modern languages, classical languages, and social science/languages, and, for the science side, mathematics/physics, general science, and social science/mathematics.

In all essentials, the first form (arts side + the second and third forms (modern languages branch) and the first form (science side) + the second and third forms (mathematics/physics branch) will correspond to the present arts and science sides. Unlike the present classical languages side, the future one will be of but two years' duration, which means that the requirements in Greek and Latin will be somewhat reduced. It is hoped that this shortening of the course will encourage more students to study classical languages, the studies in the first form of classical antiquity in the subjects of Latin, classical civilization, and history being likely to arouse the pupils' interest in the languages and cultures of that epoch .

The introduction of special social branches on both sides is due to the desirability of permitting large numbers of young persons to receive a broad information on political, economic and social conditions of their age, national as well as international. The pupils will receive instruction in social subjects for five weekly periods in the second and third forms and extended instruction in geography against a corresponding reduction in the number of weekly periods in foreign languages and mathematics/physics, respectively.

In view of the importance of the results of biological research to human knowledge, it was decided to set up a general science branch, where an increased number of weekly periods are devoted to geography, biology and biochemistry at the expense of the subjects of mathematics and physics.

Mathematics will be included in the curriculum of the language side, partly because many pupils studying on that side will need elementary mathematical knowledge for their advanced studies, partly because it is found desirable for such pupils to get an insight in mathematical thinking and method in this age of rapid technical development affecting all aspects of community life.

At the same time, the instruction in English or German is intensified on the mathematical side the better to equip these pupils for their future studies and work, where foreign textbooks and contact with foreign colleagues will be of ever increasing importance.

The Russian language is introduced as an optional subject instead of French on both lines.

Af far as each particular subject is concerned, requirements and teaching methods have been revised to take account of recent scientific developments and to encourage pupils to do independent work, to train their critical sense, and to teach them good working methods.