

Workshop scenarios for two target age groups: 7-12-16 and 19-24

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1. Workshop scenarios for target age group: 7-12-16

1. Virtual Mine and LEGOblocks. How to build a mine machine in two hours

Workshop title	Virtual Mine and LEGOblocks. How to build a mine machine in two hours		
Main objective / objectives	Presentation of copper as a raw material and its properties Presentation of the copper mining machines Building of the LEGOblocks machines: the searching robot, the drilling robot, the crushing robot and the conveyor robot		
Key words (2-5)	Copper, copper properties		
Target age group	7 – 12 -16 <input checked="" type="checkbox"/>		19 -24 <input type="checkbox"/>
Duration divided into stages	110 minutes		
Teaching methods and tools used	Educational presentation Quiz LEGOblocks building	Teaching aids	https://sites.google.com/view/virtualmine/education/roboblocks a computer, overhead projector, LEGOblocks (Lego® Education), handouts with instructions http://www.screenbyplay1.usermd.net/kgm/index.php/instructions
Detailed course of workshop divided into stages	I. Lead-in In this part of the classes students learn prototypes of the particular models and their technical data. Basic knowledge concerning copper is taught through a presentation which tells about the ways of exploration and extraction of this raw material, the history of its usage and contemporary application of copper. This part ends with a quiz which check how students remember the conveyed information.		

	<p>II. The construction of the mine machinery models A group of students is divided into smaller groups. Their task is to construct selected mine machinery models. The models constructed in the project are based on machines designed for KGHM ZANAM: a device for breaking blocks (a model defined as a crusher), a conveyor belt (a model defined as a conveyor), an independent drilling car (model defined as a drilling vehicle), a wheeled bulldozer (model defined as search vehicle). With the use of construction plans, students learn the principles of engineering thinking and cooperation in a group. Particular parts of the machine – two groups usually build one model – are later combined. This part of the classes ends with a 15-minute play of built models.</p> <p>III. The summary of the classes At the end of the classes there is a summary of the classes. Students are asked to indicate the most problematic parts while designing, they also talk about their impression. Then the students dismantle the machines and tidy the workplace. The participants of the classes receive a small gift - a comic book prepared as part of the project.</p>
<p>Awaited educational results</p>	<p>Students will possess knowledge about copper, its basic history and contemporary usage.</p> <p>Students will have knowledge about mining machines – how they look like, what their types are, what they are used for.</p> <p>Students will become aware about the precision of the engineers’ work.</p> <p>Students will develop basic engineering thinking, manual skills, they will practice concentration, hand-eye coordination. They will practice cooperation in a group and mutual solving problems.</p>

2. Basics of gemology and stonework

Workshop title	Basics of gemology and stonework		
Main objective / objectives	To represent pupils and students the opportunities to use rock, stones & jams, establish their qualitative and value characteristics through interactive classes and exhibitions with conducting relevant technical and technological evaluations.		
Key words (2-5)	Mineral deposits, paleontology, properties of stones		
Target age group	7 – 12 -16 <input type="checkbox"/>		19 -24 <input type="checkbox"/>
Duration divided into stages	45 minutes		
Teaching methods and tools used	Interactive methods, tools for visual and mass, magnetic and other properties evaluation of rock, stones & jams	Teaching aids	Providing the target audience with knowledge about the mineral resource base of Ukraine, based on world trends and to establish qualitative characteristics of separate fossil minerals
Detailed course of workshop divided into stages	<p>First part of workshop provides knowledge about:</p> <p>History of associated mineral use Mineral deposits Ukraine and the World Paleontological miracles of the World Properties of stones Technical and technological aspects of minerals extraction, dressing and usage Methods and tools of establishing the qualitative characteristics of minerals</p> <p>Second part provides different interactive classes, which consists on:</p> <ul style="list-style-type: none"> - self-learning definition of rocks and minerals - processing preferred sample (selection, sawing and polishing) - diagnosis of precious stones - making jewelry with your own hands - esoteric and energy properties of stones 		

	<p>Third part provides the independent work of pupils: The exhibition, which allows to recognize separate rock, stones & jams by audience. Also, as to exam skills on their characteristic and quality property evaluation; to see the final goods produced from fossil minerals.</p>
<p>Awaited educational results</p>	<p>Get general information about the raw materials base, get skills to identify the characteristics of stones, learn how to extract, process and evaluate them, also as how to use fossil raw materials for industry purposes.</p>

