

# Internal School Curriculum



## Biology

## Grades 9 and 10

Church Street 11-15, Windhoek.  
Windhoek

P O Box 78  
Namibia.

Tel +264 (0)61-373100  
Fax +264 (0)61-221306

E-mail:  
[verwaltung@dhps-windhoek.com](mailto:verwaltung@dhps-windhoek.com)

Home page:  
[www.dhps-windhoek.de](http://www.dhps-windhoek.de)

## Grade 9

**G2 - Basic level**

**M2 - Intermediate level**

**E2 - Advanced level**

### 9.1. From Cell to Organism

Learners are able to describe cells, organs and organisms as systems. They can describe cells as smallest functional unit of living organisms and distinguish between animal and plant cells with regard to structure and function. They describe and explain the connection between structure and function of organs and organ systems with regard to metabolism and energy conversion. They can explain the importance of cell division for growth.

Competencies Learners are able to			Contents	Time	Methods curriculum
G2	M2	E2			
(1) draw the structure of animal and plant cells based on microscopic observations and name the cell parts which can be identified under the light microscope	(1) draw the structure of animal and plant cells based on microscopic observations and name the cell parts which can be identified under the light microscope	(1) draw, describe and compare the structures of animal and plant cells based on microscopic observations	<ul style="list-style-type: none"> <li>Assembling a light microscope</li> <li>Operating a light microscope</li> <li>Mounting of simple translucent slides (onion epidermis, mouth mucosa, <i>Elodea</i>)</li> <li>Draw simple sketches</li> <li>Cell division and growth</li> <li>Cell structure (with important cell organelles)</li> <li>Comparison between animal and plant cells</li> <li>Functions of two cell types</li> <li>Comparison between two cell types under the light microscope (image interpretation)</li> </ul>	8	<ul style="list-style-type: none"> <li>Observe, monitor and examine</li> <li>Work with the microscope</li> <li>Mount slides (mouth mucosa (human cheek cells), <i>Elodea</i>, onion epidermis)</li> <li>Build a model</li> <li>Biological drawing, labelling of drawings</li> <li>Dealing with models</li> <li><u>For academically weaker learners use ready-made slides</u></li> </ul>
(2) describe the functions of the cell components ( <i>nucleus</i> ,	(2) describe the functions of the cell components ( <i>nucleus</i> , <i>cell wall</i> ,	(2) explain the functions of the cell components ( <i>nucleus</i> , <i>cell wall</i> ,	<ul style="list-style-type: none"> <li>Role and importance of the nucleus, chloroplast, mitochondrion, cell membrane, vacuole and cell wall</li> </ul>		<ul style="list-style-type: none"> <li>Dealing with models</li> <li>GIDA film</li> </ul>

<i>cell wall, chloroplast)</i> and the membrane	<i>chloroplast, mitochondria, vacuole)</i> and the membrane	<i>vacuole, mitochondria)</i> and the significance of the membrane for compartmentalisation			
<p><b>P</b> 2.1 Knowledge acquisition 2,7</p> <p><b>P</b> 2.2 Communication 3,4,7</p>	<p><b>P</b> 2.1 Knowledge acquisition 2,7</p> <p><b>P</b> 2.2 Communication 3,4,7</p>	<p><b>P</b> 2.1 Knowledge acquisition 2,7</p> <p><b>P</b> 2.2 Communication 3,4,7</p>			
(3) Express cell division and cell differentiation as basis for tissue formation	(3) Express cell division and cell differentiation as basis for tissue formation	(3) Explain cell division and cell differentiation as basis for tissue formation	<ul style="list-style-type: none"> <li>Cell division using the example of plant growth and cell differentiation using the example of the structure of a leaf</li> <li>Differentiation between pro- and eukaryotes</li> </ul>		<ul style="list-style-type: none"> <li>Dealing with models</li> </ul>
(4) State the difference between pro- and eukaryotes	(4) State the difference between pro- and eukaryotes	(4) State and explain the difference between pro- and eukaryotes			
<p><b>P</b> 2.1 Knowledge acquisition 3,11</p> <p><b>P</b> 2.2 Communication 3, 4,10</p> <p><b>P</b> 2.3 Evaluation 1</p>	<p><b>P</b> 2.1 Knowledge acquisition 3,11</p> <p><b>P</b> 2.2 Communication 3, 4,10</p> <p><b>P</b> 2.3 Evaluation 1</p>	<p><b>P</b> 2.1 Knowledge acquisition 3,11</p> <p><b>P</b> 2.2 Communication 3, 4,10</p> <p><b>P</b> 2.3 Evaluation 1</p>			

