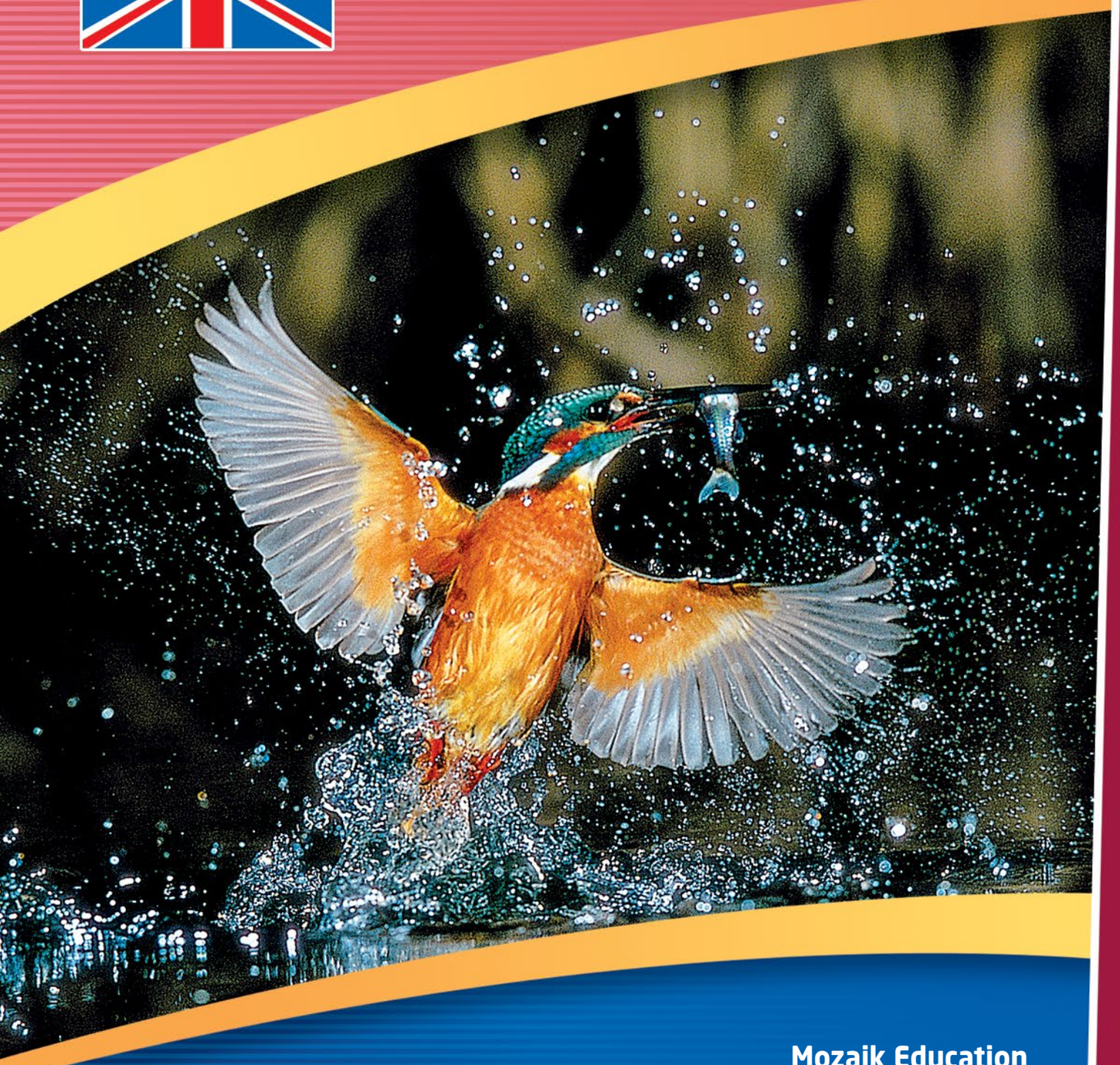


**Mozaik Education**

Somogyi utca 19, 6720 Szeged, Hungary • Phone: +36 62 554 664
E-mail: office@mozaweb.com • Web: www.mozaweb.com

# mozaLearn

## Innovative Education Solutions

by Mozaik Education

***mozaWeb**.com*

MOZAIK


# Mozaik Education

- *Mozaik Education started out as a textbook publisher in 1990. We are currently one of the largest digital content providers in Hungary.*
- *The company was founded by teachers and software engineers, which created a unique fusion of expertise in education and software engineering.*
- *200 employees, 100+ ongoing digital education projects.*
- *Continual development of interactive content: 3D scenes, videos and digital lessons, even at our partners' requests.*
- *Professional printing press equipped with state-of-the-art machinery.*
- *International content development: content available in more than 30 languages.*

ACADEMICS' CHOICE SMART MEDIA AWARD WINNER

EDTECH AWARDS COOL TOOL WINNER

bett AWARDS FINALIST

GESS EDUCATION AWARDS FINALIST

FRANKFURTER BUCHMESSE BEST EUROPEAN SCHOOLBOOK AWARDS

# Our worldwide partners

# The mozaLearn integrated educational system

***mozaLearn*** *is a* ***digital education system*** *specifically designed to* ***facilitate teachers' work,*** *according to their needs. It covers the entire education system (K–12, all subjects) and provides appropriate support for both pupils and parents.*

*Its 3+1 key components:*

- *the* ***mozaBook*** *interactive educational presentation software suite,*
- *the* ***mozaWeb*** *online platform for learning at home,*
- *the* ***mozaLog*** *student information and school administration system,*
- *the* ***media library*** *an interactive content library.*

MOZAIK

# *Digital Solutions*

*for*

- *interactive whiteboards*
- *digital learning at home*
- *school administration*

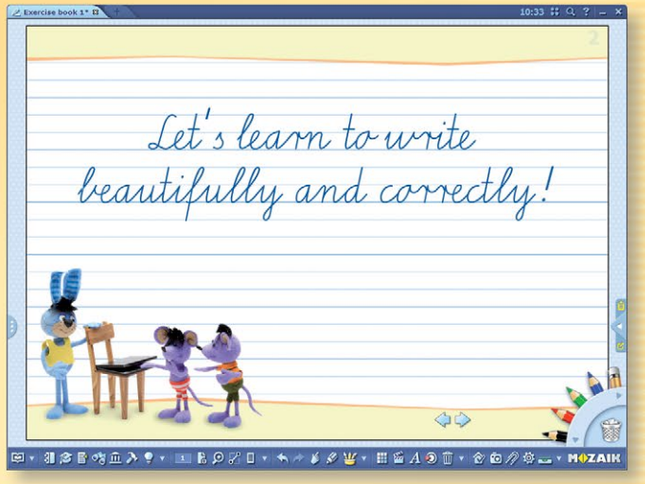
# mozaBook

**educational presentation software**

*MozaBook is a presentation software optimised for interactive whiteboards and displays. The digital publications make the printed version of the textbooks more interesting and easier to comprehend with various interactive materials, 3D scenes, educational videos, exercises and thematic tools.*


## Impressive exercise books with just a few clicks

*Exercise books can be illustrated with several background pictures that are grouped by theme. The background images and page lining are fixed, so they do not impede editing and presentation.*

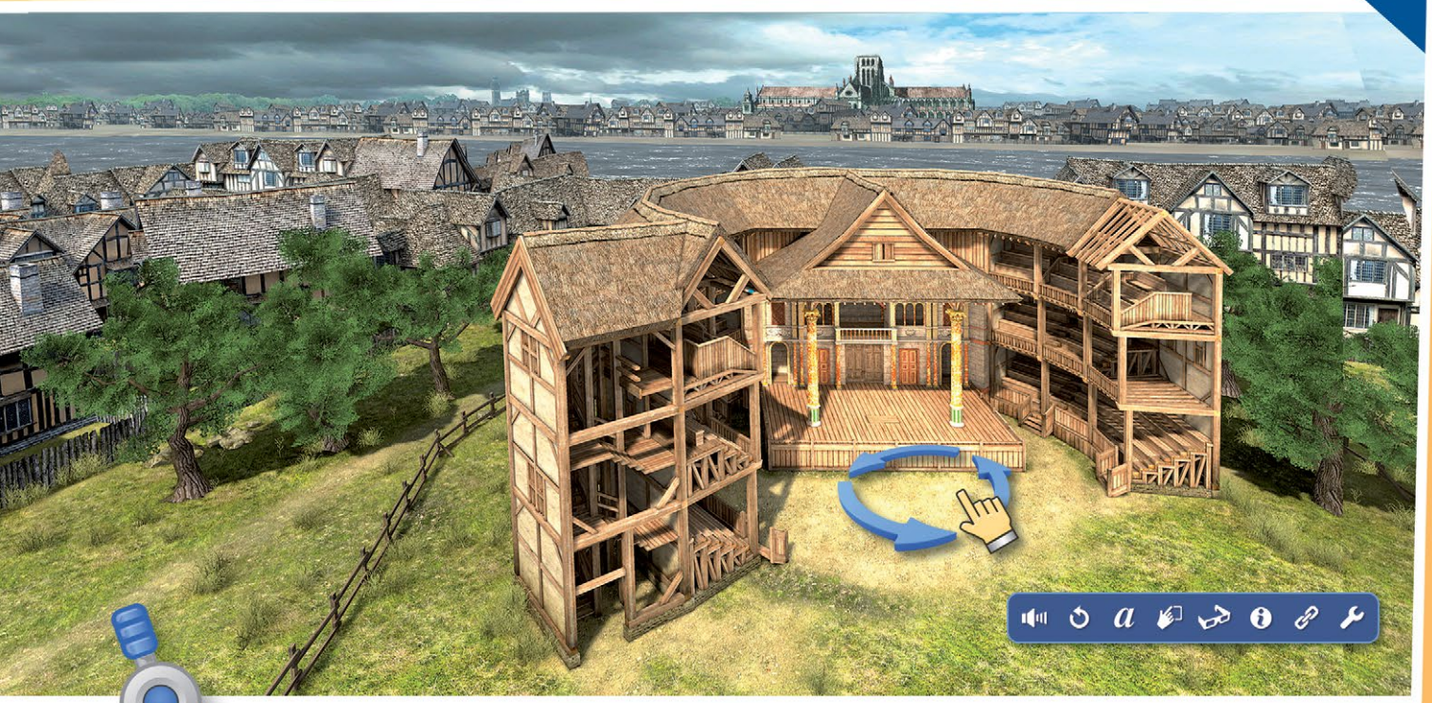

*You can write or draw in the exercise books or create spectacular animated presentations. Text, drawings, pictures, videos and 3D scenes can all be used in the presentations.*


## Gallery

*The built-in image gallery contains freely resizeable images created by our graphic artists for illustrating exercise books, grouped by subject and topic.*

## Media library – *Window to the world*

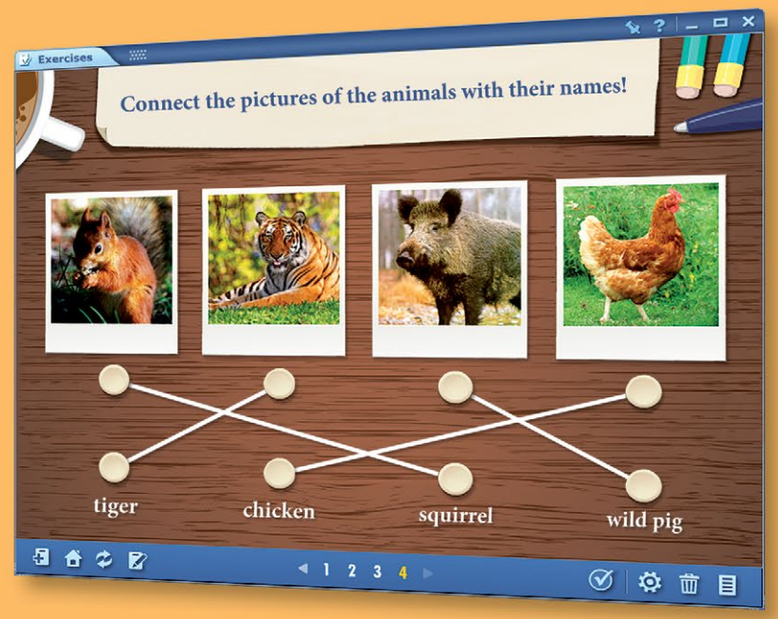
*The mozaBook media library provides an inexhaustible source of educational resources. Browse among thousands of our interactive extras, search images, video or sound files on your computer or on the Internet.*



## Test editor

*Impressive, individualised worksheets are simple to construct with the mozaBook's test editor. These worksheets can be incorporated into the books and exercise books and played in class.*

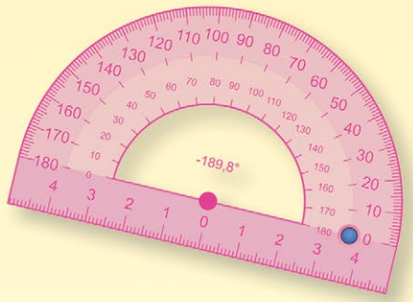
*You can choose from several types of exercises (simple choice, matching, crosswords, labelling, gap filling, etc.). Pictures, drawings, videos and sounds can also be inserted from the media library, from the Internet (e.g. YouTube videos) or from your computer.*




*The created worksheets can be shared at school or at national level, making it possible for teachers to use each other's worksheets, or parts of those in class.*

## Visual drawing tools

*Drawing is simple and playful with the user interface of the visual drawing tool on the interactive board for even the youngest pupils. The different tool packs contain individual drawing tools, selected according to the chosen presentation mode.*



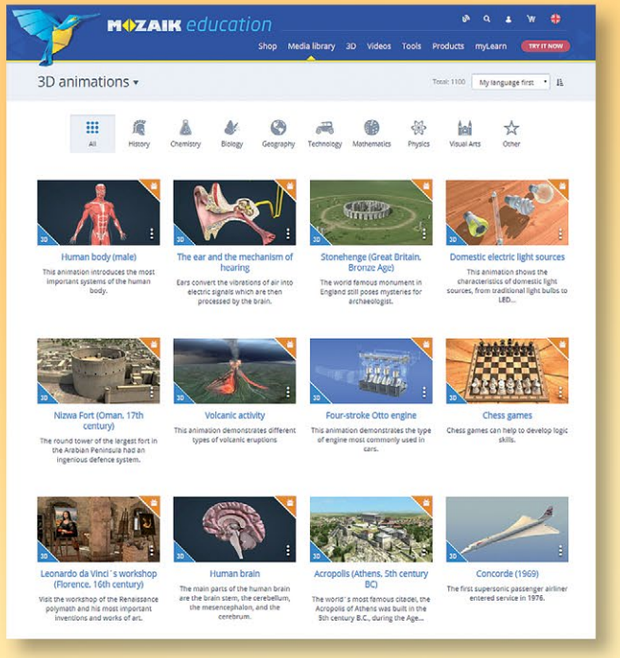
# mozaWeb

**digital learning at home**

THE WEB PAGE OF THE YEAR
2012

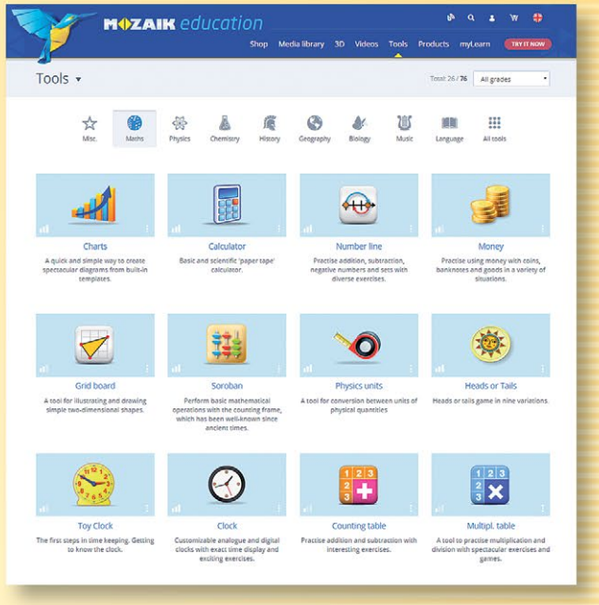
*The interactive textbooks accessible through the Internet are aimed at self-directed learning as well as at practicing skills associated with acquiring knowledge.*


*Animations, exercises and supplementary materials help students immerse themselves in the given fields. mozaWeb is accessible with any Internet browser, without installing any additional software.*