3. Discovering of prehistoric world

Workshop title	Discovering of prehistoric world		
Main objective / objectives	Develop child's relationship not only with the biotic but also abiotic components of the environment Gain basic knowledge about raw materials, mining and its techniques		
Key words (2-5)	prehistoric world, mining, the Earth, raw material		
Target age group	7 – 12 -16 <input checked="" type="checkbox"/>		19 -24 <input type="checkbox"/>
Duration divided into stages	The workshop lasts 2 hours. First part of the workshop - excursion /30 min/ Second part – creative part of the workshop /40 min/ Third part of the workshop - lecture and discussion / 40 min/ Fourth part of the workshop /10 min/		
Teaching methods and tools used	Excursion to the regional/local mining /geological museum Maker Education/Creative project Lecture Discussion	Teaching aids	Projector Computer Objects in the museum (minerals, fossils, mining tools) Interactive memory-game in the museum
Detailed course of workshop divided into stages	<ol style="list-style-type: none"> 1. Short excursion of mining museum – kids can see and try e.g. interactive exposition /30 min/ 2. Creating the picture of Earth with colorful gravels /40 min/ 3. Presentation and discussion about raw materials / 40 min/ 4. Passing off diplomas /10 min/ 		

Awaited educational results	Acquire new skills and applies new knowledge about regional geology and mining Possess a creative skills
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4. The use of raw materials in today's life

Workshop title	The use of raw materials in today's life		
Main objective / objectives	Develop relations with mining traditions Gain knowledge about minerals, raw materials and their use in daily life		
Key words (2-5)	raw materials, mining, minerals, mining traditions		
Target age group	7 – 12 -16 <input checked="" type="checkbox"/>		19 -24 <input type="checkbox"/>
Duration divided into stages	<p>The workshop lasts 3 hours 10 minutes.</p> <p>First part of the workshop – lecture /15 min/ Second part – jewelry making /45 min/ Third part of the workshop – gold panning game /45 min/ Fourth part of the workshop – short break /15 min/ Fifth part of the workshop – observation of minerals /30 min/ Sixth part of the workshop – mineral seeking game /30 min/ Seventh part of the workshop – passing off diplomas and small gifts – mineral samples /10 min/</p>		
Teaching methods and tools used	Lecture Maker education – Jewelry making Gaming and simulation – gold panning, mineral seeking Observation	Teaching aids	Minerals Microscope Projector Computer Gold panning tools

Detailed course of workshop divided into stages	<ol style="list-style-type: none"> 1. Short presentation about raw materials and their use in today's life / 15 min/ 2. Jewelry making / 45 min/ 3. Gold panning game /45 min/ 4. Short break /15 min/ 5. Observation of minerals with microscope /30 min/ 6. Mineral seeking /30 min/ 7. Passing off diplomas and a small gifts – samples of minerals /10 min/
Awaited educational results	<p>Recognize and utilize raw materials</p> <p>Demonstrate the skills and knowledge needed in adapting to the ever-changing world of technology</p> <p>Respect and value mining traditions</p>

5. The use of raw materials in today's world

Workshop title	The use of raw materials in today's world		
Main objective / objectives	Gain knowledge about raw materials and their use Increase interest in mining and raw materials Develop relationship to abiotic nature		
Key words (2-5)	raw materials, mining, abiotic nature		
Target age group	7 – 12 -16 <input checked="" type="checkbox"/>		19 -24 <input type="checkbox"/>
Duration divided into stages	The workshop lasts 1 hour 20 minutes. First part of the workshop - presentation / 20 min/ Second part of the workshop - presentation and exhibition /30 min/ Third part of the workshop - observation of minerals with microscope /30 min/		
Teaching methods and tools used	Lecture Discussion Observation Exhibition	Teaching aids	Projector Computer Microscope Minerals
Detailed course of workshop divided into stages	1. Presentation about raw materials and their use in today's life / 20 min/ 2. Presentation and exhibition of local /regional exposition of minerals and fossils /30 min/ 3. Observation of minerals with microscope /30 min/		
Awaited educational results	Recognize and utilize resources Respect and value mining traditions Value biotic but also abiotic nature		