## 9.2 Immunobiology

Learners can describe the development and course of infectious diseases. They get to know the way in which the body's immune system functions and understand that only a well-functioning immune system allows for survival in our environment. They understand the significance of vaccination and the need to contribute to the health of the body through appropriate behaviour. Learners are able to:

Competencies			Contents	Time	Methods curriculum
G2	M2	E2			
(1) describe the structure of bacteria and viruses and the means by which they are spread.	(1) describe the structure of bacteria and viruses and the means by which they are spread..	(1) describe the structure of bacteria and viruses and the means by which they are spread.	<ul style="list-style-type: none"> <li>Pathogens:               <ul style="list-style-type: none"> <li>Bacteria</li> <li>Viruses</li> <li>Protozoa</li> <li>Fungi</li> </ul> </li> </ul>	24	<ul style="list-style-type: none"> <li>Group work: Create a poster</li> <li>GIDA film</li> </ul>
(2) describe the development and course of bacterial and viral disease by means of one example respectively.	(2) describe the development and course of bacterial and viral disease by means of one example respectively.	(2) describe the development and course of bacterial and viral disease by means of one example respectively.			
(3) name sources of infection and paths of infection (e.g. influenza, HIV)	(3) name sources of infection and paths of infection (e.g. influenza, HIV)	(3) name sources of infection and paths of infection (e.g. influenza, HIV)			
(4) identify measures to prevent infectious diseases	(4) identify measures to prevent infectious diseases	(4) identify measures to prevent infectious diseases			
		(5) explain the problem of antibiotic resistance	<ul style="list-style-type: none"> <li>Antibiotic resistance</li> </ul>		
<ul style="list-style-type: none"> <li><b>P</b> 2.1 Knowledge acquisition 3,5</li> <li><b>P</b> 2.2 Communication 5,7</li> <li><b>P</b> 2.3 Evaluation 1,9</li> </ul>	<ul style="list-style-type: none"> <li><b>P</b> 2.1 Knowledge acquisition 3,5</li> <li><b>P</b> 2.2 Communication 5,7</li> <li><b>P</b> 2.3 Evaluation 1,9</li> </ul>	<ul style="list-style-type: none"> <li><b>P</b> 2.1 Knowledge acquisition 3,5</li> <li><b>P</b> 2.2 Communication 5,7</li> <li><b>P</b> 2.3 Evaluation 1,9</li> </ul>			
(6) name and determine mechanisms of the innate immune response (natural barriers)	(6) name and determine mechanisms of the innate immune response (natural barriers)	(6) name and determine mechanisms of the innate immune response (natural barriers, inflammatory response)	<ul style="list-style-type: none"> <li>Non-specific and specific immune response</li> </ul>		
(7) describe acquired immune	(7) describe acquired immune	(7) describe acquired immune			<ul style="list-style-type: none"> <li>GIDA film</li> </ul>

response (antibodies, killer cells) on cellular level and name the development of immunity (memory cells).	response (antibodies, killer cells) as an interaction on cellular level and explain the development of immunity (memory cells).	response (antibodies, killer cells) as an interaction on cellular level and explain the development of immunity (memory cells)			<ul style="list-style-type: none"> <li>Roll play: Immune defence</li> </ul>
<ul style="list-style-type: none"> <li>2.1 Knowledge acquisition 12</li> <li>2.2 Communication 1,3, 4</li> <li>2.3 Evaluation 1</li> </ul>	<ul style="list-style-type: none"> <li>2.1 Knowledge acquisition 12</li> <li>2.2 Communication 1,3, 4</li> <li>2.3 Evaluation 1</li> </ul>	<ul style="list-style-type: none"> <li>2.1 Knowledge acquisition 12</li> <li>2.2 Communication 1,3, 4</li> <li>2.3 Evaluation 1</li> </ul>			
(8) describe active immunisation by means of an example	(8) describe active immunisation by means of an example	(8) explain and compare active and passive immunisation	<ul style="list-style-type: none"> <li>Active and passive immunisation</li> <li>Allergies</li> <li>Selected diseases: (Compulsory: AIDS, malaria)</li> <li>antibiotics</li> </ul>		
(9) explain the significance of <i>immunisation</i> for society.	(9) explain the significance of immunisation by means of examples (e.g. measles, polio case numbers before and after introduction of immunisation, worldwide eradication of smallpox).	(9) explain the significance of <i>immunisation</i> to society.			<ul style="list-style-type: none"> <li><u>Description and interpretation of tables/statistics with internal differentiation</u></li> </ul>
<ul style="list-style-type: none"> <li>2.2 Communication 4,5, 9</li> <li>2.3 Evaluation 1,5,12</li> </ul>	<ul style="list-style-type: none"> <li>2.2 Communication 4,5,9</li> <li>2.3 Evaluation 1,5,12</li> </ul>	<ul style="list-style-type: none"> <li>2.2 Communication 4,5,9</li> <li>2.3 Evaluation 1,5,12</li> </ul>			