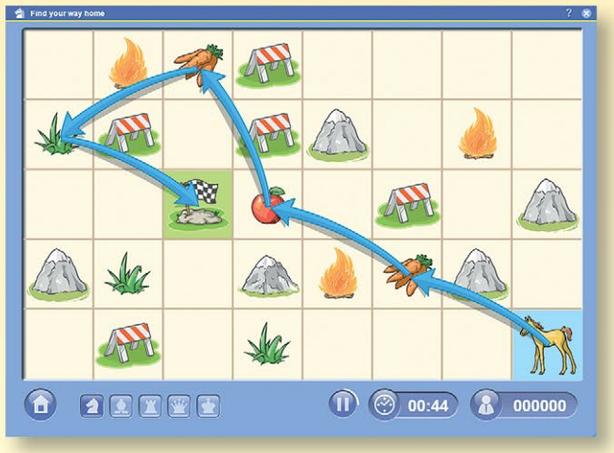

## Media library

*The media library contains the interactive content of textbooks in an organised, searchable format. Digital lessons, videos, sound files, pictures, 3D scenes, exercises and explanations can be viewed in alphabetical order in the currently open textbook, in all textbooks of the given subject or in the entire media library.*




## Tools

*More than 120 tools, grouped by subject, are accessible to teachers and students. Their number and functions are continuously growing. Students are provided with great opportunities for playful learning, practicing, or immersing themselves in the given subject.*



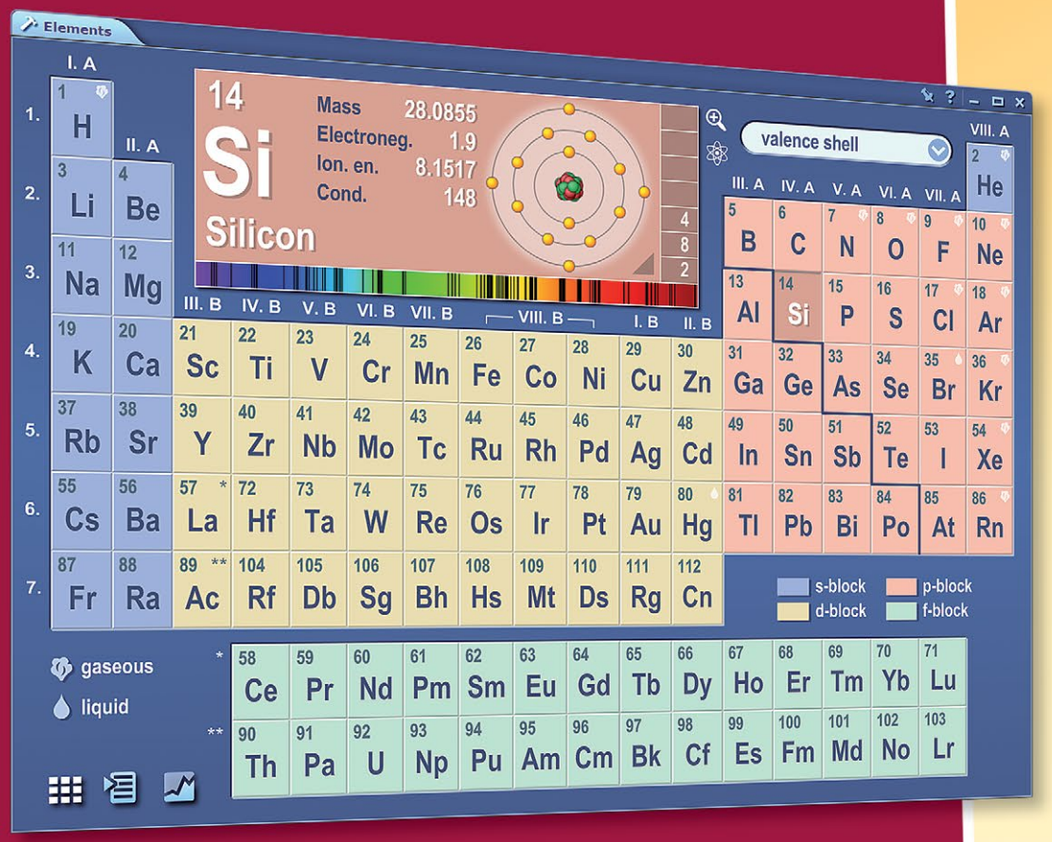

## Games for practice and skill development

*mozaWeb's continuously expanding range of logical, practice and skill development games, in addition to being entertaining, helps students practice and deepen the knowledge they acquired. Students can even play with friends or classmates using the online games.*

# mozaTools

**thematic applications**

*Our interactive applications provide a unique and playful way for students to acquire knowledge and understand the learning material better.*

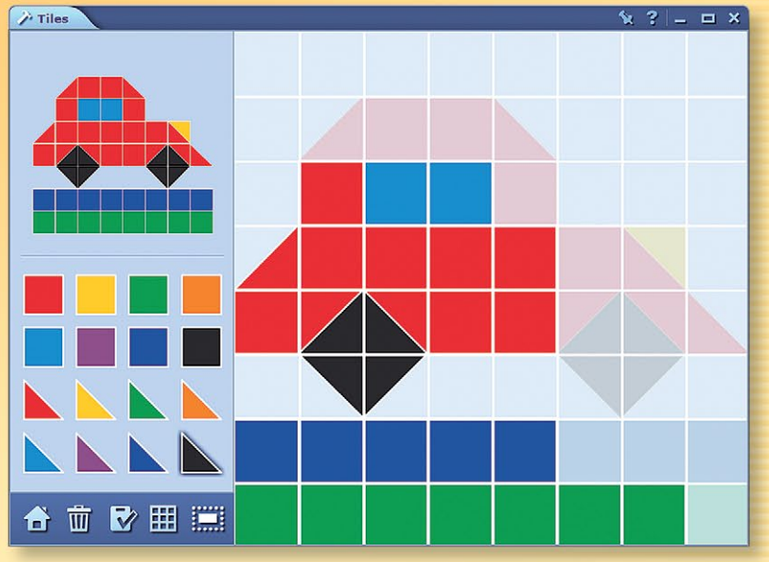



- *Over 120 thematic applications are available at the moment, the number of which is constantly increasing.*
- *Accessible for both students and teachers, even online.*

*Molecules* *Wildlife* *miniScore* *Dice*

## *Skill development*

*These applications are designed for elementary school students and are aimed primarily at the development of skills.*




*The collection of the more than 120 currently available tools is continuously expanding with new functions being added regularly. The applications are available for teachers in our mozaBook software, but students can also access them on our website, www.mozaweb.com.*

## *Animations*

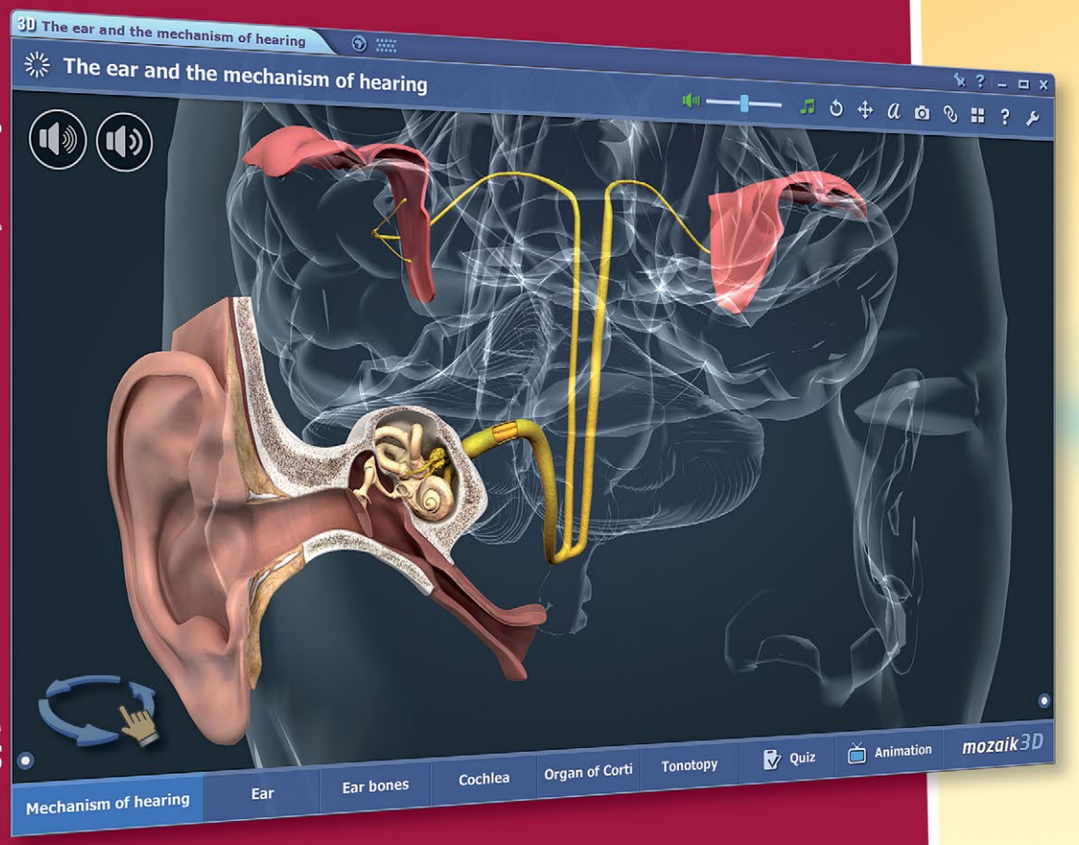
*Certain tools contain animated exercises which make learning even more enjoyable.*


*Metronome* *Number line* *Weather* *Calendar* *Word cards* *Charts*

# mozaik3D

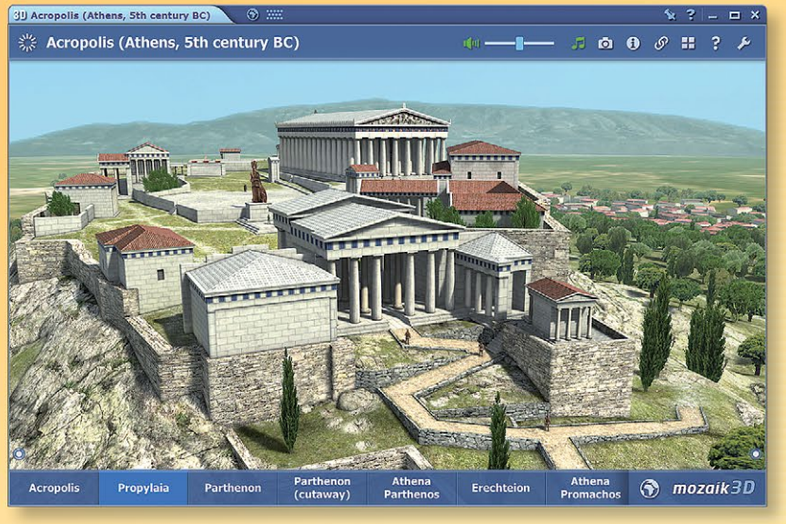
**interactive 3D scenes**

*Over 1300 3D scenes supplement the text, images and diagrams in our textbooks. These can be accessed through our interactive textbooks, which, when shown in class on an interactive whiteboard, help students to understand the learning material better, make lessons more impressive and improve the quality of illustration in class.*




***Biology 3D scene** – The ear and the mechanism of hearing*

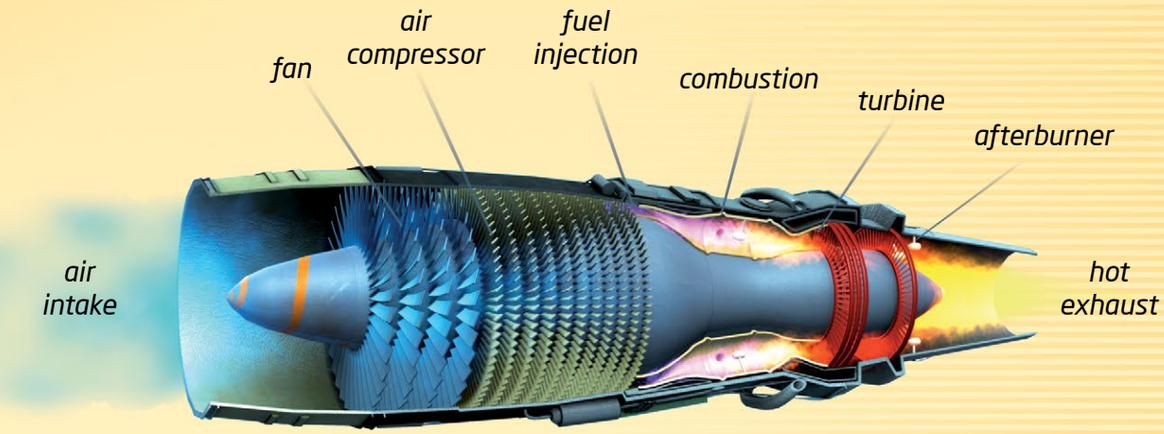
- *The 3D scenes can be enlarged and rotated.*
- *The unified interface is easy to use.*
- *Most animations can be explored with the help of narrations and contain built-in quizzes.*

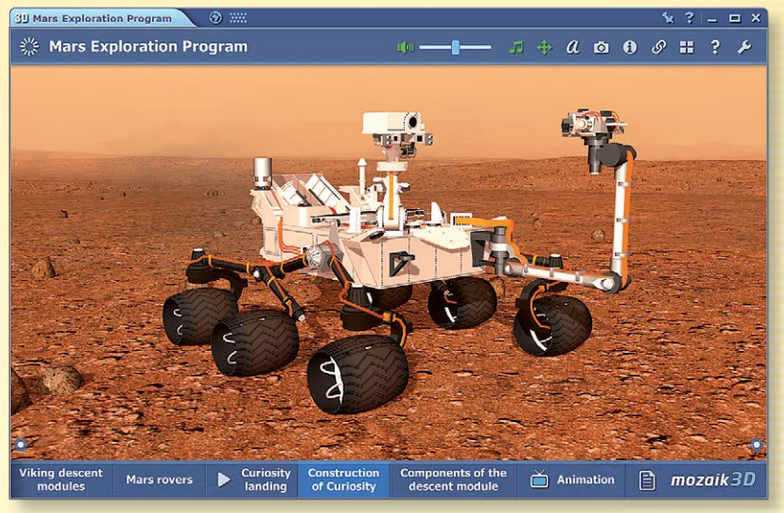



***History 3D scene** – Acropolis (Athens, 5th century BC)*

## *History comes alive*

*We can walk through buildings of the past, take a peek into the daily lives of people, explore real and mythical historical events in ways that were unimaginable until now.*




***Geography 3D scene** – Mars Exploration Program*

## *The secrets of Nature*

*We can travel through space, learn about our Solar System, the natural wonders of Earth and the laws and secrets of Nature.*

# mozaBook for tablets

**mozaBook on mobile devices**

*Students using tablets in school or at home can access the content of their textbooks directly on their portable smart devices.*


*With our tablet applications, students can use their enhanced textbooks, including the built-in extra content, on Windows, Android and iOS tablets. Once downloaded, the textbooks are fully functional both online and offline.*

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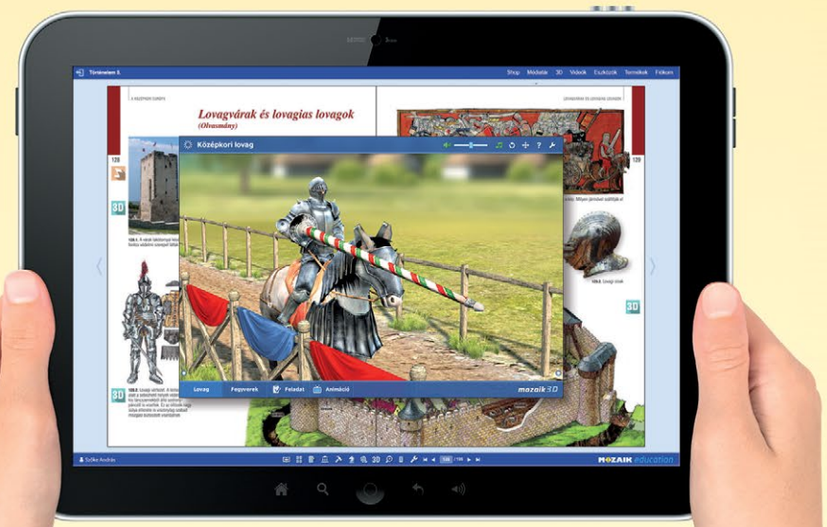
## *Virtual reality in 3D scenes*

*Students can virtually explore the 3D scenes on their mobile phones. If they place their phones inside appropriate VR glasses, they can find themselves in ancient Athens, in the Globe Theatre or on the surface of the Moon.*

## *VR requirements:*

- *smartphone with a gyroscope*
- *VR glasses for smartphones*
- *mozaWeb account*
- *mozaik 3D application, available free of charge from app stores*




*Interactive tables of contents and the built-in search function help users navigate in digital publications. Students can draw and highlight texts in books and exercise books. The system notifies students about new homework assignments, which they can solve and send back to their teachers.*