6. Prehistoric world recovery

Workshop title	Prehistoric world recovery		
Main objective / objectives	Gain knowledge about prehistoric animals Gain basic information about minerals Develop relationship to abiotic nature Develop children's creativity		
Key words (2-5)	prehistoric animals, fossils, dinosaurs		
Target age group	7 – 12 -16 <input checked="" type="checkbox"/>	19 -24 <input type="checkbox"/>	
Duration divided into stages	The workshop lasts 2 hours and 30 minutes. First part of the workshop - presentation about raw materials and fossils / 20 min/ Second part of the workshop - presentation about the exposition of minerals and fossils /20 min/ Third part of the workshop - game - dinosaurs and prehistoric animals quiz /30 min/ Fourth part of the workshop - short break /10 min/ Fifth part of the workshop - prehistoric animals drawing, cutting and finding whether they belong to land or sea /60 min/ Seventh part of the workshop - passing off diplomas and small gifts – mineral samples /10 min/		
Teaching methods and tools used	Lecture Discussion Gaming Maker education – drawing, cutting prehistoric animals	Teaching aids	Projector Computer Minerals and fossils Pictures

Detailed course of workshop divided into stages	<ol style="list-style-type: none"> 1. Short presentation about raw materials and fossils / 20 min/ 2. Short presentation about local/regional exposition of minerals and fossils /20 min/ 3. Dinosaurs and prehistoric animals quiz /30 min/ 4. Short break /10 min/ 5. Prehistoric animals drawing, cutting and finding whether they belong to land or sea /60 min/ 6. Passing off diplomas and small present – samples of minerals /10 min/
Awaited educational results	<p>Recognize and utilize resources</p> <p>Respect and value history and mining traditions</p> <p>Value biotic but also abiotic nature</p> <p>Expand knowledge and be able to solve problems</p>

7. Do you know what you drink?

Workshop title	Do you know what you drink?		
Main objective / objectives	Discussion of the water cycle in nature and in mining areas The quality of drinking water Test of several types of water available on a daily basis Water management in copper mines		
Key words (2-5)	water circulation, mining areas, drinking water, water quality		
Target age group	7 - 12 -16 <input checked="" type="checkbox"/>		19 -24 <input type="checkbox"/>
Duration divided into stages	90-110 minutes		
Teaching methods and tools used	Educational presentation Quiz	Teaching aids	computer and projector, different kind of water available in shops/stores, disposable cups, paper and pen
Detailed course of workshop divided into stages	I stage A teacher introduce students to selected issues (presentation): <ul style="list-style-type: none"> - Introduction to the problems of water circulation in nature - Factors affecting on the climate - Areas of water deficit in the region / country and in the World. - The impact of mining on ground and surface waters - Cities heat islands II stage Survey "Do you know what you drink?" A teacher conducts a survey among students Example questions: <ul style="list-style-type: none"> - How amount of water do you drink per day? 		

	<ul style="list-style-type: none"> - What type of water have you drink? - Do you know the standards for drinking water? - Do you check the water parameters (in the tap) published by waterworks? - Do you think that tap water can be harming for health? - What you pay attention to when buy water in the store / shop? <p>III stage Experience</p> <p>A teacher prepares a few cups to which he pours: distilled water, tap water and several types of water from the store (with different mineralization) and highly saline water found in the mine (<100mg NaCl / L).</p> <p>Students taste each type of water.</p> <p>After tasting students are filling the questionnaire and describe their taste experience. They compare water from the best to the worst in their opinion.</p> <p>IV stage</p> <p>A teacher check questionnaires and gives the result.</p> <p>A teacher tells students in which cup what kind of water was.</p> <p>A teacher says which water win as the most tasty in students opinion.</p> <p>A teacher discusses the risks associated with drinking demineralized and highly mineralized water.</p> <p>Providing curiosities related to water.</p>
<p>Awaited educational results</p>	<p>Students will possess the knowledge about water circulation in nature and factors affecting the climate. They find out about connects between water circulation and mining activities.</p>