### 9.3 Reproduction and Development

Learners can describe basic processes during the course of the menstrual cycle. They describe the development of human life by fusion of the ovum and sperm and subsequent multiplication and differentiation of cells. They explain the development of a child in the womb until birth and understand the significance of caring for the unborn life. They compare and evaluate various contraception options. Different forms of sexual orientations are introduced in an unbiased way.

Learners are able to:

Competencies			Contents	Time	Methods curriculum
G2	M2	E2			
(1) describe the most important phases of the menstrual cycle	(1) describe the most important phases of the menstrual cycle	(1) describe and assign the most important phases of the menstrual cycle	<ul style="list-style-type: none"> <li>Menstrual cycle</li> </ul>	14	<ul style="list-style-type: none"> <li>Films</li> <li>Models</li> <li>Learner presentations</li> </ul>
(2) describe the process of fertilisation of the egg and formation of the embryo by cell division and cell differentiation.	(2) describe fertilisation of the egg and the first cell divisions before implantation of the embryo	(2) describe fertilisation of the egg, the first cell divisions before implantation and forming of the embryo by cell division and cell differentiation	<ul style="list-style-type: none"> <li>Structure and function of reproductive organs</li> <li>Role of male and female hormones (Primary and secondary sexual characteristics, menstrual cycle)</li> </ul>		
<ul style="list-style-type: none"> <li>2.2 Communication 4</li> </ul>	<ul style="list-style-type: none"> <li>2.2 Communication 4</li> </ul>	<ul style="list-style-type: none"> <li>2.2 Communication 4</li> </ul>	<ul style="list-style-type: none"> <li>Spermato- and Oogenesis</li> <li>mating, intercourse and insemination</li> <li>embryonic and fetal development</li> <li>birth process and post-natal care.</li> </ul>		
(3) describe the main developmental stages during pregnancy (implantation, embryo, organ formation, foetus, birth)	(3) describe the main developmental stages during pregnancy (implantation, embryo, organ formation, foetus, birth)	(3) describe the main developmental stages during pregnancy (blastocyst, implantation, embryo, organ formation, foetus, birth)			
(4) describe risks and dangers during pregnancy.	(4) describe risks and dangers during pregnancy.	(4) describe and evaluate risks and dangers during pregnancy.			
<ul style="list-style-type: none"> <li>P 2.1 Knowledge acquisition 11</li> <li>P 2.2 Communication 4,5</li> <li>P 2.3 Evaluation 12</li> </ul>	<ul style="list-style-type: none"> <li>P 2.1 Knowledge acquisition 11</li> <li>P 2.2 Communication 4,5</li> <li>P 2.3 Evaluation 12</li> </ul>	<ul style="list-style-type: none"> <li>P 2.1 Knowledge acquisition 11</li> <li>P 2.2 Communication 4,5</li> <li>P 2.3 Evaluation 12</li> </ul>			

(5) compare different methods of contraception	(5) compare different methods of contraception	(5) evaluate different methods of contraception	<ul style="list-style-type: none"> <li>• Chemical, mechanical and surgical methods of contraception</li> <li>• in vitro fertilisation</li> <li>• Social and societal aspects of birth control</li> </ul>	<ul style="list-style-type: none"> <li>• Contraception-box</li> </ul>
(6) state the significance of the use of condoms for protection against sexually transmitted infections	(6) state the significance of the use of condoms for protection against sexually transmitted infections	(6) state the significance of the use of condoms for protection against sexually transmitted infections		
<p>▣ 2.2 Communication 5</p> <p>▣ 2.3 Evaluation 10,12</p>	<p>▣ 2.2 Communication 5</p> <p>▣ 2.3 Evaluation 10,12</p>	<p>▣ 2.2 Communication 5</p> <p>▣ 2.3 Evaluation 10,12</p>		
(7) describe different forms of sexual orientation (hetero-, homo-, bi-, inter-, and trans-sexuality) and living as partners	(7) describe different forms of sexual orientation (hetero-, homo-, bi-, inter-, and trans-sexuality) and living as partners	(7) describe different forms of sexual orientation (hetero-, homo-, bi-, inter-, and trans-sexuality) and living as partners	<ul style="list-style-type: none"> <li>• Different forms of sexual orientation</li> </ul>	
<p>▣ 2.2 Communication 8,9</p> <p>▣ 2.3 Evaluation 2,10</p>	<p>▣ 2.2 Communication 8,9</p> <p>▣ 2.3 Evaluation 2,10</p>	<p>▣ 2.2 Communication 8,9</p> <p>▣ 2.3 Evaluation 2,10</p>	<ul style="list-style-type: none"> <li>• Film</li> </ul>	

