Internal School Curriculum

For Grades 7 and 8 in
Subject

Physical Science

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Introduction

Concepts for acquisition of skills

Educational value of Physics

Learning from Physics
Learners are taught to orientate in their environment and to develop criteria for their future actions by detecting the key concepts and ideas in Physics classes, thereby investigating how to shape their own world of experiences. In Physics lessons they clearly experience the connection between experiment/theory (model) and real life. In this way, Physics helps them to understand their environment better and it serves as a guideline for shaping their futures.

In addition to getting acquainted with facts about the origin and interactions of all aspects of our world, which is of central importance for their identity formation, learners are taught the physical principles, which accommodate man-made models in their environment. This does not only apply to Physics lessons which seem rather theoretical, but especially for the everyday world of learners.

In this way learners can read and understand their immediate and distant environment with an increasingly sharpened scientific eye.

The current Physics curriculum is focused on areas of classical Physics like mechanics, optics, and thermodynamics but in addition also on modern theories which developed in the last century, mainly reflected in nuclear Physics.

The current curriculum is based on the 2016 Baden-Württemberg training-specifications. The explanatory skills, specified therein, form the basic structure of the curriculum. These content-related competencies are arranged by basic (B), intermediate (I) and advanced level (A).

Remarks for Grades and course levels:

In the junior secondary grades (Grades 7 to 9), the subject is taught in German in two periods per week. This is reflected in the total scheduled lesson on the relevant topics.
In Grades 10 to 12 bilingual lessons are offered. By teaching Physics terms in English and German, apart from purely technical skills acquisition, a high level of linguistic skills are acquired and expected from the learners.

Procedure-related skills

1. Gaining knowledge

Learners observe and describe phenomena and derive questions which they can examine physically. They apply scientific working procedures, i.e. they apply experiments to test hypotheses, conduct experiments, analyze them and document the results. In their descriptions they differentiate between real experiences and contrived models, identify correlations and use models to explain physical phenomena.

Learners are able to

conduct targeted experiments

1. target-oriented observation of phenomena and description of their observations;
2. set up hypotheses on physical questions;
3. design experiments to test hypotheses (i.e. adjust presumed influencing values separately);
4. perform and evaluate experiments;
5. capture readings and perform computer analysis;
6. use digital data measurement systems; (A)

modeling and mathematization

7. produce simple mathematical correlations between physical quantities and verify (in particular proportionality of two quantities);
8. develop equations of proportional correlations; (A)
9. perform mathematical transformations to calculate physical quantities; (A)
10. differentiate between real experience and contrived, idealized model concepts (i.e. the differentiate between observations and explanations);
11. describe correlations and use to solve problems;
12. explain phenomena and formulate hypotheses by means of models;

acquire and apply knowledge

13. apply their knowledge of Physics to solve problems and tasks purposefully;
14. gain and apply knowledge beyond school.

Communication:

Learners discuss physical findings and the application thereof by using subject-related terminology and representations. They distinguish between every-day and technical language descriptions. They increasingly describe physical situations by using mathematical forms of representations. They select information from various sources to solve problems. They discuss issues under physical aspects and document their results and present them suitably for their target group.

Learners are able to

verbalize findings

1. distinguish between every-day and technical language descriptions;
2. verbally describe functional correlations between physical quantities (e.g. 'the - the' expressions) and explain physical formulas (e.g. cause-effect statements, unknown formulas);
3. exchange information on physical findings and on their application by using subject related language and representations (e.g. distinction between variable and unit, use of pre-fixes);
4. describe physical processes and technical devices (e.g. time sequences, cause-and effect correlations);

document and present findings

5. document physical experiments, results and findings - also by using digital media (e.g. drawings, descriptions, tables, diagrams and formulas);
6. conclude factual information and measurement data from one representation format and transfer it to another (e.g. table, diagram, text, formula);
7. obtain information from different sources, structure knowledge clearly, process in a relevant and target-group-oriented way and present by using appropriate media.