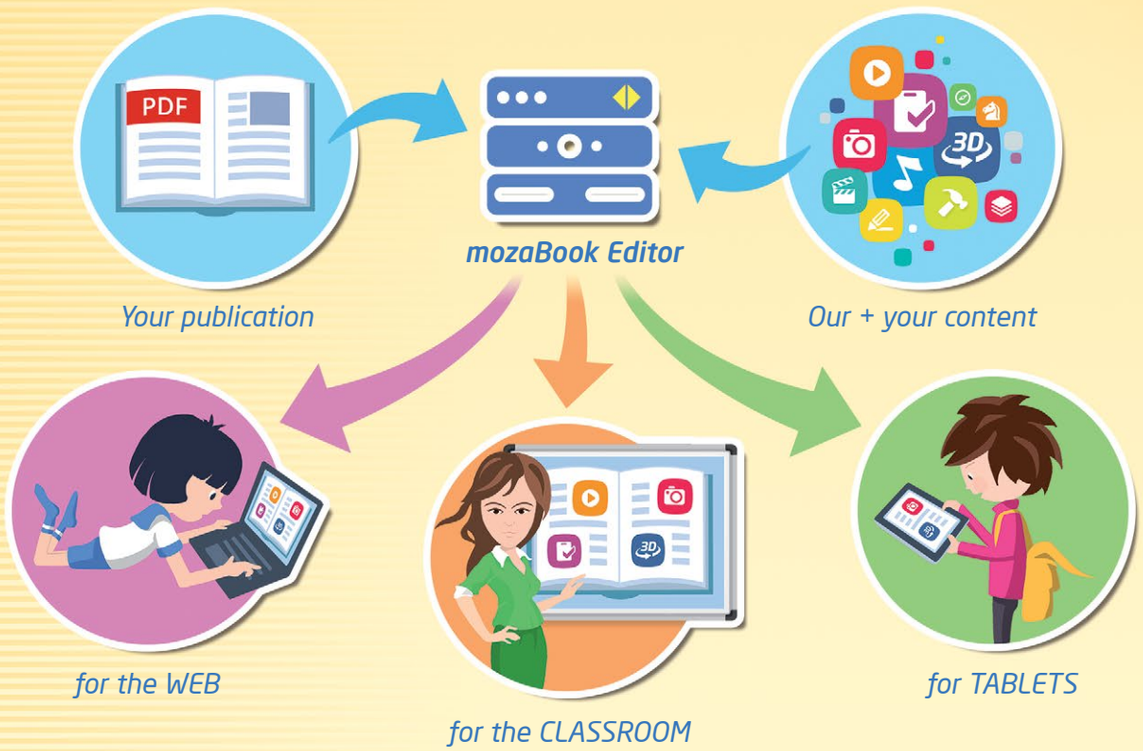
# mozaBook Editor

**online digital textbook editing system**

*Any publisher can upload* ***the PDF versions of their own printed textbooks*** *to mozaBook Editor, and* ***convert them immediately into interactive digital textbooks.*** *The system givs individual access for every publisher so that each and* ***every publisher has exclusive access to their own publications.***

## Creation of digital textbooks

*First, publishers upload the electronic files of the printed textbooks used by teachers and pupils to the* ***mozaBook Editor*** *online digital textbook editing platform. Then they can insert extra content from the* ***media library,*** *a collection of interactive educational content including over one thousand 3D scenes, several hundred video and audio files, images, assessment exercises and other supplementary materials created by Mozaik Education.*




*In addition to using the content of the Media library, publishers can also insert their own digital content, or use educational materials from the Internet too. The mozaBook Editor can create various digital textbook packages from existing books, depending on the publisher's needs: books for classroom use on an* ***interactive board,*** *for online* ***home learning,*** *or for* ***Windows, iOS*** *and* ***Android*** *tablets.*

## mozaBook Editor

*Online digital textbook editing system*

***Features***

- *Import PDF files (textbooks)*
- *Editing page highlights and enlargements*
- *Insertion of interactive content into the publication*
- *Creation of interactive table of contents*
- *Creation of digital textbook packages for mozaBook, mozaWeb, iOS, Android*
- *Assignment of tasks for editors*
- *Editing statistics*
- *Administration of digital textbook packages*
- *Management of digital textbook packages*
- *Status report of digital textbook packages*

## mozaLearn Localisation

*Online translation and localisation tool for the mozaLearn system*

***Features***

*Upon further localisation requests, the translation of the mozaBook and mozaWeb software interface and linguistic elements, as well as any corrections can be performed within the mozaLearn localisation platform.*

- *mozaBook: menu system and user interface*
- *mozaWeb: menu system and user interface*
- *mozaTools: databases and user interface*
- *3D scenes: menu system and the content of 3D scenes*

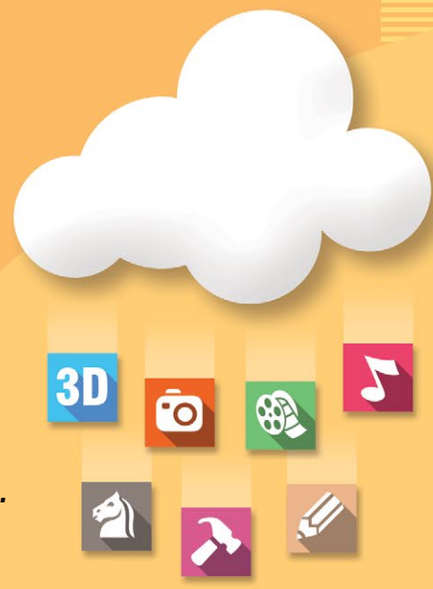
## Media library

*Interactive educational content for all K-12 school subjects*

***Content types***

- *Interactive 3D scenes (more than 1,200)*
- *Educational videos (more than 1,000)*
- *Educational tools and games (over 120)*
- *Collection of educational images*
- *Music and audio files*

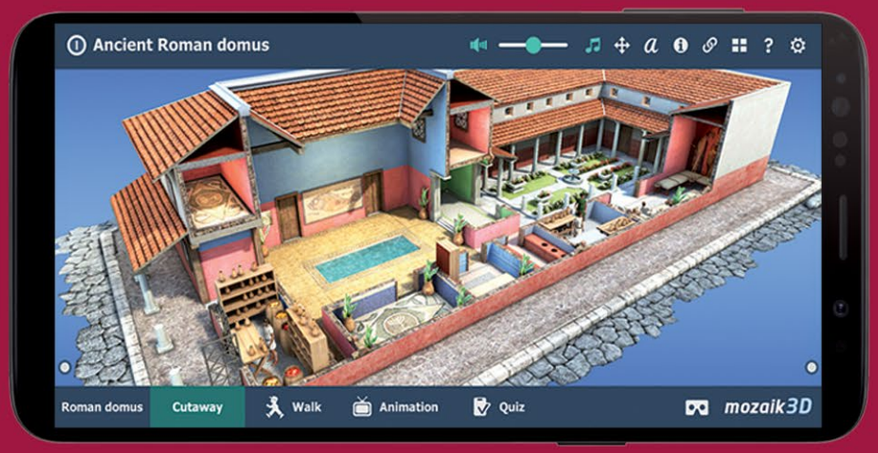
*Mozaik Education and its partners continually develop new educational content, which is why the* ***Media library is actively expanding.*** *All currently available content can be viewed on our website,* ***www.mozaweb.com.***



# mozaik3D app

## mozaik 3D on mobile devices

*Our application has been designed mainly for students between 8 and 18 years of age. The interactive educational scenes related to History, Technology, Physics, Mathematics, Biology, Chemistry, Geography and Visual Arts will turn learning into an adventure.*



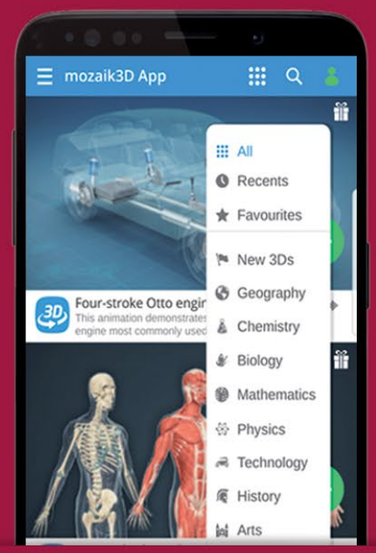

*The 3D scenes are available in 30+ languages, which also offers an excellent opportunity to acquire and practise foreign languages.*

Download on the App Store

GET IT ON Google Play

*Our interactive 3D scenes can be rotated, enlarged, and viewed from pre-set angles. Navigate through the complex scenes easily with the help of the predetermined views.*

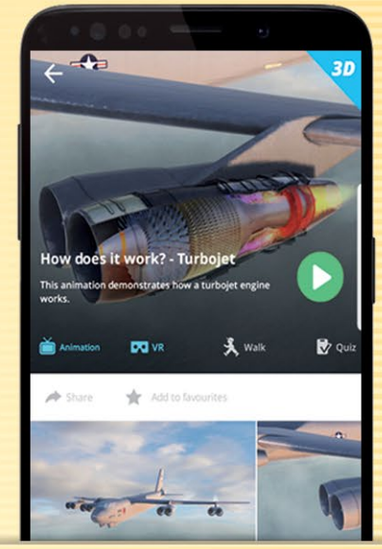
*Most of our 3D scenes include narrations and built-in animations. They also contain labels and entertaining animated quizzes.*




*With the help of the 3D scenes, you can bring the pages of the interactive books to life.*

*All Mozaik 3Ds can be switched to stereoscopic mode for an amazing virtual reality experience. Walking around the city of Babylon, through a medieval town or landing on the Moon is just a click away.*

*Some of the 3D scenes contain a walk function, enabling you to explore the scene yourself by using the virtual joystick.*




*With the **mozaik3D app** (compatible with all VR headsets and available for iOS and Android), subscribers can explore all our 3D scenes.*

WALK

ANIMATION

NARRATION

QUIZ

VR FUNCTION

SEARCH, FILTER

DRAWING

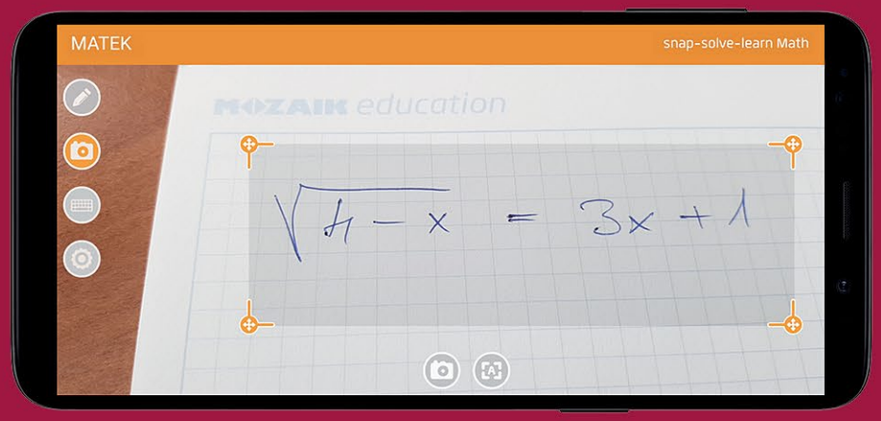
GAMES

*If you place your phone in a VR headset you can take a look around in the human body or examine the structure of a leaf.*

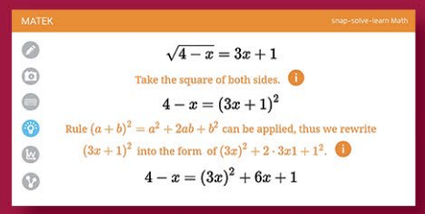
# Matek app

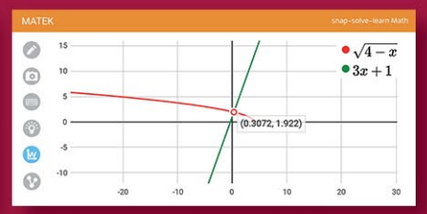
**for solving equations on smart devices**

*The Matek educational application helps solve the most complex equations and understand how to find the correct result. Snap a picture of the equation or write it on the display and the app will gradually guide you through the solution.*




*Insert the exercise directly from a textbook or testbook using a smartphone camera or by writing it by hand on the display of the device.*




Download on the App Store GET IT ON Google Play

*Go through the solution step by step. If possible, solve problems individually or ask for hints when stuck. Have a look at the simplified solution of the whole exercise, or access more detailed explanations with one click.*

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# Fizika app

**for experimentation on smart devices**

*The Fizika app offers an exciting user experience and the opportunity to play. Learn while having fun and understand how the surrounding world works. Use the application on a smartphone or an interactive board in school.*

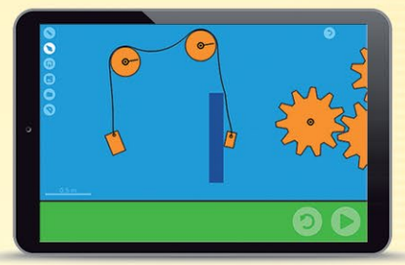
*Observe a mechanical process, model it with a few clicks, then play on your device as many times as you wish.*

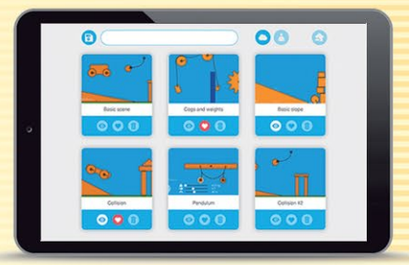
*This allows for examination of what happens and leads to an understanding of the underlying physical phenomena.*


Download on the App Store GET IT ON Google Play

*Modify the parameters and properties of objects during experiments; this enables you to observe what happens when you change the initial conditions.*

*The easiest way to grasp processes is to use well-made graphs. Create graphs for analysing virtual experiments with a click, and use them to interpret the physical phenomena along with the motion of objects.*





# LabCamera

**real time video analysis**

*LabCamera is a science exploration application which enables students to carry out experiments using their built-in cameras of smart devices or any external webcam. It's a cost-effective way to enhance the STEM curriculum and promote scientific inquiry.*

*LabCamera develops skills for investigation, problem-solving, critical thinking and deductive reasoning. LabCamera has 7 modules to cover all Science subjects.*

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## *Time Lapse*

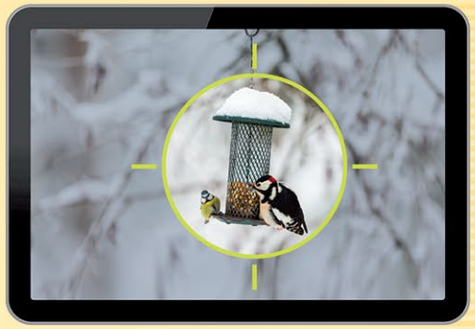
*The Time Lapse function helps you observe and better understand the slow processes in nature, such as the formation and migration of clouds, ice melting, the growth of plants, etc.*


## *Kinematics*

*This module uses the picture of the webcam or pre-recorded videos for movement analysis and can track up to 3 objects at the same time.*

## *Motion Cam*

*Motion Cam allows you to capture rare and intimate situations in nature; it works just like motion-sensor cameras.*




## *Universal Logger*

*The module can log any measurement instrument's data that has either a digital, radial-dial, or fluid-based display by 'connecting' it to your computer through its built-in camera.*

## *Microscope*

*Built as a universal measuring tool, it enables students and teachers to measure sizes, distances, angles and areas as well as allowing the examination of microorganisms.*

## *Pathfinder*

*The Pathfinder module tracks and detects the unseen paths and patterns of moving objects and beings. Toggle between path and motion density maps to find patterns in seemingly chaotic motion.*