2. Workshop scenarios for target age group: 19-24

1. Interpretation of the mining heritage through a museum object

Workshop title	Interpretation of the mining heritage through a museum object		
Main objective / objectives	Persuade students on approaches to the interpretation of the mining heritage, in case they encounter a museum object. In museum objects, designers and artists, on the one hand, get to know their historical value, on the other hand, it can inspire the creation of new artworks.		
Key words (2-5)	mine heritage, museum, interpretation, education		
Target age group	7 – 12 -16 <input type="checkbox"/>		19 -24 <input checked="" type="checkbox"/>
Duration divided into stages	Part 1: Jewelry through archaeological periods Part 2: Light and light in the past Part 3: Practical workshop		
Teaching methods and tools used	lecture, practical work with students at the workshop	Teaching aids	mining museum objects - archaeological jewelry and lamps
Detailed course of workshop divided into stages	The first part of the workshop is devoted to the theory of interpretation of heritage. This part focuses on museum objects of jewelry and lamps. In the second part, students should creatively create. The challenge is represented by archaeological jewelry made of stones and archaeological lamps. A semi-precious stone hematite with jasper from the Sitarjevec Mine (VirtualMine case study) is a material that is available for designing by students. They also think about the lamps in a same way. Students can consider how to prepare a modern interpretation story for visitors to museums and school children about hematite with jasper and archaeological lamps.		

	<p>The workshop lasts 4 hours.</p> <p>Part 1- Theory</p> <p>Museological analysis of meanings (reconstruction of the role of jewelry items in prehistory and antiquity, interpretation of their meanings)</p> <p>An example of ancient lamps and their practical and symbolic use and use as propaganda tools of the Roman Empire</p> <p>Part 2 – Practice</p> <p>The conceptual design of the object, which will be the most relevant, design and symbolic of the selected message (work in groups)</p>
<p>Awaited educational results</p>	<p>Diploma works in the field of design and pedagogical work, art exhibition, design of modern jewelry made of semi-precious stone and lamps using modern technologies</p>

2. Virtual and Augmented Reality Tools for Mining Activities and the Raw Materials life cycle

Workshop title	Virtual and Augmented Reality Tools for Mining Activities and the Raw Materials life cycle		
Main objective / objectives	Introducing Virtual and Augmented Reality technologies as an effective tool to improve the perception and highlight the importance of mining activities in current society Showcasing new and more engaging ways to disseminate mining topics, especially to younger generations		
Key words (2-5)	Virtual Reality, Augmented Reality, Mixed Reality, Mining, Learning		
Target age group	7 – 12 -16 <input type="checkbox"/>		19 -24 <input checked="" type="checkbox"/>
Duration divided into stages	The workshop lasts 2 hours. Stage 1 (30 minutes): Lecture about Virtual/Augmented/Mixed reality Stage 2 (1 hour): Hands-on activities with live demos using VR/AR/MR technologies Stage 3 (30 minutes): open discussion about possible, new applications in mining and the raw materials life cycle		
Teaching methods and tools used	Lectures by experts in Virtual Reality who will mix traditional teaching methods (e.g. talk and slide presentation) and practical live activities using different types of technology. The workshop will follow a scheme based on the 'learn-by-fun' approach.	Teaching aids	Android Tablet device VR glasses - HTC Vive Portable VR display system PC with VR/AR demos Microsoft Kinect for PC
Detailed course of workshop divided into stages	Stage 1 – Lecture on Virtual / Augmented / Mixed Reality: <ul style="list-style-type: none"> - Introduction to Virtual/Augmented/Mixed Reality: definition, working principles, history, technical differences, overall state-of-the-art, etc. - Possible applications of these technologies in mining and the raw materials life cycle 		

	<p>Stage 2 – Hands-on activities using VR/AR/MR devices:</p> <ul style="list-style-type: none"> - The e.g. ‘Marcelo Jorissen’ Virtual Reality visit: <ul style="list-style-type: none"> o 3D virtual experience from a first-person perspective view of the mine using VR devices (headsets and/or the portable VR system) o Navigation and interaction with the 3D environment using body gestures (natural interaction) - The ‘Marcelo Jorissen’ Augmented Reality application using a mobile device (tablet): <ul style="list-style-type: none"> o Description of the general layout of the mine o Interaction with the model (e.g. headframe animation, hide/show mine levels, virtual mine first person visit) o Exploration of the additional media content, such as photos of the main components of the mine (architectural and tools), descriptions of the extraction process of coal (textual and by videos) - The ‘Marcelo Jorissen’ Mixed Reality application using a mobile device (tablet / smartphone): <ul style="list-style-type: none"> o Exploration and navigation of the real environment using the application (e.g. using the map and GPS compass information; simulating a touristic route visiting characteristic points of interest) o Interaction with the mine in the real environment (exploration of the digital models of the mine, photos and video visualization) <p>Stage 3 – Open discussion:</p> <ul style="list-style-type: none"> - Discussion about the improvements of the demos - Brainstorming session about possible, future applications of these technologies in practical mining activities - Brainstorming on how to raise more interest in current society about the role played by raw materials in everyday life
<p>Awaited educational results</p>	<p>This workshop scenario is targeting students who are familiarized with raw materials and mining or are close to choose this path for their careers. The planned result is that they learn about the practical possibilities behind these technologies and how they might be successfully applied in areas such as formation, mining activities and general knowledge diffusion.</p>