Assessment

By using examples, learners assess possibilities and limitations of physical perspectives in purely physical and non-subject-related contexts. They compare and assess alternative scientific solutions. They use their physical knowledge to assess the risks and security measures of experiments of everyday activities and in modern technologies. They designate effects of physical findings in historical and social contexts. Learners assess information and scrutinize its relevance.

Learners are able to

reflect physical procedures

1. distinguish relevant from irrelevant variables in experiments
2. rate results of experiments (measurement errors, accuracy);
3. asses hypotheses according to results of experiments;
4. use examples to explain limitations of physical models
5. evaluate climate change scenarios; (E)

rate information

6. examine information from various sources for relevance;
7. critically observe media presentations based on their physical findings (e.g. films, newspaper articles, pseudo-scientific statements);

discuss opportunities and risks

8. evaluate risks and safety measures in experiments and in everyday life, based on their physical knowledge;
9. assess opportunities and risks of technologies by applying physical knowledge;
10. discuss technologies, by taking social, ecological and economical aspects into consideration;
11. differentiate between local and global action in sustainable development by means of their physical knowledge;
12. describe historical effects of physical findings;
13. discuss gender clichés regarding interests and career choices in the scientific-technical field.

Physics-oriented thinking and working methods for Grades 7 and 8

B	I	A
1) Name criteria for distinguishing between observation and explanation (observation by perception and measurements, explanation by laws and models)	(1) Describe criteria for distinguishing between observation and explanation (observation by perception and measurements, explanation by laws and models)	(1) Describe criteria for distinguishing between observation and explanation (observation by perception and measurements, explanation by laws and models)
(2) By means of examples describe, that statements in Physics are generally verifiable (question, hypothesis, experiment, proof or disproof)	(2) By means of examples describe, that statements in Physics are generally verifiable (question, hypothesis, experiment, proof or disproof)	(2) By means of examples describe, that statements in Physics are generally verifiable (question, hypotheses, experiment, proof or disproof)
(3) Describe the function of models in Physics (i.e. by means of the *light beam model* and the *particle model)*	(3) Describe the function of models in Physics (i.e. by means of the *light beam model* and the *particle model)*	(3) Explain the function of models in Physics (i.e. by means of the *light beam model* and the *particle model)*
		(4) Describe the significance of the *SI-unit system* by means of examples.

Curriculum Grade 7

7.1	Thermodynamics						
	Content-related skills **B** **I** **A**			**Contents (compulsory for the region)**	**Time in lessons**	**Methods curriculum**	**School-specific supplements and additions**
			(1) Describe similarities and differences between the Celsius- and the Kelvin scale (i.e. the *absolute zero point*)	Temperature perception and objective temperature measurement - design of thermometers - various thermometers Temperature scales	4	Work with diagrams and models	Designing a thermometer *Optional: Particle model* - *Brownian movement* - *States of aggregation* *Change of state of aggregation*
	(2) Describe, that solid, liquid and gaseous substances usually expand with increasing temperature.	(2) Describe, that solid, liquid and gaseous substances usually expand with increasing temperature.	(2) Describe, that solid, liquid and gaseous substances usually expand with increasing temperature.	Thermal expansion - Expansion of solid, liquid and gaseous state - Anomaly of water - bi-metals	4	Work with diagrams and models	
	(3) describe the three ways of thermal energy transfer	(3) describe the three ways of thermal energy transfer	(3) describe the three ways of thermal energy transfer (*convection,*	Thermal energy transfer - heat conduction	4	Recording of experiments	Thermal insulation