### 9.4 Co-ordination systems

As an example for all human sensory organs, learners get to know the eye and consider it the basis for detecting internal and external stimuli and our own body. Using the example of seeing, they examine performance and limitation of human perception and can understand the procedure of information processing. Learners gain knowledge on the structure of the nervous system.

Learners are able to:

Competencies		Contents	Time	Methods curriculum
G2	M2	E2		

(1) Name environmental stimuli and assign them to the corresponding sense organs	(1) Name environmental stimuli and describe the sensory organs involved in stimulus intake	(1) Name environmental stimuli and describe the sensory organs involved in stimulus detection	<ul style="list-style-type: none"> <li>Nervous system</li> <li>Stimulus-response pattern</li> <li>Components of the nervous system</li> <li>Structure and function of the eye of vertebrates</li> <li>(Accommodation and visual defects and correction, adaption)</li> <li>Brain: Structure and cognitive domains</li> <li>Structure and function of a neuron</li> <li>Reflexes</li> </ul>	14	<ul style="list-style-type: none"> <li>Possibly inter-curricular with physical sciences</li> <li>Dissection of an eye (lens)</li> <li>GIDA materials</li> <li><u>Study circles - eye with internally differentiated stations</u></li> <li>Running dictation</li> <li>Form a neuron from play dough</li> </ul>
<ul style="list-style-type: none"> <li>2.1 Knowledge acquisition 2,3</li> <li>2.2 Communication 5,6,7</li> <li>2.3 Evaluation 1,12</li> </ul>	<ul style="list-style-type: none"> <li>2.1 Knowledge acquisition 2,3</li> <li>2.2 Communication 5,6,7</li> <li>2.3 Evaluation 1,12</li> </ul>	<ul style="list-style-type: none"> <li>2.1 Knowledge acquisition 2,3</li> <li>2.2 Communication 5,6,7</li> <li>2.3 Evaluation 1,12</li> </ul>			
(2) describe the structure of the nervous system in view of the fundamental importance of the peripheral, central and vegetative nervous system	(2) describe the structure of the nervous system in view of the fundamental importance of the peripheral, central and vegetative nervous system	(2) describe the structure of the nervous system in view of the fundamental importance of the peripheral, central and vegetative nervous system			
(3) describe the stimulus-response pattern using the example of visual perception.	(3) describe the stimulus-response pattern using the example of visual perception.	(3) describe the stimulus-response pattern using the example of visual perception.			
(4) describe the structure and function of a neuron	(4) describe the structure and function of a neuron	(4) describe the structure and function of a neuron			
(5) describe the structure and function of a sensory organ (eye) and examine its limitations	(5) describe the structure and function of a sensory organ (eye) and examine its limitations	(5) describe the structure and function of a sensory organ (eye) and examine its limitations			
<ul style="list-style-type: none"> <li>2.1 Knowledge acquisition 5,6</li> <li>2.2 Communication 4,5,6,7</li> <li>2.3 Evaluation 1,12</li> </ul>	<ul style="list-style-type: none"> <li>2.1 Knowledge acquisition 5,6</li> <li>2.2 Communication 4,5,6,7</li> <li>2.3 Evaluation 1,12</li> </ul>	<ul style="list-style-type: none"> <li>2.1 Knowledge acquisition 5,6</li> <li>2.2 Communication 4,5,6,7</li> <li>2.3 Evaluation 1,12</li> </ul>			
	(6) describe simple neuron interconnections (e.g. reflex, voluntary movement)	(6) describe simple neuron interconnections (e.g. reflex, voluntary movement)			