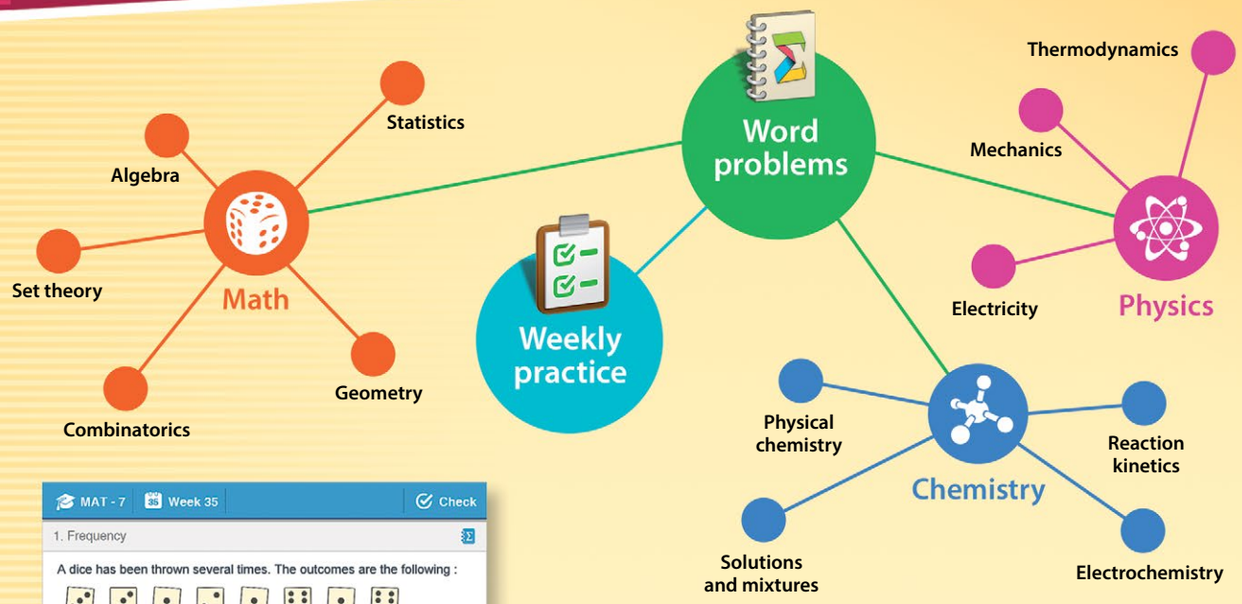
## *Graph Challenge*

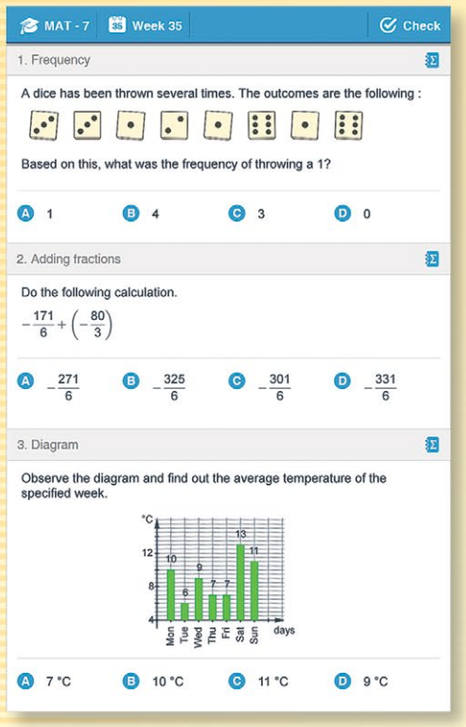
*Understand graphs through a game-like app that follows movement and compares it to a designated curve.*

# Weekly practice tool

**artificial intelligence in education**

*Weekly practice is a complex tool that generates exercises based on the time allocation of topics covered by the curriculum of any given country. It affords teachers and students the opportunity to work and practise with customised tests that allow for individual problem-solving, with the option to monitor results on a weekly basis.*




*The Weekly practice tool offers practice opportunities for every week throughout the academic year as well as during summer vacation.*

*The user can select the subject, their grade, and the relevant week of the school year.*

*Based on the curriculum, the software **generates a custom, individualised** test to be solved and checked by the student. Results of the completed tests can be tracked retroactively with the help of the software.*

*If the student gets stuck while solving an exercise, the **Word problems** tool can be of assistance, **guiding the student** through the solution of each specific exercise **step by step.***

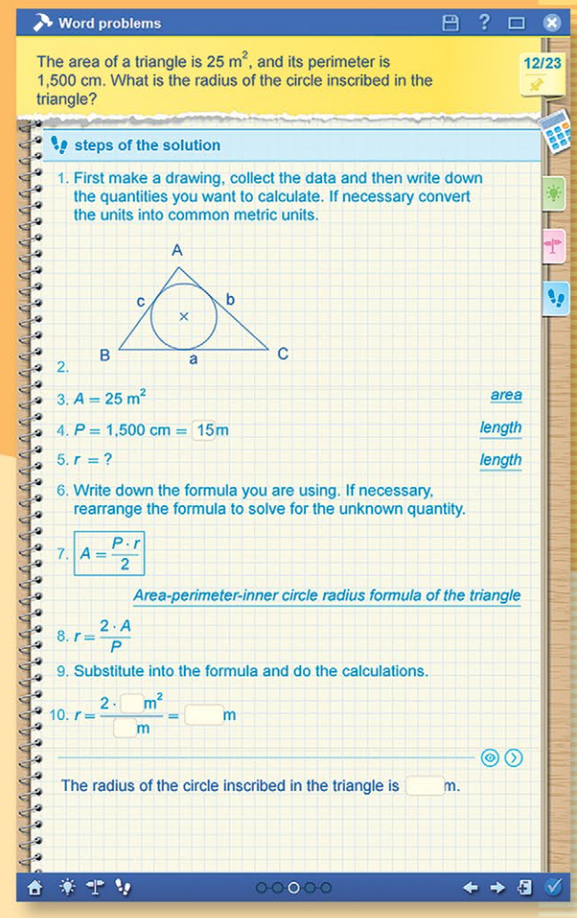
## Word problems

*The tool is familiar with the rules of given field of natural science and can apply these when generating and solving exercises. This enables the software to generate any number of custom exercises and reveal solutions step by step.*

## Word problems features:

- *includes topical categorisation of the various exercise types pertaining to natural science*
- *able to generate exercises in any given topic and language (localisation possible upon separate custom agreement)*
- *guides user through the solution of any generated exercise step by step*
- *allows teachers to custom-create tests for students*

*Processing the units of the syllabus temporally is adapted to each country's curriculum. Import local curricula for various areas and subjects to enable the software to generate an appropriately timed test, in accordance with the relevant week's topic of discussion.*




## Benefits of the Weekly practice tool:

- *ensures systematic practice*
- *generates personalised tests*
- *offers users help with the solution of exercises*
- *aids the monitoring of results*
- *tailors topics and timing to curriculum of specific country*

# Network of Knowledge

**all relevant content just one click away**

*All educational materials tie into a shared network, creating a conceptually unified system based on the individual content items. The Content graph can be adapted to any given country's curriculum, allowing the software to offer more relevant, subject-specific material.*


- *interactive digital textbooks with relevant content*
- *spectacular digital lessons to engage students*
- *interactive 3D scenes with VR component*
- *age-adjusted, subject-related educational tools*
- *informative educational videos*
- *interactive 3D smartbooks to supplement in-class learning*

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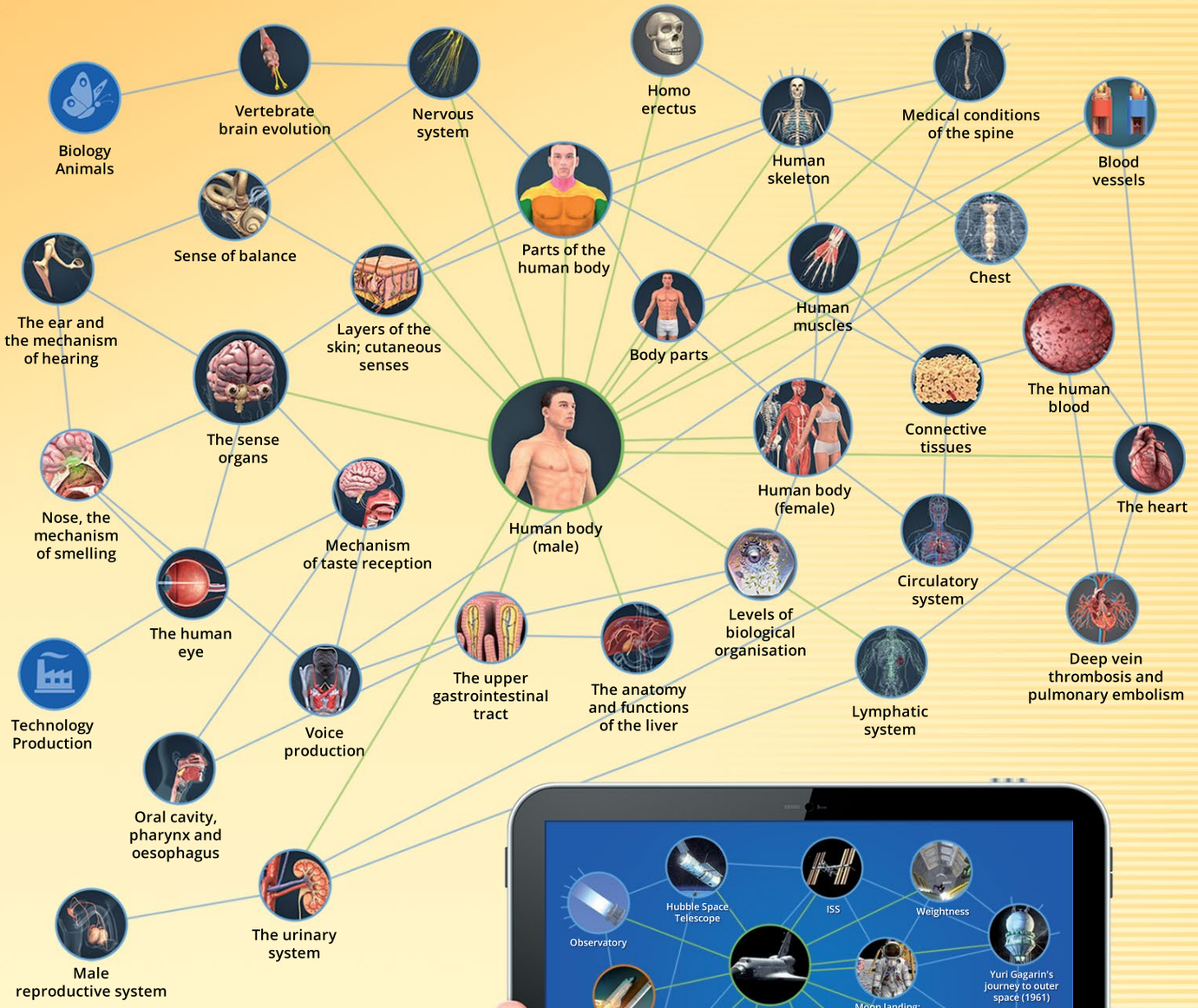
*The **Content graph** allows users to jump from one content item to the next, supporting movement between related topics as well. Depending on the individual's interests, forming personalised learning paths is also possible.*

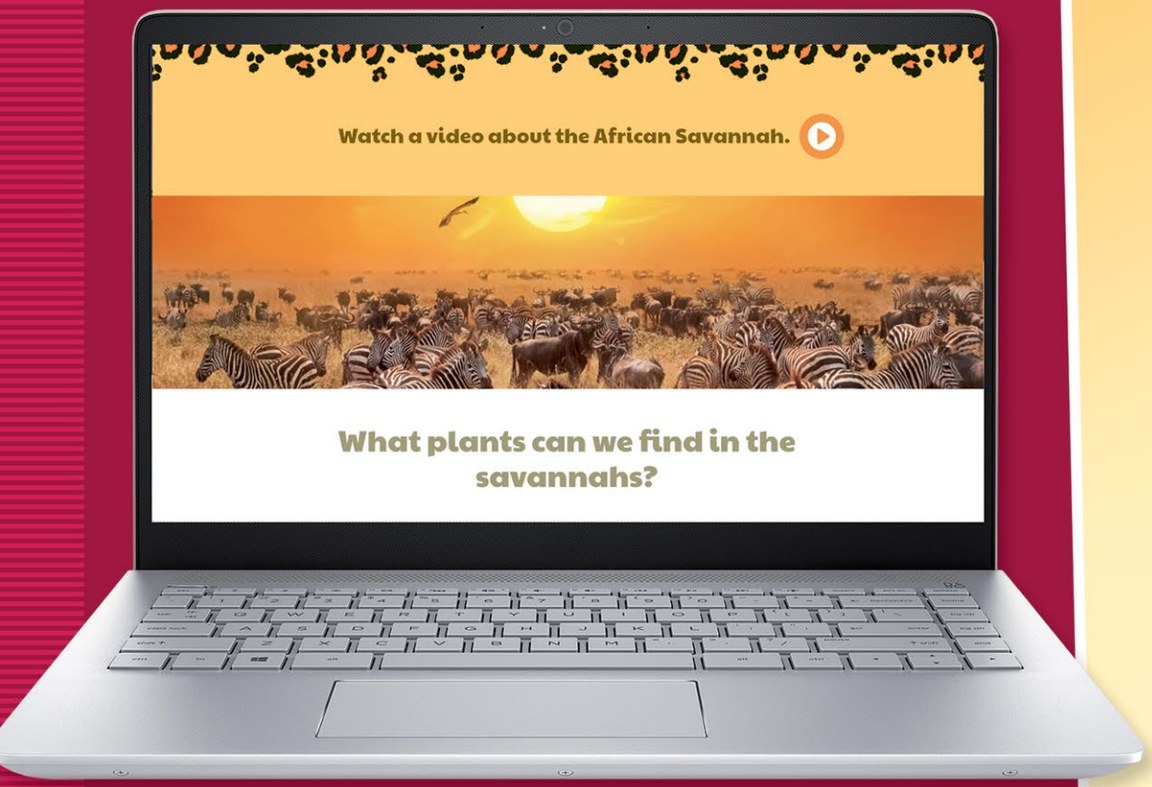



*The connectivity structure of the graph is adaptable to the requirements of given country.*

# Digital lessons

**cooperative, project-based materials**

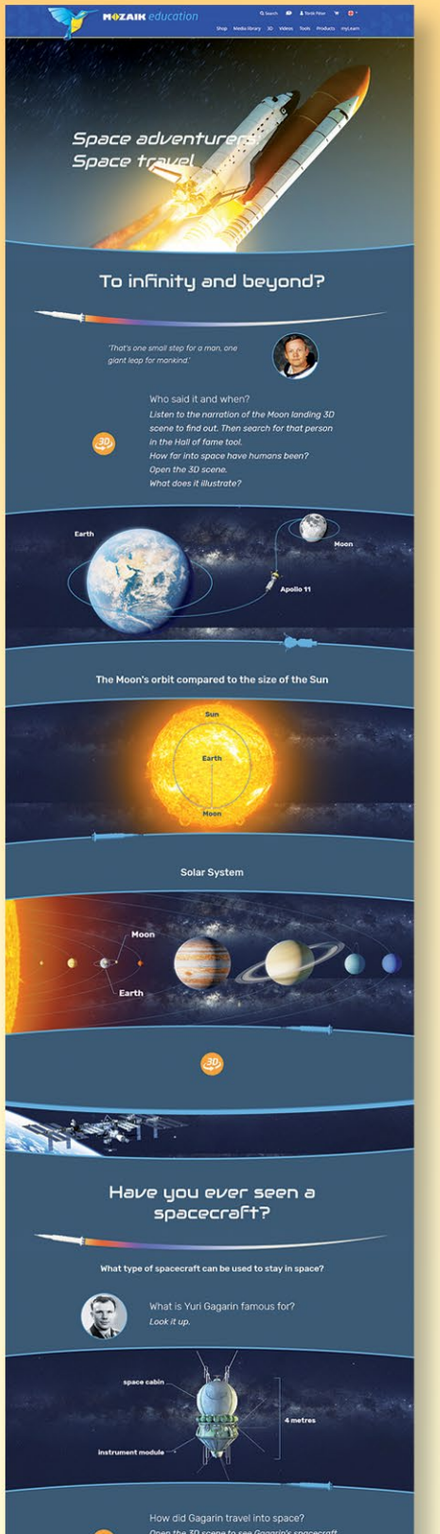
*The missing link between printed textbooks and digital education. Up-to-date material that helps make the transition to digital classes.*




*Processing learning objects founded on students' active participation, experience-based knowledge acquisition, and cooperative skills. After presenting novel problems, students are encouraged to search for solutions in groups.*

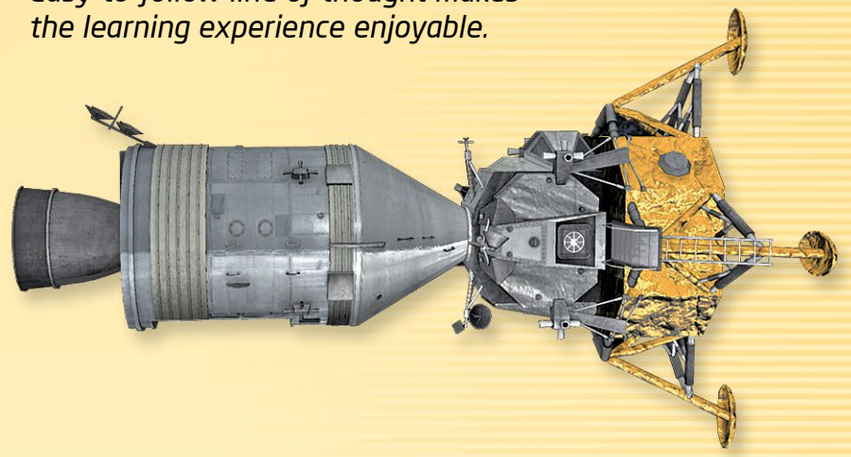
*The materials build on the teacher's role as facilitator and improve student cooperation along with social and digital competence. Therefore, skill sets that prove essential for future generations in the world of artificial intelligence are brought to the forefront.*

*Digital lessons can be used either as individual or cumulative lessons in class or study groups (i.e. out-of-class activities). Interactive content items such as 3D scenes, educational videos, as well as tests for practice and revision included in the lessons help process the subject matter more efficiently.*