	(4) describe technical applications with respect to thermal energy transport (e.g. insulation, heating, thermal insulation glazing)	(4) describe technical applications with regard to thermal energy transport (e.g. insulation, heating, thermal insulation glazing)	*thermal radiation, heat conduction)* (4) describe technical applications with respect to thermal energy transport (e.g. insulation, heating, thermal insulation glazing)	- convection - thermal Radiation		.	
7.2	**Magnetism**						
	Content-related skills **B**	**I**	**A**	**Contents (compulsory for the region)**	**Time in lesson**	**Methods curriculum**	**School-specific supplements and additions**
	(1) Learners are able to examine and describe phenomena of magnetism by using simple experiments (ferromagnetic materials, *magnetic poles*, attraction - repulsion, *compass*)	(1) Learners are able to examine and describe phenomena of magnetism by using simple experiments (ferromagnetic materials, *magnetic poles*, attraction - repulsion, *compass*)	(1) Learners are able to examine and describe phenomena of magnetism by using simple experiments (ferromagnetic materials, *magnetic poles*, attraction - repulsion, *compass*)	Basic concepts of magnetism - poles - color code - force effects of magnets - compass	4	Workstations	Ferrous substances in the sand dunes
			(2) Explain the function of	Elementary magnet model	4	Work with	

			models in Physics by means of the elementary magnet.	- dipoles instead of monopoles - magnetizing of iron, nickel, cobalt		Models	
			(3) describe the structure of simple *magnetic fields* (*bar magnet, horseshoe magnet, coil)*	Magnetic fields - rod- and horseshoe magnet	4	Experiments with iron-shavings	
7.3	**Acoustics**						
	Content-related skills **B I A**			**Contents (compulsory for the region)**	**Time in lessons**	**Methods curriculum**	**School-specific supplements and additions**
			(1) Learners can describe acoustic phenomena (*amplitude, frequency*) (2) describe the hearing process	Properties of sound - volume - pitch - frequency - amplitude	4	Experiments with the tuning fork and oscilloscope	Cooperation with Biology department: The anatomy of the ear
			(3) Describe acoustic phenomena (sound propagation, sound insulation) (4) Inspect the environment for sources of noise, evaluate and derive measures	Sound propagation, sound insulation, noise and reduction of noise levels	4		

7.4	Optics						
	Content-related skills **B** **I** **A**			**Contents (compulsory for the region)**	**Time in lessons**	**Methods curriculum**	**School-specific supplements**
	(1) Learners are able to describe the visual process (transmitter, receiver)	(1) Learners are able to describe the visual process (transmitter, receiver)	(1) Learners are able to describe the visual process (transmitter, receiver)	Light source and light-reflecting bodies	2		
	(2) Examine basic phenomena of light propagation by using experiments and describe by means of the *light beam model* (3) Examine and describe shadow phenomena by using experiments (e.g. shadow areas and silhouettes, umbra and partial shade)	(2) examine basic phenomena of light propagation by using experiments and describe by means of the *light beam model* (3) examine and describe shadow phenomena by using experiments (e.g. shadow areas and silhouettes, umbra and partial shade)	(2) Examine basic phenomena of light propagation by using experiments and describe by means of the *light beam model* (3) Examine and describe shadow phenomena by using experiments (e.g. shadow areas and silhouettes, umbra and partial shade)	Light and shadow - light propagation - silhouettes - umbra - partial shade	2	Shade theater	
	(4) describe image formation through a *screen* (*pinhole camera*)	(4) describe image formation through a *screen* (*pinhole camera*)	(4) describe image formation through a *screen* (*pinhole camera*)	Design and functioning of a pinhole camera	2	Constructing a pinhole camera	
	(5) explain optical phenomena in	(5) explain optical phenomena in the universe	(5) explain optical phenomena in the universe	Eclipses - solar eclipse	4	Learner presentations	