<p>2.2 Communication 4</p>	<p>2.2 Communication 4</p>	<p>2.2 Communication 4</p>			
<p>(7) Assign functions to the subsections of the human brain (cerebrum, cerebellum, brain stem)</p>	<p>(7) Assign functions to the subsections of the human brain (cerebrum, cerebellum, brain stem)</p>	<p>(7) Assign and describe functions to the subsections of the human brain (cerebrum, cerebellum, brain stem)</p>			
<p>2.2 Communication 1,3</p>	<p>2.2 Communication 1,3</p>	<p>2.2 Communication 1,3</p>			<p>• Group puzzle</p>

## Grade 10

**G2 - Basic level**  
**E2 - Advanced level**

**M2 - Intermediate level**

### 10.1 Cytology

#### 1. From Cell to Organism

Learners can describe cells, organs and organisms as systems. They can describe cells as structural units of living organisms and distinguish between animal and plant cells with regard to structure and function. They describe and explain the connection between structure and function of organs and organ systems with regard to the metabolism and energy conversion. They can explain the importance of cell division for growth.

Learners are able to:

Competencies			Contents	Time	Methods curriculum
G2	M2	E2			
(1) draw the structure of animal and plant cells based on microscopic observations and name the cell parts which can be identified under the light microscope	(1) draw the structure of animal and plant cells based on microscopic observations and name the cell parts which can be identified under the light microscope	(1) draw, describe and compare the structure of animal and plant cells based on microscopic observations	<ul style="list-style-type: none"> <li>Assembling a light microscope</li> <li>Mounting of simple translucent slides (onion epidermis, mouth mucosa, marine water organisms, pond water)</li> <li>Draw simple sketches of slides</li> <li>Cell division for growth</li> <li>Levels of organisation of living organisms</li> <li>Characteristics of living organisms</li> <li>The cell as the basic building block of all living organisms</li> <li>Important cell organelles (nucleus, mitochondria, chloroplasts, ER (endoplasmic reticulum), Golgi-apparatus, lysosomes, ribosomes, cell wall)</li> <li>Differentiation between Pro- and Eukaryotes</li> </ul>	60	<ul style="list-style-type: none"> <li>Observe, monitor and examine</li> <li>Work with magnifying glass and microscope</li> <li>Mount samples (mouth mucosa, Elodea, onion epidermis) onto a slide</li> <li>Build a model</li> <li>Biological drawing, labeling of drawings</li> <li>Dealing with models</li> </ul>
(2) describe the functions of the cell components and the membrane	(2) describe the functions of the cell components and the membrane	(2) explain the functions of the cell components and the significance of the membrane for compartmentalisation	<ul style="list-style-type: none"> <li>Function and significance of the individual cell organelles</li> <li>The role of compartmentalisation</li> </ul>		<ul style="list-style-type: none"> <li>Dealing with models</li> <li>The “cell city” thinking model</li> <li>Roll play</li> </ul>
<p><b>P</b> 2.1 Knowledge acquisition 2,7</p> <p><b>P</b> 2.2 Communication 3,4,7</p>	<p><b>P</b> 2.1 Knowledge acquisition 2,7</p> <p><b>P</b> 2.2 Communication 3,4,7</p>	<p><b>P</b> 2.1 Knowledge acquisition 2,7</p> <p><b>P</b> 2.2 Communication 3,4,7</p>			
(3) describe the structure of biologically relevant	(3) describe and explain the structure of biologically	(3) describe and explain the structure of	<ul style="list-style-type: none"> <li>Structure and special characteristics of a water</li> </ul>		<ul style="list-style-type: none"> <li>Roll play</li> </ul>