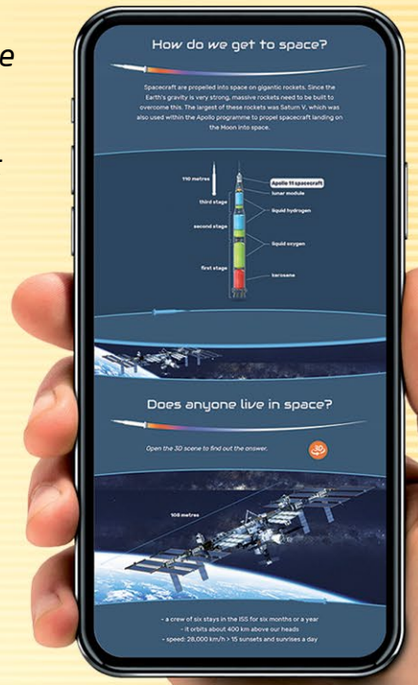



## Features

- *Learning objects built on cooperative work and project-based learning.*
- *Interdisciplinary content connecting various subjects' body of knowledge (e.g. Science, Mathematics, History)*
- *Easy-to-follow line of thought makes the learning experience enjoyable.*



*The spectacular content can be used on interactive displays, tablets, and smartphones, improving both teacher and student digital competence.*

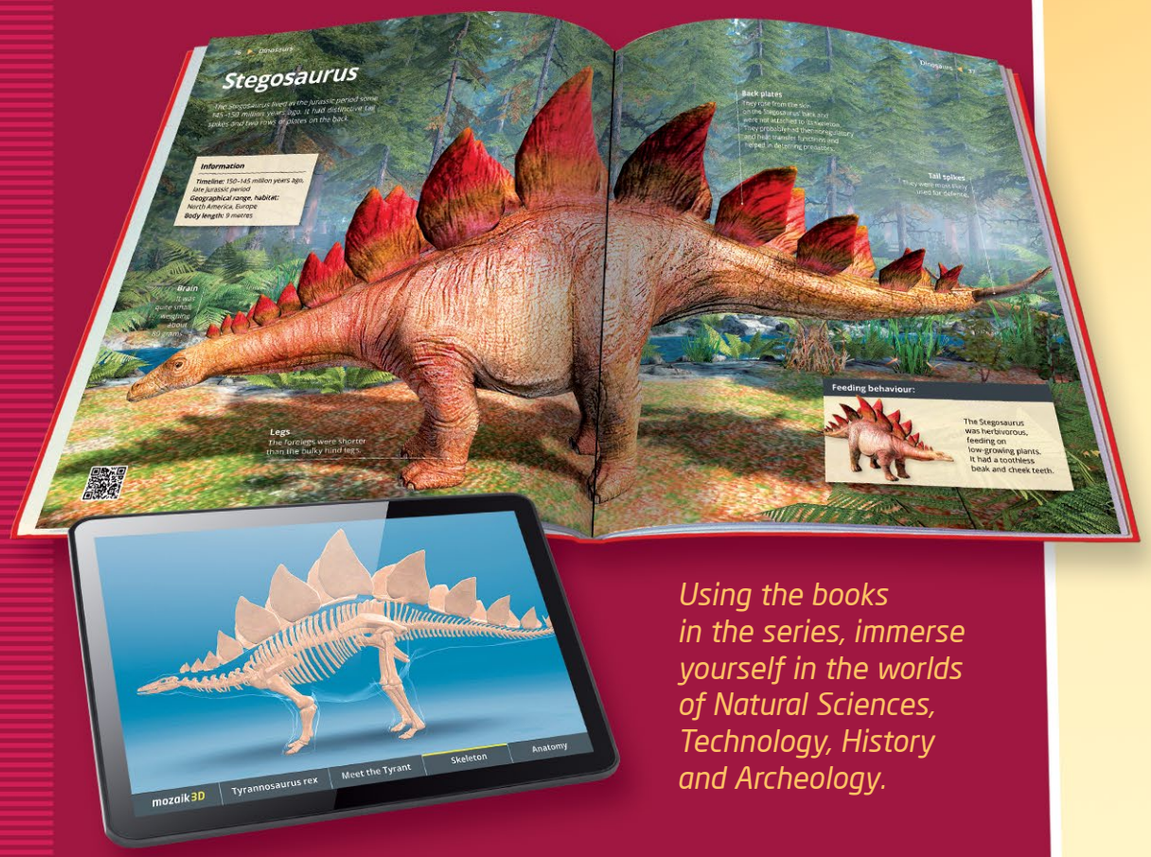



*Teachers can access lesson plans that help process the curriculum in the most efficient way possible. These also provide ideas as to the allocation of time, realisation of pedagogical aims, and execution of lessons.*

# 3D smartBooks

**interactive 3D smartbooks**

***The series consists of 20 books***
*based on the 3D scenes available on mozaWeb. The publications combine the spectacular images from animations with well-formulated and easily understandable texts, are available in several languages, and cover various school subjects.*




*Using the books in the series, immerse yourself in the worlds of Natural Sciences, Technology, History and Archeology.*

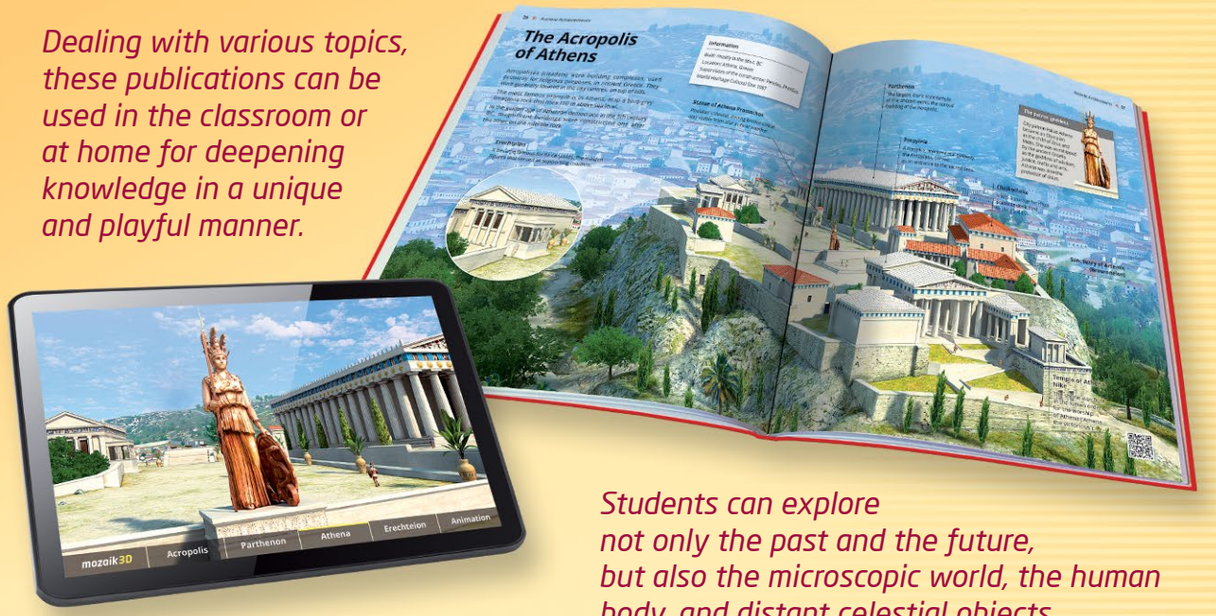
*By **scanning the QR codes** found on the pages, students are **just a click away from accessing the 3D scenes,** which provide an interactive approach to exploring the topics. Students can even **walk around** in this virtual world using a VR headset and experience first-hand what they are reading about in the books.*

MOZAIK

*The publications are unique as they **combine the benefits of both printed books and of virtual reality** so that readers may acquire state-of-the-art knowledge.*

CLICK N' LEARN

*Dealing with various topics, these publications can be used in the classroom or at home for deepening knowledge in a unique and playful manner.*




*Students can explore not only the past and the future, but also the microscopic world, the human body, and distant celestial objects.*

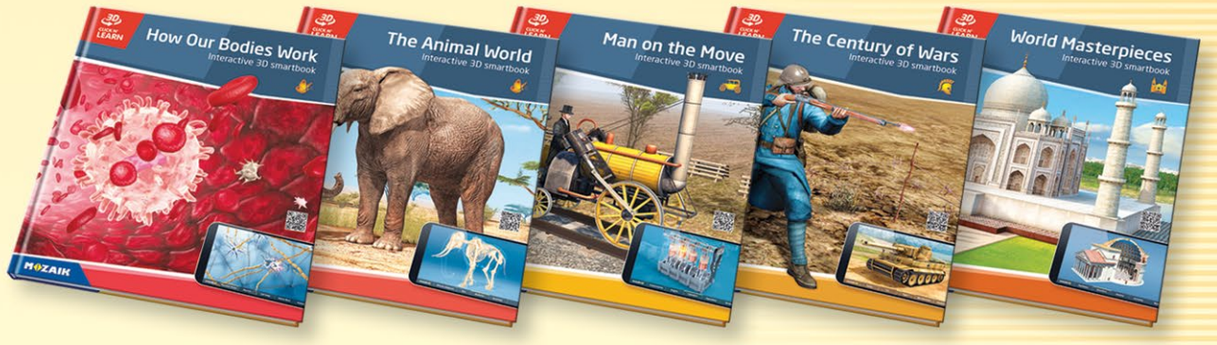
## *The series is recommended for:*

- *schools that want to add modern, high-quality books to their libraries or to offer them as gifts to students;*
- *teachers who want to motivate their pupils and need ideas regarding the use of digital tools in class;*
- *children who like to read and are also interested in digital animations;*
- *parents who not only want their children to spend their time usefully, but also to enjoy the spectacular resources and to learn while having fun.*

Download on the App Store

GET IT ON Google Play

*The 3D scenes can be opened with the mozaBook application, which is available free of charge.*



# mozaLog

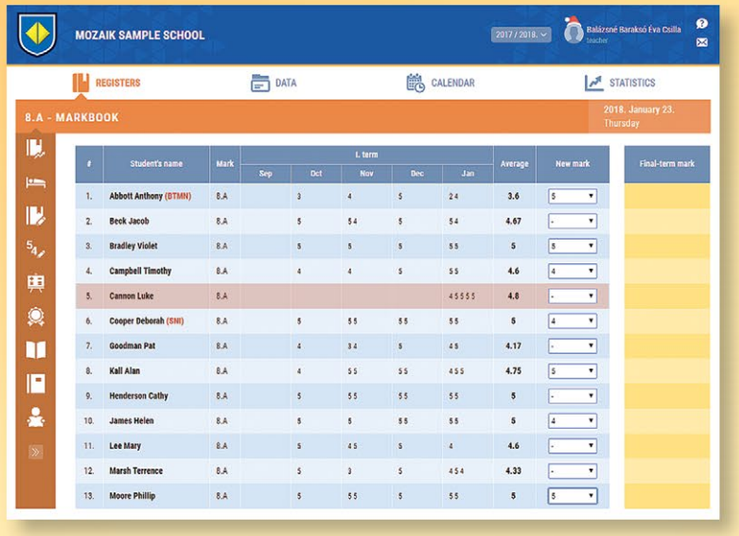
**digital school register**

*The mozaLog digital school register, developed by our company, is an educational information system that enables school staff to use a single interface for both administrative and organizational tasks. By using mozaLog, the laborious and cumbersome management of traditional paper-based class registers becomes redundant. mozaLog also helps to considerably reduce teachers' daily administrative workload.*






*Broadband servers ensure the operation of the digital school register 24 hours a day, thus mozaLog can be used by many thousands of people at a time over the Internet.*




## *Flexible and versatile*

*mozaLog has all the functions of traditional, paper-based school registers, e.g. it allows for entering marks, progress and absence data and managing student groups.*

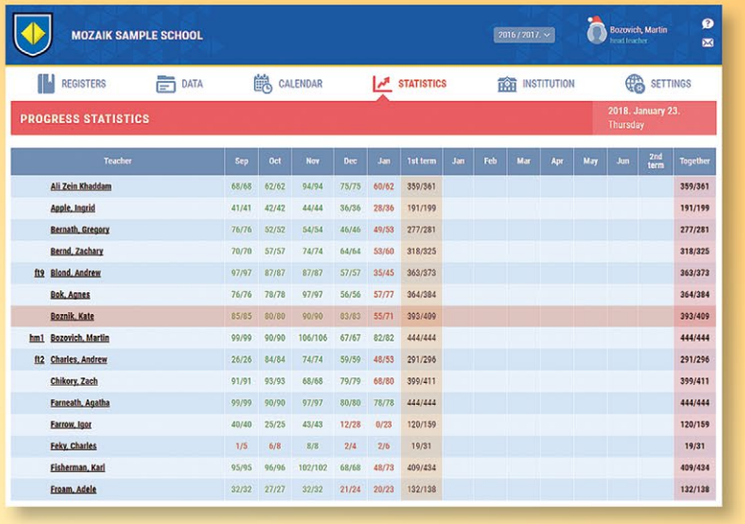
- *Besides absences, late arrival, exemptions and lack of equipment can also be recorded, and lists of students missing tests can be obtained.*
- *Different types of marks with different weights (e.g. final marks) can be entered.*


## *Simple administration*

*The program handles changes in the standard class time and the school year calendar and manages school events (ceremonies, school trips, form teacher classes).*

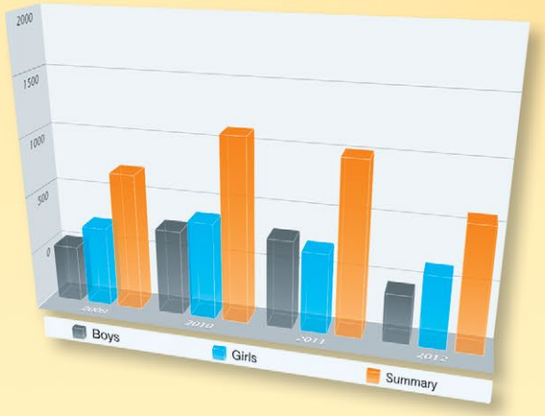
## Academic statistics

*Progress books make it possible to follow the academic activities of teachers and classes, thus teachers become more motivated to fill in the progress book regularly.*




| Teacher | Sep | Oct | Nov | Dec | Jan | 1st term | Jun | Feb | Mar | Apr | May | Jun | 2nd term | Together |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ali Zein Khaddam | 68/68 | 62/62 | 94/94 | 75/75 | 60/62 | 359/361 | | | | | | | | 359/361 |
| Apple, Ingrid | 41/41 | 42/42 | 44/44 | 36/36 | 28/36 | 191/199 | | | | | | | | 191/199 |
| Bernath, Gregory | 76/76 | 52/52 | 54/54 | 46/46 | 49/53 | 277/281 | | | | | | | | 277/281 |
| Bernd, Zachary | 70/70 | 57/57 | 74/74 | 64/64 | 53/60 | 318/325 | | | | | | | | 318/325 |
| ft9 Blond, Andrew | 97/97 | 87/87 | 87/87 | 57/57 | 35/45 | 363/373 | | | | | | | | 363/373 |
| Bok, Agnes | 76/76 | 78/78 | 97/97 | 56/56 | 57/77 | 364/384 | | | | | | | | 364/384 |
| Boznik, Kate | 85/85 | 80/80 | 90/90 | 83/83 | 55/71 | 393/409 | | | | | | | | 393/409 |
| hm1 Bozovich, Martin | 99/99 | 90/90 | 106/106 | 67/67 | 82/82 | 444/444 | | | | | | | | 444/444 |
| ft2 Charles, Andrew | 26/26 | 84/84 | 74/74 | 59/59 | 48/53 | 291/296 | | | | | | | | 291/296 |
| Chikory, Zach | 91/91 | 93/93 | 68/68 | 79/79 | 68/80 | 399/411 | | | | | | | | 399/411 |
| Farneath, Agatha | 99/99 | 90/90 | 97/97 | 80/80 | 78/78 | 444/444 | | | | | | | | 444/444 |
| Farrow, Igor | 40/40 | 25/25 | 43/43 | 12/28 | 0/23 | 120/159 | | | | | | | | 120/159 |
| Feky, Charles | 1/5 | 6/8 | 8/8 | 2/4 | 2/6 | 19/31 | | | | | | | | 19/31 |
| Fisherman, Karl | 95/95 | 96/96 | 102/102 | 68/68 | 48/73 | 409/434 | | | | | | | | 409/434 |
| Froam, Adele | 32/32 | 27/27 | 32/32 | 21/24 | 20/23 | 132/138 | | | | | | | | 132/138 |

- *Student data does not have to be typed in individually, it can be imported from spreadsheets.*
- *With mozalog, school managers can create comprehensive analyses and illustrate these with diagrams.*





## Communication with Parents

*Parents can follow their children's academic performance, absences from classes or the evaluation of their behaviour.*

*If they require, parents can receive e-mail updates regarding new entries related to their children.*
*Teachers can send reminders about approaching school events, trips or even exams, so that students and parents may be well informed.*