	the universe (*moon phases*, *solar eclipse*, *lunar eclipse)*	(*moon phases*, *solar eclipse*, *lunar eclipse)*	(*moon phases*, *solar eclipse*, *lunar eclipse)*	- lunar eclipse - total and partial eclipse - moon phases			
	(6) *Describe* scattering *and* absorption phenomenologically (7) Describe *reflection* at plane surfaces (*law of reflection*) (8) Describe *refraction* and total reflection	(6) *Describe* scattering *and* absorption phenomenologically (7) Describe *reflection* at plane surfaces (*law of reflection*) (8) Describe *refraction* and total reflection	(6) *Describe* scattering *and* absorption phenomenologically (7) Describe *reflection* at plane surfaces (*law of reflection, mirror image*) (8) Describe *refraction* und total reflection	Scattering, reflection, absorption and refraction of light	4	Learner experiments	
	(9) Describe the effect of optical lenses (*collective lens, focal point*) (10) Physical aspects of processes in the human body (e.g. iris as pinhole, arm as a lever)	(9) Describe the effect of optical lenses (*collective lens, focal point*) (10) Physical aspects of processes in the human body (e.g. iris as pinhole, arm as a lever)	(9) Describe the effect of optical lenses (*collective lens, focal point*) (10) Physical aspects of processes in the human body (e.g. iris as pinhole, hearing and vision, arm as a lever)	Lenses - ray paths through lenses - different types of lenses - effect of a lens on parallel incident light	4	Learner experiments, learner presentations	Application of lenses - magnifying glass - glasses - microscope - telescope - camera

	(11) describe simple experiments for separation of white light (*prism*)	(11) describe simple experiments for separation of white light (*prism*)	(11) describe simple experiments for separation of white light and addition of colors (*prism*)	Colors: - refraction of white light on the prism - complementary colors - azure - afterglow - rainbow	4		
			(12)Describe similarities and differences of *light* and *sound* (transmitter and receiver, perception range, medium, propagation speed	Comparison of sound and light based on all acquired knowledge on both phenomena.	2		
7.5	**Mechanics I**						
	Content-related skills **G M E**			**Contents (compulsory for the region)**	**Time in lessons**	**Methods curriculum**	**School-specific supplements and additions**
	(1) Describe and classify motions verbally (2) Determine velocity experimentally and	(1) Describe and classify motions verbally (2) Determine velocity experimentally and	(1) Describe and classify motions verbally and by means of diagrams (*timing, location, direction, f*orm of the track, *velocity*) (2) Determine velocity experimentally, describe movements	Movement at a constant velocity, v=s/t	4	Learner experiments application of equations and formulas	*Optional: Accelerated motions (qualitative)*

	create movement graphs (*s-t graph,* $v = \frac{s}{t}$)	create movement graphs (*s-t graph,* $v = \frac{s}{t}$)	(e.g. by means of data acquisition or video analysis system) and create corresponding *movement charts* (*s-t graph, v-t graph)*				
	(3) Describe the effects of *forces* (deformation, change in motional state) (4) Describe the interaction of *forces*	(3) Describe the effects of *forces* (deformation, change in motional state) (4) Describe the interaction of *forces* by using one-dimensional examples *(resultant force and force equilibrium*)	(3) Describe change of *states of motion* as a result of *forces* (4) Quantitatively describe the interaction of *forces* by using one-dimensional examples (*resultant force* and *force equilibrium*)	Forces in general - effects of forces - arrow-representation of forces - addition of force-arrows - resolution of forces	6	Learner experiments and work with diagrams	
	(5) Determine f*orces* experimentally (*dynamo meter*)	(5) Determine *forces* experimentally (*dynamo meter*)	(5) Describe *deformations* resulting from forces (*dynamo meter, Hook's law)*	Design and functioning of the dynamo meter, Hook's law	4		

Grade 8

8.1	Mechanics II						
	Content-related skills **G** **M** **E**			**Contents (compulsory for the region)**	**Time in lessons**	**Methods curriculum e.g.**	**School-specific supplements and additions**
	(1) Learners are able to describe the law of inertia	(1) Learners are able to describe and apply the law of inertia	(1) Learners can apply Newton's principles of mechanics in verbal descriptions and explanations of simple situations from experiments of the daily life.	Newton's laws	4	Literature research	
	(2) examine a simple machine and describe its application in everyday life and in technology (e.g. lever, pulley)	(2) examine a simple machine and describe its application in everyday life and in technology (e.g. lever, pulley)	(2) examine a simple machine and explain its application in everyday life and in technology (e.g. lever, pulley)	Deflection of forces and force savers - lever - fixed and movable role - pulley - sloping surface	8	Learner experiments	
	(3) name the connection and difference between *mass* and *weight force*	(3) explain the connection and difference between *mass* and *weight force (F-mg)*	(3) explain the connection and difference between *mass* and *weight force (F-mg)*	Gravity: F=mg	2	Work with equations and formulas	