basic materials and then describe the structure of the unit membrane as well as transport- and regulatory procedures accordingly	relevant basic materials and then describe the structure of the unit membrane as well as transport- and regulatory procedures accordingly	biologically relevant basic materials and then describe the structure of the unit membrane as well as transport- and regulatory procedures accordingly	molecule <ul style="list-style-type: none"> <li>• Simplified structure of carbohydrates, fats and proteins</li> <li>• Structure and function of the unit membrane</li> <li>• Diffusion, osmosis, plasmolysis and osmoregulation</li> </ul>	<ul style="list-style-type: none"> <li>• Experiments</li> </ul>
(4) Name cell division and cell differentiation as basis for tissue formation	(4) Name cell division and cell differentiation as basis for tissue formation	(4) Explain cell division and cell differentiation as basis for tissue formation	<ul style="list-style-type: none"> <li>• Cell differentiation</li> <li>• Tissue and organ formation</li> <li>• Organ systems</li> </ul>	<ul style="list-style-type: none"> <li>• Create a poster</li> <li>• Films</li> <li>• Models</li> </ul>
(5) describe the structure of organs (e.g. leaf, stem, human skin) consisting of different tissues	(5) describe the structure of organs (e.g. leaf, stem, human skin) consisting of different tissues	(5) describe the structure of organs (e.g. leaf, stem, human skin) consisting of different tissues and explain, how specialised tissues initiate the function of an organ		
<p><b>P</b> 2.1 Knowledge acquisition 2,8,9,11</p> <p><b>P</b> 2.2 Communication 2,4,7</p> <p><b>P</b> 2.3 Evaluation 1,5</p>	<p><b>P</b> 2.1 Knowledge acquisition 2,8,9,11</p> <p><b>P</b> 2.2 Communication 2,4,7</p> <p><b>P</b> 2.3 Evaluation 1,5</p>	<p><b>P</b> 2.1 Knowledge acquisition 2,8,9,11</p> <p><b>P</b> 2.2 Communication 2,4,7</p> <p><b>P</b> 2.3 Evaluation 1,5</p>		
(5) observe the diversity of protozoa (unicellular organisms) and describe their existence using an example	(5) observe the diversity of protozoa (unicellular organisms) and describe and compare their existence using different examples and describe higher development	(5) observe the diversity of protozoa (unicellular organisms) and describe and compare their existence using different examples and describe higher development	<ul style="list-style-type: none"> <li>• From protozoa (unicellular organisms) to multicellular organisms, structure and function of the paramecium (slipper animalcule), amoeba, <i>Euglena</i>, colony (<i>Pandorina</i>) and multicellular organisms (<i>Volvox</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• Microscopic examination of a hay infusion and drawing of a sketch</li> <li>• Learner presentations</li> <li>• Results displayed on posters</li> <li>• Group puzzle</li> </ul>
<p><b>P</b> 2.1 Knowledge acquisition 1,2</p> <p><b>P</b> 2.3 Evaluation 1</p>	<p><b>P</b> 2.1 Knowledge acquisition 1,2</p> <p><b>P</b> 2.3 Evaluation 1</p>	<p><b>P</b> 2.1 Knowledge acquisition 1,2</p> <p><b>P</b> 2.3 Evaluation 1</p>		

## 10.2 Genetics

Learners get familiarized with DNA as carrier of genetic information. By means of models they can describe the structure of DNA and explain how information is stored. They can distinguish between different types of inheritance.

Learners are able to:

Competencies			Contents	Time	Methods curriculum
G2	M2	E2			
(1) describe chromosomes as carriers of genetic information	(1) describe chromosomes as carriers of genetic information	(1) describe chromosomes as carriers of genetic information	<ul style="list-style-type: none"> <li>• Structure of a chromosome</li> <li>• Karyogram</li> <li>• Mitosis (significance and process, role in growth and asexual reproduction)</li> <li>• Meiosis (significance and process, role in growth and sexual reproduction)</li> </ul>	40	<ul style="list-style-type: none"> <li>• Films</li> <li>• Models</li> <li>• Examine with the microscope</li> <li>• <i>Self-study course Mallig (internally differentiated)</i></li> <li>• Learner presentations</li> <li>• Fishbowl-discussion</li> <li>• <i>Work with texts (internally differentiated)</i></li> <li>• Results displayed on posters</li> <li>• Create a poster</li> </ul>
(2) explain that mitosis produces daughter cells with same number of chromosomes	(2) explain that mitosis produces daughter cells with same number of chromosomes	(2) explain that mitosis produces daughter cells with same number of chromosomes			
<ul style="list-style-type: none"> <li>▣ 2.1 Knowledge acquisition 14</li> <li>▣ 2.2 Communication 4,7</li> </ul>	<ul style="list-style-type: none"> <li>▣ 2.1 Knowledge acquisition 11,14</li> <li>▣ 2.2 Communication 4,7</li> </ul>	<ul style="list-style-type: none"> <li>▣ 2.1 Knowledge acquisition 11,14</li> <li>▣ 2.2 Communication 4,7</li> </ul>			
(3) describe and explain the structure of a chromosome using a simple model	(3) describe and explain the structure of a chromosome using a simple model	(3) describe and explain the structure of a chromosome using a simple model			
<ul style="list-style-type: none"> <li>▣ 2.1 Knowledge acquisition 11,14</li> <li>▣ 2.2 Communication 4,7</li> </ul>	<ul style="list-style-type: none"> <li>▣ 2.1 Knowledge acquisition 11,14</li> <li>▣ 2.2 Communication 4,7</li> </ul>	<ul style="list-style-type: none"> <li>▣ 2.1 Knowledge acquisition 11,14,15</li> <li>▣ 2.2 Communication 4,7</li> </ul>			
(4) explain, how gender is inherited in humans (karyogramm)	(4) explain, how gender is inherited in humans (karyogramm)	(4) explain, how gender is inherited in humans (karyogramm)			
(5) describe the process and significance of meiosis	(5) describe the process and significance of meiosis	(5) describe the process and significance of meiosis			
(6) describe mutations as changes in genetic information and illustrate the consequences using an example (e.g. trisomy 21)	(6) describe mutations as changes in genetic information and illustrate the consequences using an example (e.g. trisomy 21)	(6) describe mutations as changes in genetic information and illustrate the consequences using an example (e.g. trisomy 21, sickle cell)			