	<p>By means of the live interaction with the practical applications developed during the VirtualMine project, it is expected to awake their interest in technology and at the same time involve them in the definition of new practical ideas and applications.</p>
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3. Old mines used as a tool for geotourism and mining tourism development

Workshop title	Old mines used as a tool for geotourism and mining tourism development		
Main objective / objectives	Increase of the interest of abandoned mines / former mining Develop the relationship to mining traditions		
Key words (2-5)	Old mine, geotourism, mining tourism, mining traditions		
Target age group	7 – 12 -16 <input type="checkbox"/>		19 -24 <input type="checkbox"/> x
Duration divided into stages	The workshop lasts 1 hour 10 minutes First part of the workshop / 40 min/ Second part of the workshop /30 min/		
Teaching methods and tools used	Lecture Class discussion	Teaching aids	classroom projector computer pictures / presentation
Detailed course of workshop divided into stages	<ol style="list-style-type: none"> 1. Presentation and discussion about abandoned mines in the region /country / 40 min/ 2. Examples of abandoned mines in the world which are used for geotourism and mining tourism purposes /30 min/ 		

Awaited educational results	Respect and value mining traditions Promote the idea of the use of abandoned mines Demonstrate the knowledge needed in adapting to the ever-changing world
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4. Stone herbarium

Workshop title	Stone herbarium		
Main objective / objectives	Increase patriotism Gain knowledge about prehistoric animals (fossils) and prehistoric life in the territory		
Key words (2-5)	fossils, prehistoric life, herbarium, prehistoric animals		
Target age group	7 – 12 -16 <input type="checkbox"/>		19 -24 <input checked="" type="checkbox"/>
Duration divided into stages	The workshop lasts 1 hour 30 minutes First part of the workshop – lecture/ 30 min/ Second part of the workshop – excursion /60 min/		
Teaching methods and tools used	Lecture Excursion (botanical garden)	Teaching aids	Fossils and other objects in botanical garden Projector Computer Pictures and photographs
Detailed course of workshop divided into stages	<ol style="list-style-type: none"> 1. Short presentation about fossils / 30 min/ 2. Excursion to Botanical garden with the current exposition – Stone herbarium /60 min/ 		
Awaited educational results	Possess a strong academic foundation		

5. My future career in mining sector

Workshop title	My future career in mining sector		
Main objective / objectives	<p>Increase interest in mining and minerals</p> <p>Develop relationship to raw materials and abiotic nature</p> <p>Get information about current job opportunities in mining field and related sectors/fields</p> <p>Get information about different study programs and content of the studies</p> <p>Get information about professional development opportunities in the raw materials industry</p>		
Key words (2-5)	raw materials, mining, mines, fossils		
Target age group	<p>7 – 12 -16</p> <p><input type="checkbox"/></p>		<p>19 -24</p> <p><input checked="" type="checkbox"/></p>
Duration divided into stages	<p>The workshop lasts 1 hour 30 minutes.</p> <p>First part of the workshop - lecture / 20 min/</p> <p>Second part of the workshop - lecture /20 min/</p> <p>Third part of the workshop – observation of minerals /30 min/</p> <p>Fourth part of the workshop – presentation about current job opportunities in mining field /20 min/</p>		
Teaching methods and tools used	<p>Lecture</p> <p>Discussion</p> <p>Observation</p>	Teaching aids	<p>Projector</p> <p>Computer</p> <p>Pictures and photographs</p> <p>Microscope</p>
Detailed course of workshop divided into stages	<p>Participants should be divided in different groups and came in different time if needed.</p> <p>Program of the workshop for small groups:</p> <ol style="list-style-type: none"> 1. Presentation about raw materials and their use in today's life / 20 min/ 2. Presentation about local / regional exposition of minerals and fossils /20 min/ 3. Observation of minerals with microscope /30 min/ 		

	4. Presentation about current job opportunities connected to mining field and related sectors / fields /20 min/
Awaited educational results	<p>Recognize and utilize resources</p> <p>Respect and value mining traditions</p> <p>Indicate of professional development opportunities in the raw material industry</p>