	(4) Describe the basic properties of *energy* (e.g. energy conservation) (5) Name examples of *energy chains* in everyday life and in technology (e.g. by means of *potential energy, kinetic energy, thermal energy, electric energy)* (6) Describe ways of energy supply by means of energy chains (e.g. hydroelectric power plant, coal plant) (7) Explore the environment on careful energy consumption, evaluate and derive concrete technical measures	(4) Describe the basic properties of *energy* (e.g. energy conservation) (5) Name and give a qualitative description of examples of *energy chains* in everyday life and in technology (e.g. by means of *potential energy, kinetic energy, thermal energy, electric energy)* (6) Describe ways of energy supply by means of energy chains (e.g. hydroelectric power plant, coal plant) (7) Explore the environment on careful energy consumption, evaluate and derive concrete technical measures	(4) Describe the basic properties of *energy* (e.g. energy conservation) (5) Name and give a qualitative description of examples of *energy chains* in everyday life and in technology (e.g. by means of *potential energy, kinetic energy, thermal energy, electric energy)* (6) Describe ways of energy supply by means of energy chains (e.g. hydroelectric power plant, coal plant) (7) Explore the environment on careful energy consumption, evaluate and supply concrete technical measures. (e.g.	Work and energy - work and energy, forms of energy - conversion and conservation of energy - performance	10	Workstations	

	(e.g. energy saving lamps) as well as guidelines (e.g. stand-by functions) (8) describe the correlation between *energy* and *power* (9) Determine orders of magnitude of typical *performance* in everyday life and compare (e.g. physical activities, hand generator, bicycle ergometer, identification plates, performance measuring device) 10) by means of simple *energy chains*	(e.g. energy saving lamps) as well as guidelines (e.g. stand-by functions) (8) Describe the correlation between *energy* and *performance* and determine *performance* by calculation (9) Determine orders of magnitude of typical *performance* in everyday life and compare (e.g. physical activities, hand generator, bicycle ergometer, identification plates, performance measuring device) 10) by means of simple *energy chains*	Energy saving lamps) and derive the rules of conduct (e.g. stand by-function) (8) Describe the correlation between *energy* and *performance* and determine *performance* by calculation (9) Determine orders of magnitude of typical *performance* in everyday life and compare (e.g. physical activities, hand generator, bicycle ergometer, identification plates, performance measuring device) (10) by means of simple *energy chains*				

	describe the connection between *supplied energy, usable energy* and *efficiency* (11) Explain the apparent loss of energy during the conversion into thermal energy.	describe the connection between *supplied energy, usable energy* and *efficiency* (11) Explain the apparent loss of energy during the conversion into thermal energy.	describe the connection between *supplied energy, usable energy* and *efficiency* (11) Explain the apparent loss of energy during the conversion into thermal energy.				
8.2	**Electricity**						
	Content-related skills **B** **I** **A**			**Contents (compulsory for the region)**	**Time in lessons**	**Methods curriculum e.g.**	**School-specific supplements and additions**
	(1) Investigate the conductivity of materials experimentally (*conductor, insulator*)	(1) Investigate the conductivity of materials experimentally (*conductor, insulator*)	(1) Investigate the conductivity of materials experimentally (*conductor, insulator*)	Conductivity of materials	6	Learner experiments	*Optional: electrostatics (experiments, basic concepts, practical)*
	(2) Learners can describe an electrical circuit and basic processes by means of models	(2) Learners can explain an electrical circuit and basic processes by means of models	(2) Learners can explain an electrical circuit and basic processes by means of models	Define terms electrical current, voltage and resistance, possibly as an analogy to the water model.	6	Work with models	