<p>21)                  P 2.1 Knowledge acquisition                      1.4                  P2.2 Communication                      4.7                  P2.3 Evaluation 1.8</p>	<p>P 2.1 Knowledge acquisition                      1.4                  P2.2 Communication                      4.7                  P2.3 Evaluation 1.8</p>	<p>anemia, cat crying syndrome)                  P 2.1 Knowledge acquisition                      1.4                  P2.2 Communication                      4.7                  P2.3 Evaluation 1.8</p>	<ul style="list-style-type: none"> <li>• Mutation and modification</li> </ul>	
<p>(7) explain, using an example, that heredity has an impact on the appearance of a living organism and understand Mendel's laws</p>	<p>(7) explain, using an example, that heredity has an impact on the appearance of a living creature and understand Mendel's laws and apply simple inheritance</p>	<p>(7) explain, using an example, that heredity has an impact on the appearance of a living organism and understand Mendel's laws and apply simple inheritance</p>		
<p>(8) describe the dominant-recessive form and the automomal-gonosomal form of inheritance and perform family tree analysis</p>	<p>(8) describe the dominant-recessive form and the automomal-gonosomal form of heredity and perform strain analyses (family tree analyses)</p>	<p>(8) describe the dominant-recessive form and the automomal-gonosomal form of heredity and perform strain analyses (family tree analyses)</p>		

<p> <b>P</b> 2.1 Knowledge acquisition 14  <b>P</b> 2.2 Communication 4,7  <b>P</b> 2.3 Evaluation 1                 </p>	<p> <b>P</b> 2.1 Knowledge acquisition 14  <b>P</b> 2.2 Communication 4,7  <b>P</b> 2.3 Evaluation 1                 </p>	<p> <b>P</b> 2.1 Knowledge acquisition 14  <b>P</b> 2.2 Communication 4,7  <b>P</b> 2.3 Evaluation 1                 </p>			
---	---	---	--	--	--

### 10.3 Information system - hormones

Learners acquire knowledge of the hormone system and can describe its interaction using examples. They recognize different action mechanisms within the information system. They can describe the functional principle of the hormone system by means of the regulation of the menstrual cycle and blood glucose levels. They can explain causes of hormonal malfunctions and possible therapeutic measures. They use the findings of modern brain research to prepare treatment options for everyday therapy.

Learners are able to:




Competencies			Contents	Time	Methods curriculum
<b>G2</b>	<b>M2</b>	<b>E2</b>			
(1) describe the effect of hormones (chemical messengers)	(1) describe the effect of hormones (chemical messengers)	(1) describe the effect of hormones (chemical messengers)	<ul style="list-style-type: none"> <li>• Messenger substances (neurotransmitters) in the body</li> <li>• Control circuits for the action of hormones</li> <li>• Description of the human hormone system (endocrine system) (using the example of blood glucose regulation and sex hormones)</li> <li>• Stress and stress management</li> </ul>	12	<ul style="list-style-type: none"> <li>• Films</li> <li>• <u>Work with texts (internally differentiated)</u></li> </ul>
(2) describe hormonal regulation using the example of the blood glucose level	(2) describe hormonal regulation using the example of the blood glucose level	(2) describe hormonal regulation using the example of the blood glucose level			
	(3) explain disorders of the hormonal system (diabetes mellitus) and describe therapy measures	(3) explain disorders of the hormonal system (diabetes mellitus) and describe therapy measures			
		(4) describe hormonal regulation by sex hormones			
<p> <b>P</b> 2.2 Communication 2,3,4,5  <b>P</b> 2.3 Evaluation                 </p>	<p> <b>P</b> 2.2 Communication 2,3,4,5,7  <b>P</b> 2.3 Evaluation                 </p>	<p> <b>P</b> 2.2 Communication 2,3,4,5,7  <b>P</b> 2.3 Evaluation                 </p>			

1	1	1		
---	---	---	--	--

### 10.4 Evolution

Learners can understand development of life on the basis of the phylogeny of vertebrates. They can explain the origin of new species by the interaction of different evolutionary factors. The evolutionary theory can be explained by means of examples. They can thus describe and explain the phylogeny of the human being.