MOZAIK

## Digital school register on your school's website

*Our mozaPortal service is a website service with a functional website structure, especially designed and tested to suit the school environment. Its menu is freely variable and thus it can be customised to the school's individual needs.*


- *Our digital school register can be ordered together with the mozaPortal school website service.*
- *In this case mozaLog is incorporated into the school website and is accessible from the menu.*

# ClassWork

**classroom management**

*mozaBook allows teachers to start a virtual classroom and invite students to join it. Students can connect to the classwork using their tablets. For this, the teacher's computer and the tablets must be connected to the same Wi-Fi network. It is not necessary to be connected to the Internet.*


*Teachers can also share pages of a textbook directly to students' devices. In addition, teachers can send assignments, worksheets, videos or images to students. Teachers can also keep track of worksheet completion and check students' results on their computer.*

MOZAIK

*Teachers can always see who is connected and who isn't, as well as get screenshots any time, to make sure everyone is on track.*

*Personalised exercises, individual and group work and targeted use of IT devices.*


## *Teachers can ...*

- *send images and exercise books to students' devices*
- *set individual or group exercises*
- *organise and monitor the work of the groups*
- *keep track of worksheet completion*
- *see answers that have been sent and automatically checked*
- *view statistics on the results*


*Students complete the exercises they have received either individually or in groups and send the answers to the teacher.*

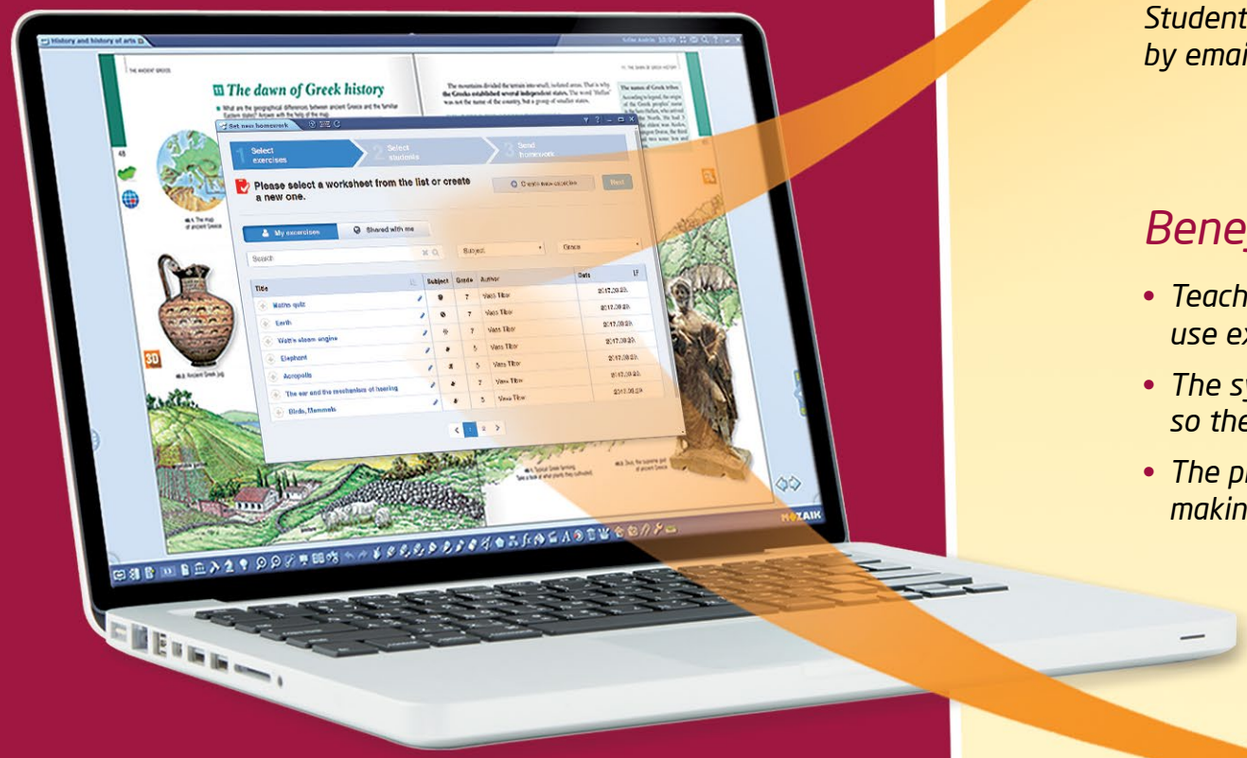
*The program automatically checks the answers and generates statistics on the results, so teachers can easily evaluate students' performance.*

# HomeWork

**online assignments**

*Teachers can set the exercises created with the Test editor as homework.*

*With mozaBook, teachers can manage homework assignments set for classes, groups or individual students.*



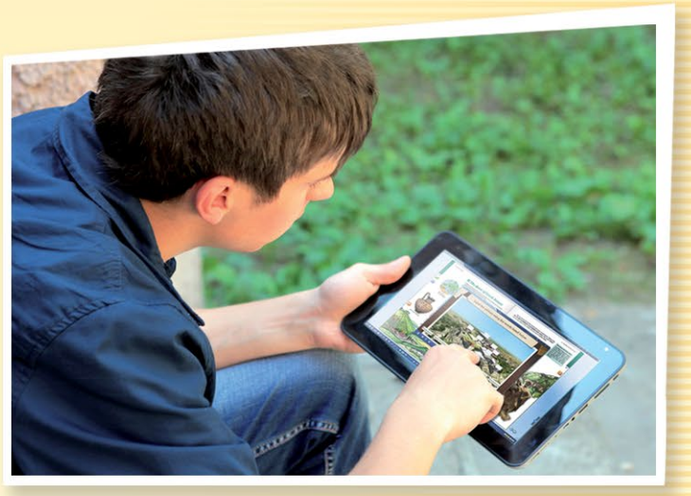

*Teachers can manage groups on the mozaWeb platform and see all information on the homework assignments that have been set and completed. These functions are also directly available on the Homework panel in mozaBook.*

*Students will be notified of the homework assignment, the topic and the deadline by email. They can open the homework assignment and solve the exercises online.*

## *Benefits:*

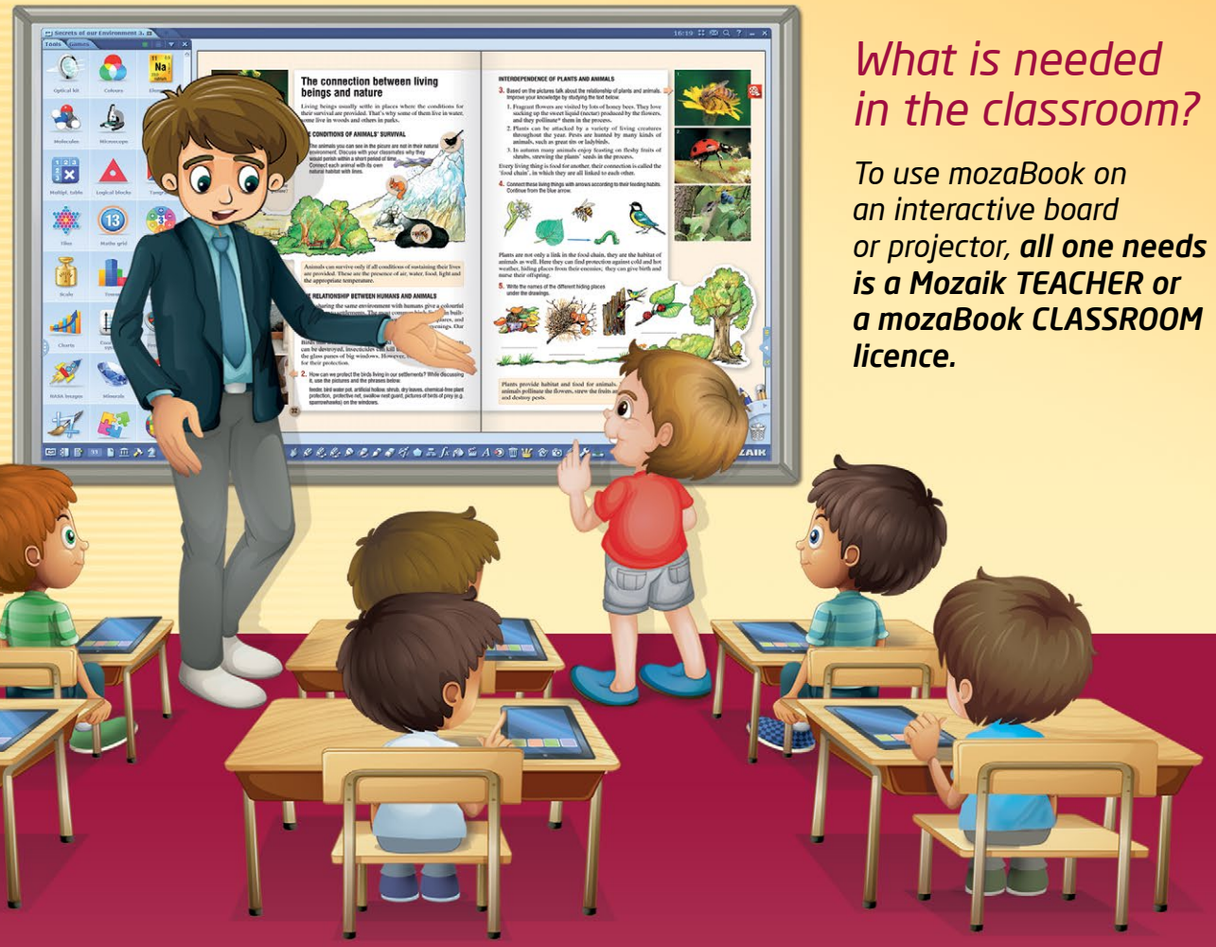
- *Teachers can easily create exercises with the Test editor for which they can also use extra interactive content of the Media library.*
- *The system records homework assignments that have been set and submitted, so they can be easily evaluated and managed.*
- *The program automatically checks the answers and creates statistics on the results, making it easy to evaluate and compare students' performance.*

*The assignments can be completed online with any Internet browser.*



# In the Classroom

***Teachers can create dynamic presentations for any school subject on the interactive board*** *and use amazing interactive tools, 3Ds, videos and other content. They can create exercises and assignments for students to complete in class or at home.*




## What is needed in the classroom?

*To use mozaBook on an interactive board or projector,* ***all one needs is a Mozaik TEACHER or a mozaBook CLASSROOM licence.***

### What do students need for their tablets?

*Students need a* ***Mozaik STUDENT subscription*** *in order to be able to connect to the classwork started by their teacher and receive images, interactive apps, texts and worksheets and complete the assignments set to them.*

MOZAIK

*If students have a Mozaik STUDENT subscription, they can also install the mozaBook Windows software to their computers, download the mozaBook Android, iOS app to their smartphones and tablets and they can use the mozaWeb educational portal. With their user account, they can access every Mozaik content on a suitable device.*

iOS app on App Store

Android app on Google play

*Apps for Android and iOS are also available on the App Store and Google Play.*

### Mozaik TEACHER licence

***User-based licence*** *that allows* ***a teacher*** *to use both* ***mozaBook*** *and* ***mozaWeb on multiple devices.***

### mozaBook CLASSROOM licence

***Device-based licence*** *that allows* ***multiple teachers*** *to use* ***mozaBook on the same device.***

*Both licences grant teachers access to the entire media library, plus they can create interactive exercise books (presentations) or share teaching materials through the cloud with fellow teachers or their students.*

*If students use PCs or tablets in class, teachers can use the* ***classroom management feature*** *to send exercises, videos, images, or other learning materials to students' devices.*

*For more information, please visit* ***www.mozaweb.com***

# At Home

*With mozaBook, teachers can plan and create lessons comfortably from home. Students can use the mozaWeb platform for learning at home. They can complete their homework assignments or take the initiative to learn more by themselves* ***on any computer with Internet access and a browser.***

### *How can teachers use mozaBook at home?*

*Teachers can enrich their digital books with interactive content, create presentations, use the educational tools in mozaBook to simulate experiments and create custom tool states and lab settings that complement the lesson topic. The* ***Mozaik TEACHER licence*** *allows users to access every Mozaik content on any suitable device even outside the classroom.*

*For more information, please visit* ***www.mozaweb.com***



*For teachers' convenience, all content created in mozaBook can be uploaded to the cloud, so that teachers can use any PC running mozaBook in order to access their content. There's no need to carry around the same laptop all day! The Mozaik TEACHER licence offers all the same features on a PC that are available on the interactive board in class.*

## *How can students solve homework and learn independently at home?*

*With a* ***Mozaik STUDENT licence*** *students can* ***log in to mozaweb.com from any desktop browser*** *to access and work on homework assignments or view exercise books sent by teachers.*

**mozaik STUDENT licence**

***User-based licence*** *that allows* ***a student*** *to use both* ***mozaBook*** *and* ***mozaWeb on multiple devices.***

*Students can also use their free time to explore the media library to review the topics taught in class or learn more about their favorite topics.*

*Students can watch educational videos, practice using games, set up their own virtual labs or learn something new using Mozaik's 3D scenes.*

*If students use their tablet at home they can log in with the same mozaWeb account on Windows, iOS or Android tablets.*

*Any digital textbooks purchased can be accessed from all platforms.*

# mozaMap

**digital maps for interactive boards**

*The mozaMap software offers atlases to expand the range of tools available to geography and history teachers. The elements of the different maps are easy to change and tailor, making preparation for class simpler and faster.*


*By using the zoom tool and turning selected map elements on and off, unique map views can be created and saved.*


## Exercises

*You can add industrial, mining, agricultural, and many other cartographic symbols from the integrated gallery to custom maps.*
*Map elements can be inserted manually, but the software is also capable of generating exercises and automatically checking students' solutions.*

## Custom maps and presentations

*Custom maps based on the maps included in mozaMap are simple to create. Text, images, built-in pictograms and symbols can be added to maps. These new maps can be saved for later use.*



## Preset and saved views

*Preset views are helpful when presenting certain historical events. The views, which have been created based on the learning material, only show the characteristics of a given era or historical event.*

# mozAR augmented reality

## augmented reality in textbooks

*The mozAR mobile application makes the images in printed books come alive, expanding reality with the help of a mobile device. The content on the pages in the books comes alive when scanning it with the device's camera.*

*3D scenes, animations, narrations, music or videos appear depending on the type of interactive content most suited to the given topic.*

MOZAIK

## *The pictures in our textbooks come alive*

*With 3D scenes, you can virtually explore historical buildings and learn about works of art in an unparalleled way. Take a glimpse into the structure of molecules, the secrets of the environment, or learn about how devices work and play preset videos accompanied by narrations related to the subject.*

*The models can be rotated freely, enlarged, viewed from different angles (sections for example).*

*The models are accompanied by explanatory labels, available in several languages.*

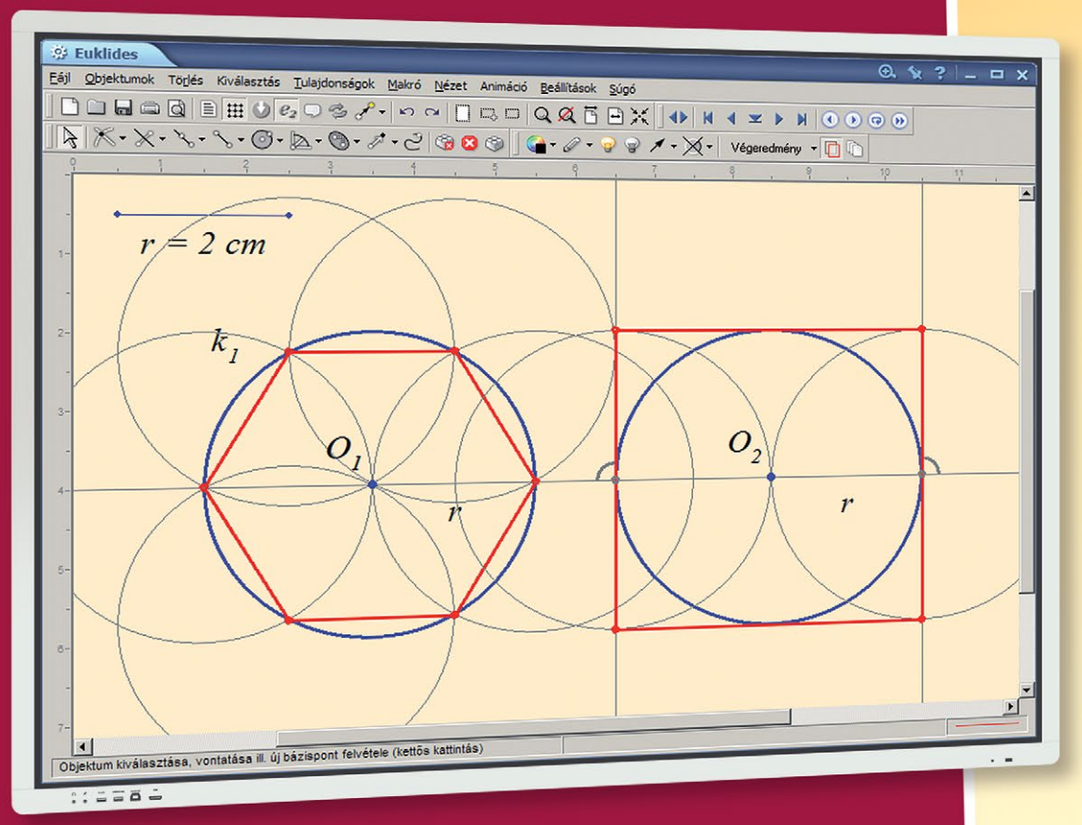
*Numerous animations include preset videos with narrations available in several languages.*