	. (3) Describe on a qualitative level, that electrical currents need a drive or cause and that their strength is affected by resistances (*amperage, voltage, potential, resistance and charge*)	(3) Describe on a qualitative level, that electrical currents need a drive or cause and that their strength is affected by *resistances* (*amperage, voltage, potential, resistance and charge*)	(3) Describe on a qualitative level, that electrical currents need a drive or cause and that their strength is affected by *resistances* (*amperage, voltage, potential, resistance and charge*)				
	(4) Set up circuits according to a specific circuit diagram and sketch circuits by using *circuit symbols* (5) Label basic components of an electrical circuit and describe their function (like for example *circuit symbols*).	(4) Set up circuits according to a specific circuit diagram and sketch circuits by using *circuit symbols* (5) Label basic components of an electrical circuit and describe their function (like for example *circuit symbols*).	(4) Set up circuits according to a specific circuit diagram and sketch circuits by using *circuit symbols* (5) Label basic components of an electrical circuit and describe their function (like for example *circuit symbols*).	Simple Circuits. Circuits: - parallel circuits - series circuits	10	Learner experiments	

	(6) Describe rules for *current strength* and *voltage* in simple parallel and series circuits. (7) Describe the structure and function of basic electrical household components (e.g. circuit, switch, protective conductor) (8) Name measures for reducing possible everyday risks (etc. insulation, fuse) (9) Examine and describe the structure and function of a basic electrical appliance (e.g. magnifying glass, hairdryer	(6) Describe rules for *current strength* and *voltage* in simple parallel and series circuits. (7) Describe the structure and function of basic electrical household components (e.g. circuit, switch, protective conductor) (8) Describe risks in everyday life and indicate measures for reducing these dangers (e.g. sun protection, insulation, fuse) (9) Examine and describe the structure and function of a basic technical appliance (e.g. magnifying glass, hairdryer, bell,	(6) Describe rules for *current strength* and *voltage* in simple parallel and series circuits. (7) Describe the structure and function of basic electrical household components (e.g. circuit, switch, protective conductor) (8) Name risks in everyday life and indicate measures for reducing these dangers (e.g. noise protection, insulation, fuse) (9) Examine and describe the structure and function of a basic technical appliance (e.g. magnifying glass, hairdryer, bell, loudspeaker)				

	bell, loudspeaker)	loudspeaker)					
	(10) Measuring current and voltage (11) examine and explain the correlation between current and voltage (resistance, $R = \frac{U}{I}$) (12) Examine the dependence of *resistance* on the length, the cross section and the material experimentally	(10) Measuring current and voltage (11) examine and explain the correlation between current and voltage (resistance, $R = \frac{U}{I}$) (12) Examine the dependence of *resistance* on the length, the cross section and the material experimentally	(10) Measuring current and voltage (11) Examine and explain the correlation between current and voltage (resistance, $R = \frac{U}{I}$) (12) Examine the dependence of *resistance* on the length, cross section and material experimentally and determine and interpret *characteristics* (e.g. iron wire, graphite, technical resistance) (13) Examine and describe the *parallel* and *series* connections of two resistors.	Ohm's Law	4	Learner experiments	

	(14) can describe the transport of energy in an electrical circuit and the correlation between current, voltage, power and energy (15) physical details to describe everyday devices (voltage, current, performance)	(14) can describe the transport of energy in an electrical circuit and the correlation between current, voltage, power and energy (15) physical details to describe everyday devices (voltage, current, performance)	(14) can describe the transport of energy in an electrical circuit and the correlation between current, voltage, power and energy (15) physical details to describe everyday devices (voltage, current, performance)	Electrical energy ($W=U \cdot I \cdot t$ and $P=U \cdot I$)	4		
	(16) illustrate effects of electric current and simple applications	(16) illustrate effects of electric current and simple applications	(16) illustrate effects of electric current and simple applications	Effects of the electric current	6	Learner experiments	