Learners are able to:

Competencies			Contents	Time	Methods curriculum
G2	M2	E2			
(1) describe the phylogenetic development using examples (e.g. development of the first terrestrial vertebrates, birds, mammals and flowering plants)	(1) describe the phylogenetic development using examples (e.g. development of the first terrestrial vertebrates, birds, mammals and flowering plants)	(1) describe the phylogenetic development using examples (e.g. development of the first terrestrial vertebrates, birds, mammals and flowering plants)	<ul style="list-style-type: none"> <li>• Big-Bang creation of the universe</li> <li>• From water to geological era</li> <li>• Fossil development</li> <li>• Milestones of the evolutionary history</li> <li>• Evolutionary factors: Mutation, recombination, selection, isolation</li> <li>• Evolution in time-lapse</li> <li>• The evolution of man (the way to upright walking, cultural evolution)</li> </ul>	20	<ul style="list-style-type: none"> <li>• Film and pictures</li> <li>• Learner presentations</li> <li>• Timeline</li> <li>• Results displayed on posters</li> <li>• Selection game</li> <li>• Group puzzle</li> <li>• Fishbowl discussion</li> <li>• <u>Graphical representation of information</u></li> <li>• <u>Create a poster</u></li> </ul>
(2) describe fossils as evidence of phylogenetic development	(2) state fossils as evidence of phylogenetic development (mosaic types, rudiments, homologous and analogous limbs) of descent and describe them by means of examples	(2) state fossils as evidence of phylogenetic development (mosaic types, rudiments, homologous and analogous limbs) of descent and describe them by means of examples			
(3) explain evolutionary theories by Darwin and Lamarck (descent, mutability, overproduction, competition, adaption and natural selection) by means of concrete examples	(3) explain evolutionary theories by Darwin and Lamarck (descent, mutability, overproduction, competition, adaption and natural selection) by means of concrete examples	(3) explain evolutionary theories by Darwin and Lamarck (descent, mutability, overproduction, competition, adaption and natural selection) by means of concrete examples			
(4) explain the development of new species by means of evolutionary factors (mutation, recombination, selection)	(4) explain the development of new species by means of evolutionary factors (mutation, recombination, selection)	(4) explain the development of new species by means of evolutionary factors (mutation, recombination, selection)			
 2.1 Knowledge acquisition 3,13	 2.1 Knowledge acquisition 3,13	 2.1 Knowledge acquisition			

<p> <b>P</b> 2.2 Communication 4  <b>P</b> 2.3 Evaluation 4                 </p>	<p> <b>P</b> 2.2 Communication 4  <b>P</b> 2.3 Evaluation 4                 </p>	<p>                     3,13  <b>P</b> 2.2 Communication 4  <b>P</b> 2.3 Evaluation 4                 </p>			
<p>(5) describe the evolution of modern humans by means of a simple family tree (Australopithecines, Homo erectus, Homo sapiens)</p>	<p>(5) represent the evolution of modern humans by means of a simple family tree (Australopithecines, Homo erectus, Homo sapiens)</p>	<p>(5) represent and explain the evolution of modern humans by means of a simple family tree (Australopithecines, Homo erectus, Homo sapiens)</p>			
<p>(6) describe the significance of cultural evolution (use of fire, tool making, communication) for the development of modern humans</p>	<p>(6) describe the significance of cultural evolution (use of fire, tool making, communication) for the development of modern humans</p>	<p>(6) explain the significance of cultural evolution (use of fire, tool making, communication) for the development of modern humans</p>			
<p> <b>P</b> 2.1 Knowledge acquisition 3,5  <b>P</b> 2.2 Communication 3,4  <b>P</b> 2.3 Evaluation 3,4                 </p>	<p> <b>P</b> 2.1 Knowledge acquisition 3,5  <b>P</b> 2.2 Communication 3,4  <b>P</b> 2.3 Evaluation 3,4                 </p>	<p> <b>P</b> 2.1 Knowledge acquisition 3,5  <b>P</b> 2.2 Communication 3,4  <b>P</b> 2.3 Evaluation 3,4                 </p>			