- *With the playful and spectacular solutions provided by the mozAR application, smartphones and tablets can prove very useful in teaching and learning.*
- *A Mozaik textbook, an Android or iOS mobile device with a camera, and the mozAR application is all that you need.*

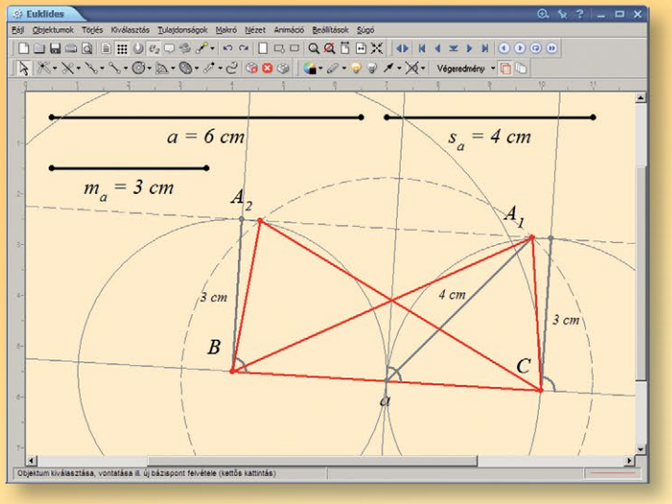
# euklides

**plane geometry construction software**

*A variety of geometry exercises can be solved easily, precisely and quickly with the help of the Euklides geometric construction software.*
*The software is designed to make it easy to keep track of construction steps and to observe the interdependence of objects and how they are built upon each other.*




*The elements of the figures are mobile, which allows for the analysis of geometric relations with different starting conditions.*

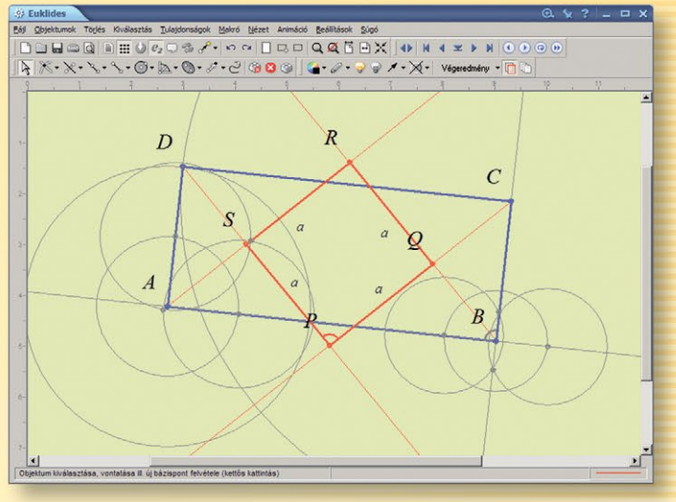


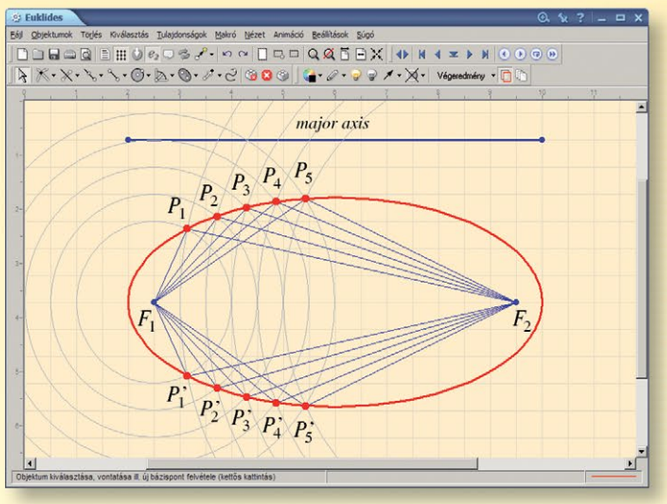

## Clear construction

*Any of the constructed objects can be turned on and off, or marked with different colours and line styles. Guidelines which are not important with regard to the solution can be hidden with a click.*

## Basic or complex

*The program is based on the six basic Euclidian construction steps. The exercises can be solved by a series of these actions. In addition to the basic steps, several commonly used complex actions are at hand (eg. perpendicular bisector, constructing tangents from the basic objects).*



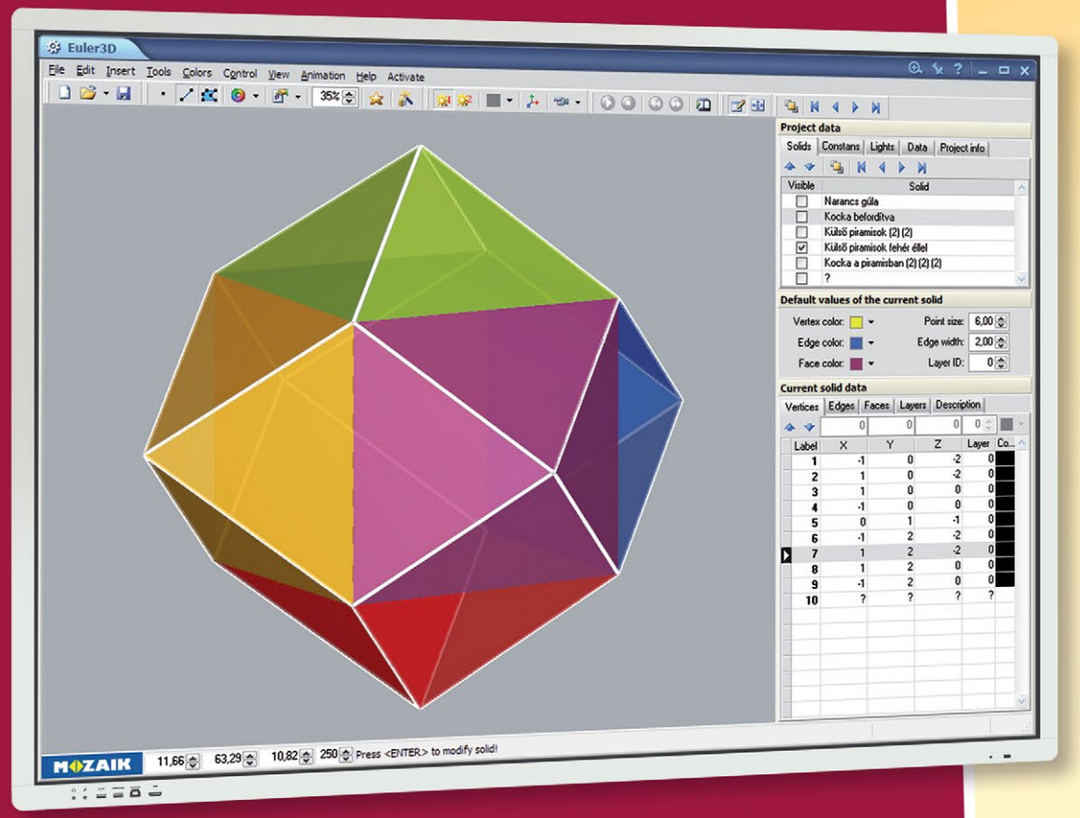

## Animated traces

*The software can illustrate how the constant change of a single parameter affects the result. For example, we can display the line of intersection of two circles while we constantly change the length of the circle's radius. The same happens when displaying the curve of an ellipse.*

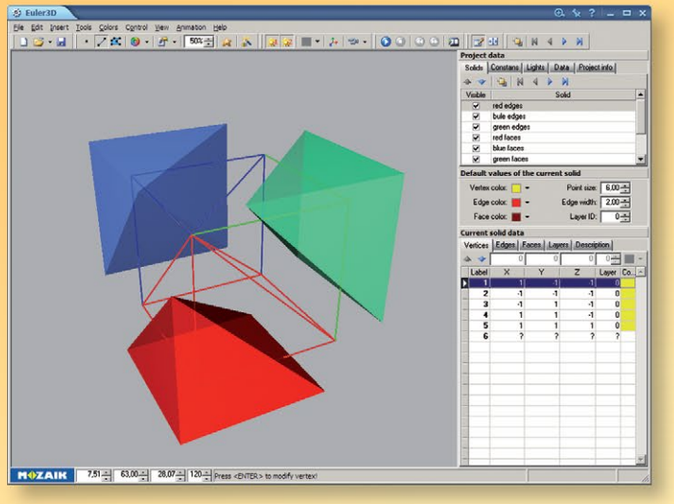
# euler3D

**spatial geometry construction software**

*In addition to displaying spatial figures and surfaces, the euler3D spatial geometric construction software enables editing these objects with a high degree of mathematical control. (Filtering out self-intersection, inspection of planes, dissecting concave polygons into triangles.)*




*The software is compatible with other mathematical programs (Maple, Mathematica). The completed figures can be exported in several formats – a few file types even allow for the reading of data.*

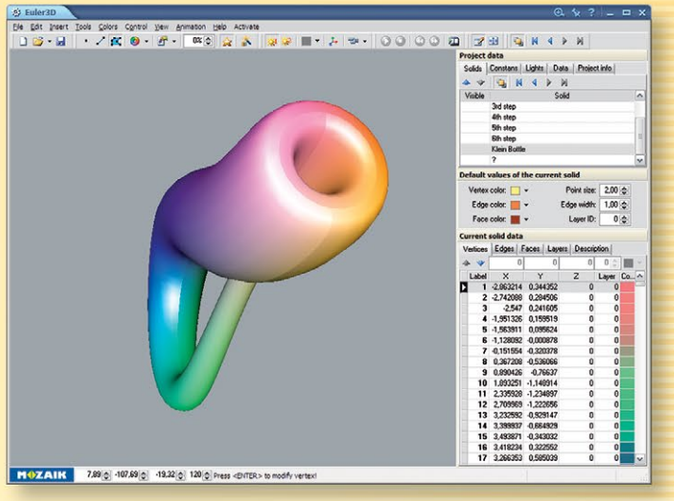


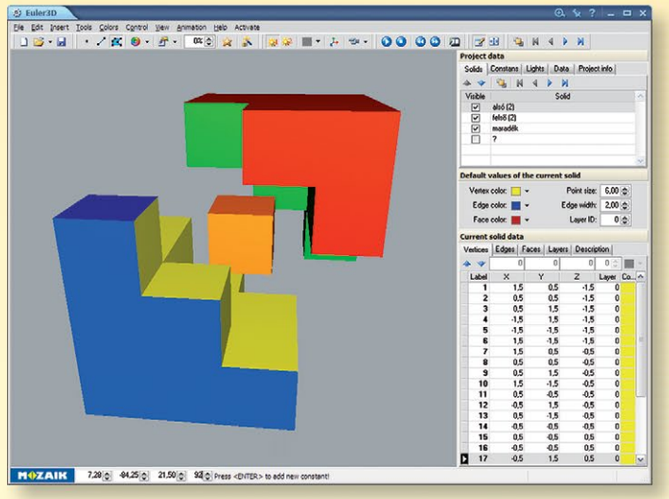

## Spatial coordinate system

*The figures are defined by their vertices, edges and sides. In addition to using the numeric coordinate values, the user can use constants, previously imported into the project.*

## Personalization

*To help in the overview of an object, different transparent layers can be assigned to the vertices, edges and sides of the object. These layers can be turned on and off. The program uses perspective and axonometric projection to display the objects. Two light sources are available for a realistic appearance.*




## Applications

*The program allows for the representation of solids of rotation, such as cones or spheres. The animations make it possible to demonstrate complex spatial connections clearly.*

# mozaLand

**online educational game**

*With the help of the mozaLand online educational game, the knowledge acquired in the fields of mathematics, languages and sciences can be improved as a citizen of a virtual knowledge-based world.*


*It builts on the elements of the most popular strategy games.*

MOZAIK


## User friendly

*All the functions can be accessed through a simple user interface or by navigating on a map. Our priority was to create a user friendly interface allowing children to start playing the game as soon as possible. Even lower grade students find the program easy to use.*

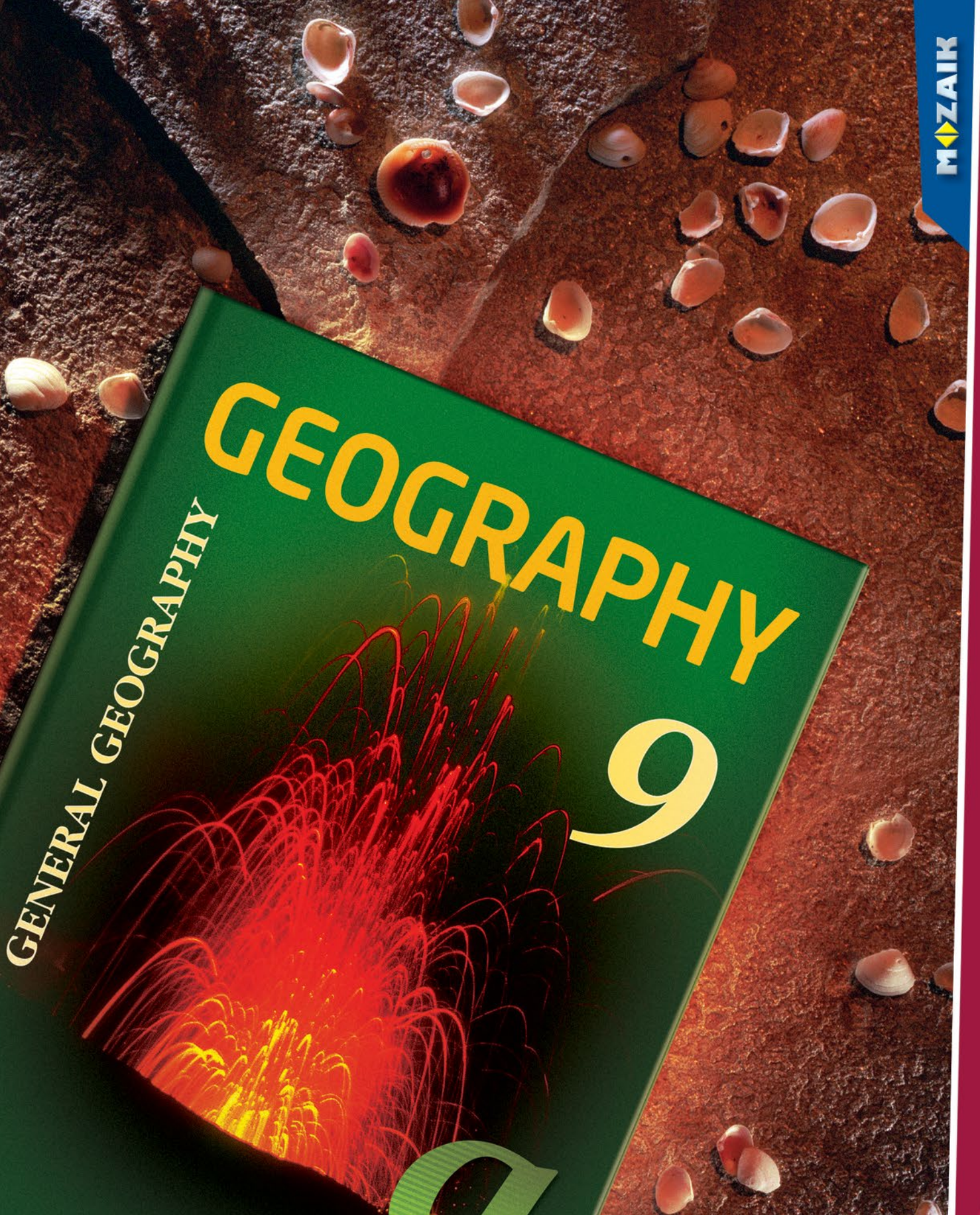
## Not just a competition

*In additon to traditional educational competitions, here, competition amongst regions, schools and classes is also important. Students are not only responsible for themselves, but they are  also fighting for a broader community. They can shape the future of this little knowledge-based community.*



## Motivation

*Wouldn't it be great if learning was a game? To direct the energy released during play towardsn learning! The mozaLand online educational game combines the joy of playing with the fruitful effort of learning, thus enticing players to achieve more.*