Operators

Specific requirements I	
set up	arrange and combine objects and devices appropriately
calculate	mathematical determination of a result
describe	express structures, situations, processes and properties of objects generally by using technical terms
create (diagrams)	express correlations between variables in a coordinate system
name/label	list elements, situations, concepts, data without explanations
outline	basic representation of situations, objects, structures or interrelations
Specific requirements II	
derive	reasonable conclusions based on findings
apply	refer a known correlation or known method to a different situation
determine	generate a result mathematically, graphically or experimentally
explain	Capture structures, processes, correlations etc. of a situation and ascribe to general statements/laws
classify	assign concepts, objects etc. to given criteria on the basis of certain characteristics
measure	determine experimental data under consideration of measurement rules
investigate	targeted exploration of situation and objects, identify features and correlations
compare	identify similarities and differences

Specific requirements III	
evaluate	founded assessment of a situation according to scientific or methodological criteria or to personal- and social values.
explain	capture structures, processes, correlations etc. of a situation and attribute to general statements/laws and make them understandable by additional information or examples
interpret	examine and assess situations and correlations in regard to explanation possibilities

Performance assessment

Assessment criteria and references for verification of learning achievements

Assessment criteria in Grades 7 and 8 in the subject Physics, are based on the different competency areas. These include methodological skills, knowledge acquisition, communication by means of technical terms and evaluation.

A differentiated assessment of learner performance is ensured by development of uniform and transparent learning evaluation criteria. Work processes (e.g. by observing learning behavior and group procedures), as well as written and oral performance in class tests, short tests, presentations, oral participation and projects, are evaluated. In addition, the learners' individual learning process is taken into account in performance evaluation. Sound terminology skills and compliance with standard linguistic norms and formal aspects are also regarded in the performance evaluation.

Team skills, appropriate problem awareness, methodological security, information acquisition and processing, independence and presentation of results are evaluated under methodological skills. In scientific knowledge acquisition, mainly scientific propaedeutic working techniques are of great significance. Learners should also be able to pass a reflected judgment. Substantiation and multiple perspectives or controversy in argumentation play a key role here.

Written performance evaluation in the junior section (Grades 7 and 8) is based on class work. Oral performance is determined by quality of participation in class (also in group- and project work), presentations and quality of homework. One class test is given per trimester in Grades 7 and 8. The written mark counts 50% of the final mark.

The following aspects are particularly important in determination of the oral and written mark:

- technical correctness
- confidence in using technical language and methods of a subject
- correct succession, substantiation, logical association of statements
- Complexity factor, multi-perspectivity or controversy in argumentation
- extent of independence
- conceptual clarity
- compliance with standard linguistic norms and formal aspects

Internal differentiation

Due to two co-existing school leaving certificates, the NSSC and the DIAP, as well as high numbers of different languages and ethnic groups at our school, differentiated lessons are essential. In no grade, in no class and nearly in no course at the DHPS, equal conditions can be expected; therefore internal differentiation is the minimum prerequisite that should be met to satisfy the learners' needs.

Physics of course is no exception in this regard. Therefore neither the experience of a river flowing, wave motions in the ocean or the fascination of libraries can be taken for granted, nor can the knowledge of centrifuges, trams or a harvester be seen as a prerequisite.

Even the level of the official language, English, offers an enormous spectrum, so that learning prerequisites are very heterogeneous among learners of our school.

All these facts imply that DHPS teachers need to have a wide repertoire of internally differentiated methods at their disposal to face the daily challenges.

Examples of Tasks

Listed below are examples of tasks for class tests or exams. For up to and including Grade 10, the respective maximum possible points are shown for better orientation for the learners. As from Grade 7, operators (see pg. 23) are used to familiarize learners at an early stage with their meaning, i.e. with the different requirement levels.

Grade 7

1. Name the substances that are attracted by a magnet. **3**

2. Explain the ways for determination of polarity of unmarked magnets. **6**

3. Explain
   a. how an iron block can be magnetized and what happens inside the magnet and **3**

   b. how this block can again be made non-magnetic. **3**

4. Describe the magnetic field of the Earth. **5**

Grade 8

1. List the three effects that forces can have. **3**

2. In a sketch, use force arrows to represent the situation where a man is trying to move a cabinet which weighs 200 kg **4**

3. Calculate the weight of the above cabinet. Take g=9,81 N/kg **3**