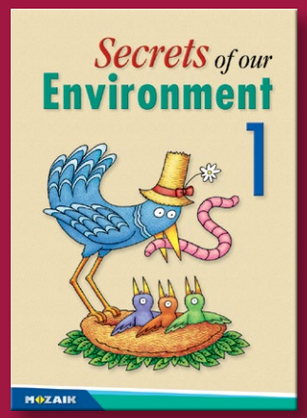

MOZAIK

# *Printed solutions*

- *textbooks, workbooks*
- *geography and history atlases*
- *collection of exercises*
- *test booklets*

# Secrets of Nature

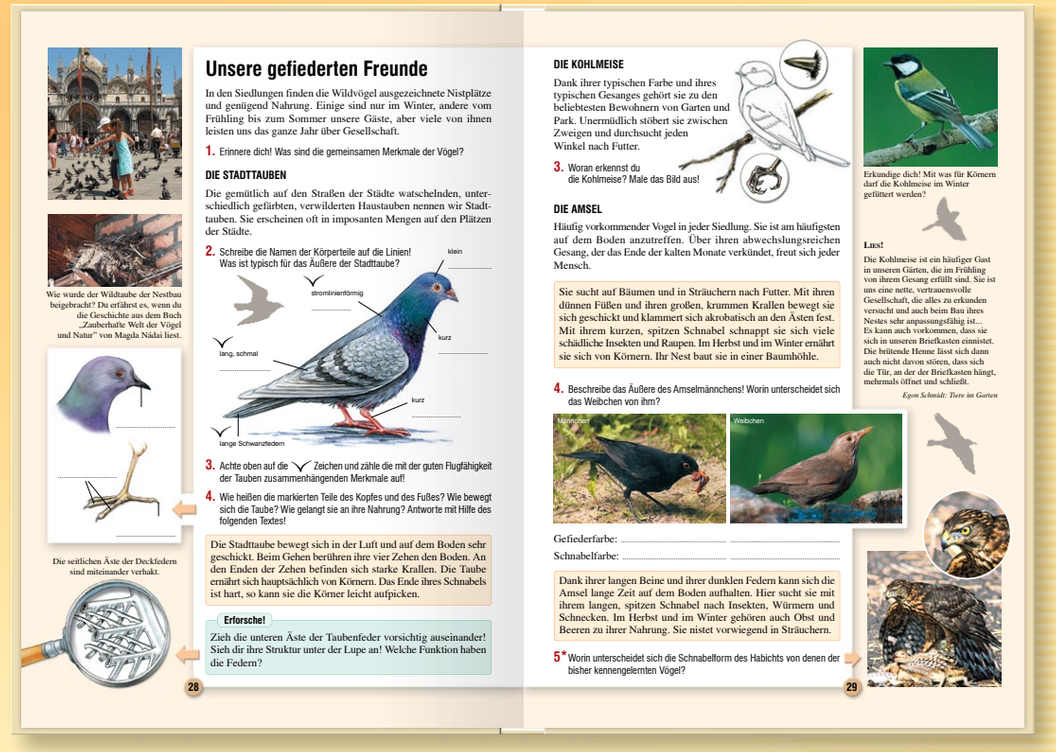
*The series 'Secrets of our Environment' is a precursor to the popular 'Science for Teenagers' series. It forms the bases of science education in upper grades. The foundation of scientific knowledge is built on reliable modern methods.*





*Best European Schoolbook Awards 2009*

*These books develop problem-solving skills. With the help of the exercises included in these books, students become environmentally aware and open to the world and their mates.*



## Unsere gefiederten Freunde

In den Siedlungen finden die Wildvögel ausgezeichnete Nistplätze und genügend Nahrung. Einige sind nur im Winter, andere vom Frühling bis zum Sommer unsere Gäste, aber viele von ihnen leisten uns das ganze Jahr über Gesellschaft.

1. Erinnere dich! Was sind die gemeinsamen Merkmale der Vögel?

**DIE STADTTAUBEN**

Die gemütlich auf den Straßen der Städte watschelnden, unterschiedlich gefärbten, verwilderten Haustauben nennen wir Stadttauben. Sie erscheinen oft in imposanten Mengen auf den Plätzen der Städte.

2. Schreibe die Namen der Körperteile auf die Linien! Was ist typisch für das Äußere der Stadttaube?

klein
stromlinienförmig
kurz
lang, schmal
kurz
lange Schwanzfedern

3. Achte oben auf die Zeichen und zähle die mit der guten Flugfähigkeit der Tauben zusammenhängenden Merkmale auf!

4. Wie heißen die markierten Teile des Kopfes und des Fußes? Wie bewegt sich die Taube? Wie gelangt sie an ihre Nahrung? Antworte mit Hilfe des folgenden Textes!

Die Stadttaube bewegt sich in der Luft und auf dem Boden sehr geschickt. Beim Gehen berühren ihre vier Zehen den Boden. An den Enden der Zehen befinden sich starke Krallen. Die Taube ernährt sich hauptsächlich von Körnern. Das Ende ihres Schnabels ist hart, so kann sie die Körner leicht aufpicken.

**Erforsche!**

Zieh die unteren Äste der Taubenfeder vorsichtig auseinander! Sieh dir ihre Struktur unter der Lupe an! Welche Funktion haben die Federn?

Wie wurde der Wildtaube der Nestbau beigebracht? Du erfährst es, wenn du die Geschichte aus dem Buch „Zauberhafte Welt der Vögel und Natur" von Magda Nádai liest.

Die seitlichen Äste der Deckfedern sind miteinander verhakt.

28

**DIE KOHLMEISE**

Dank ihrer typischen Farbe und ihres typischen Gesanges gehört sie zu den beliebtesten Bewohnern von Garten und Park. Unermüdlich stöbert sie zwischen Zweigen und durchsucht jeden Winkel nach Futter.

3. Woran erkennst du die Kohlmeise? Male das Bild aus!

**DIE AMSEL**

Häufig vorkommender Vogel in jeder Siedlung. Sie ist am häufigsten auf dem Boden anzutreffen. Über ihren abwechslungsreichen Gesang, der das Ende der kalten Monate verkündet, freut sich jeder Mensch.

Sie sucht auf Bäumen und in Sträuchern nach Futter. Mit ihren dünnen Füßen und ihren großen, krummen Krallen bewegt sie sich geschickt und klammert sich akrobatisch an den Ästen fest. Mit ihrem kurzen, spitzen Schnabel schnappt sie sich viele schädliche Insekten und Raupen. Im Herbst und im Winter ernährt sie sich von Körnern. Ihr Nest baut sie in einer Baumhöhle.

4. Beschreibe das Äußere des Amselmännchens! Worin unterscheidet sich das Weibchen von ihm?

Männchen
Weibchen

Gefiederfarbe: .....

Schnabelfarbe: .....

Dank ihrer langen Beine und ihrer dunklen Federn kann sich die Amsel lange Zeit auf dem Boden aufhalten. Hier sucht sie mit ihrem langen, spitzen Schnabel nach Insekten, Würmern und Schnecken. Im Herbst und im Winter gehören auch Obst und Beeren zu ihrer Nahrung. Sie nistet vorwiegend in Sträuchern.

5* Worin unterscheidet sich die Schnabelform des Habichts von denen der bisher kennengelernten Vögel?

Erkundige dich! Mit was für Körnern darf die Kohlmeise im Winter gefüttert werden?

**Lies!**

Die Kohlmeise ist ein häufiger Gast in unseren Gärten, die im Frühling von ihrem Gesang erfüllt sind. Sie ist uns eine nette, vertrauensvolle Gesellschaft, die alles zu erkunden versucht und auch beim Bau ihres Nestes sehr anpassungsfähig ist... Es kann auch vorkommen, dass sie sich in unseren Briefkasten einnistet. Die brütende Henne lässt sich dann auch nicht davon stören, dass sich die Tür, an der der Briefkasten hängt, mehrmals öffnet und schließt.

*Egon Schmidt: Tiere im Garten*

29

*One of the main aims of the books is to help students develop good study habits. To achieve this goal, age-appropriate colours, highlights and icons are consistently used in the books.*

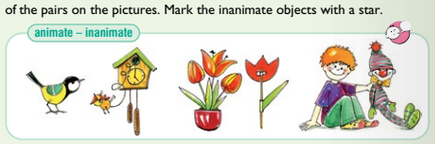
## *Living and inanimate environment*

1. The school premises, residential houses and objects were created by people. List the objects shown on the picture. Count the number of plants, animals and objects on the picture. Colour as many circles as the number of objects you´ve found.

artificial environment

2. Tell what similarities and differences are there between the members of the pairs on the pictures. Mark the inanimate objects with a star.

animate – inanimate



**Let's play!**

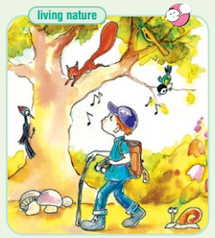
Collect pictures of various living things. Form teams. Group pictures according to criteria of your own choice. Also look for new grouping criteria. At the end of the game, one pupil from each team explains the grouping criteria.

26

3. You must have taken part in excursion in the forest before. What did you see there? List the things which sorround John in the forest.

4. Colour the inanimate things of nature: ■ – water, ■ – ground, ■ – air! Draw living things on John´s environment.

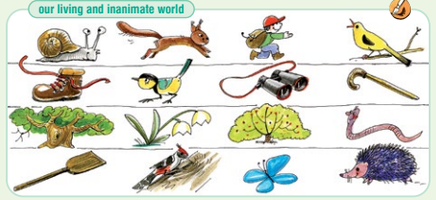
living nature



inanimate nature

5. Cross the odd one out in each group. Give reasons for your choice.

our living and inanimate world



**Useful to memorize!**

The environment around us can be natural or artificial. The natural environment is made up of living and inanimate things. Living things exhibit phenomena associated with life, which inanimate objects don´t show.

➤ If possible, bring half of an eggshell to the next class.

27

## 菌类世界

在森林里，蘑菇通常生长在下层草质茎的植物旁，它们有各种不同的形状、大小和颜色。

**菌类的生长**

如果不去森林中漫步，大多数情况下你是看不到蘑菇的。当蘑菇孢子遇到适宜的媒介时会生成网状菌丝，当菌丝体的细丝紧密排列时就会形成蘑菇，并向上生长形成子实体。蘑菇的食用部分包括菌盖和菌柄，合称子实体。菌褶处生有孢子，孢子随风飘散，在适宜的环境条件下，能长出新的蘑菇。

蘑菇喜欢生长在阴暗潮湿的地方。与植物不同，它们是不能为自己制造营养物质的异养生物，蘑菇需要从周围的环境中吸取营养物质，既不是动物，也不是植物，而是一种独立存在的生物种类。

**菌类食物**

真菌的种类有很多，有以消耗植物为生的菌类，也有一些寄生在动物身上的菌类。菌类可以分解大量的物质，它们帮助清理生物世界里残留的“垃圾”，形成简单的物质，从而提高土壤的肥力。

很多蘑菇的味道鲜美，营养丰富，是人类和动物都非常喜欢的食物。我们可以在大自然中收集许多蘑菇。因为我们常常会将毒蘑菇同食用蘑菇混淆，所以采集蘑菇时我们需要有成年人的陪同。我们也可以将收集到的蘑菇请食品专家进行鉴定，看是否可以食用。

1. 请在下面的方框中用数字序号将蘑菇的生命周期标注出来。

[1] 孢子 [4] 在地面上长出蘑菇的子实体 [2] 菌丝形成
[5] 孢子 [3] 菌丝吸取营养成分

2. 请在开花植物的组成部分下面画红线，在菌类的组成部分下面画蓝线。

根部 叶 菌丝 果实 种子 孢子 茎 菌柄 花 菌盖

3. 请在下面的横线上写出缺失的生物种类的名称，然后将图中的数字填写到相应的方框中。

植物 9 3、5、7 | 蘑菇 2、6 | 动物 8 1、4

4. 请在下图中按照正确的流程标注箭头，说一说菌类对周围环境的作用。

生长中的植物 → 有生命的动物
土壤中的矿物质 → 腐诞的植物 → 动物残骸
蘑菇和土壤中细菌的营养物质

5. 请说一说食用野蘑菇和毒蘑菇有哪些不同，通过仔细观察课本第12页和第13页的图片组，说一说下面的句子为什么存在争议。

在一本好书的帮助下，我们可以确定哪些蘑菇是可食用的。

**如果你记住了，那就太好了**

**菌类的生长条件**：热量、水分、调谢的植物或动物残骸。
**组成部分**：菌丝、菌柄和菌盖。
**繁殖**：通过孢子繁殖。
**作用**：能分解枯枝败叶和动物残骸，是人类和动物的重要食物。

**请制作孢子的印迹**

请一个菌盖放在一张白纸上，然后在它上面盖上一个大小合适的容器，1～2天后将容器移开，请用放大镜观察留在白纸上的孢子。如果你想保留孢子的印迹，那么请在印迹上喷上喷发剂并吹干。

**你听说过吗**

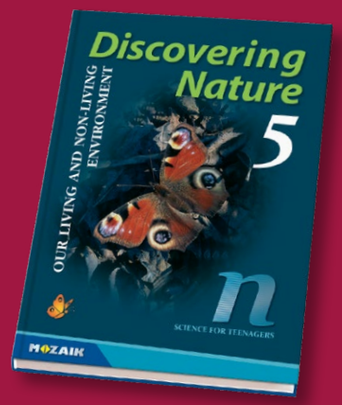
细菌是肉眼看不见的微生物，有些细菌会引起疾病，而有些细菌与蘑菇相似，可以分解生物的组成部分。

环纹蕈　鹅膏菌　橙盖鹅膏菌　灿烂蘑

12　13

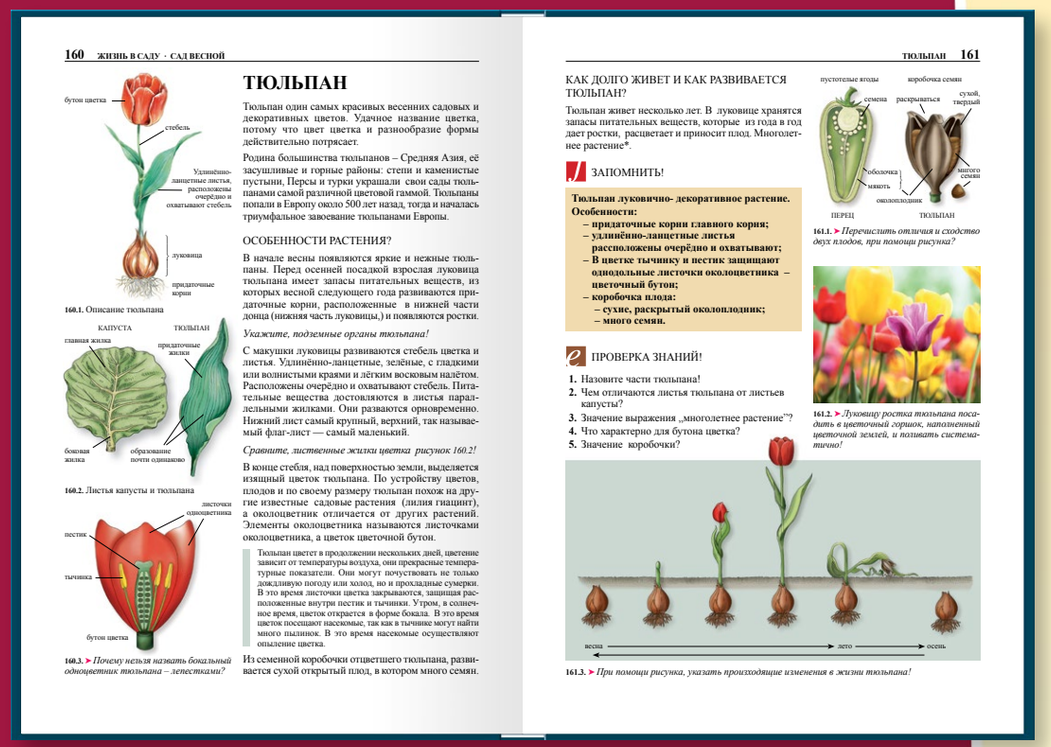
# Discovering Nature

*The clear and logical structure of the learning material makes teaching natural science simple. The learning process is based on observation and experience. The books first introduce simple concepts, then more complex ones, broadening students' knowledge at the right pace to maintain their interest.*




- *The books arouse students' natural curiosity and satisfy their thirst for knowledge.*
- *They help students form habits leading to the protection of their health and the environment.*
- *They inspire students to learn and use different methods for acquiring information.*

*The drawings, text, charts, diagrams and images, as well as the interesting facts included in the books help students to acquire knowledge effectively and easily.*



160 ЖИЗНЬ В САДУ · САД ВЕСНОЙ

## ТЮЛЬПАН

Тюльпан один самых красивых весенних садовых и декоративных цветов. Удачное название цветка, потому что цвет цветка и разнообразие формы действительно потрясает.

Родина большинства тюльпанов – Средняя Азия, её засушливые и горные районы: степи и каменистые пустыни, Персы и турки украшали свои сады тюльпанами самой различной цветовой гаммой. Тюльпаны попали в Европу около 500 лет назад, тогда и началась триумфальное завоевание тюльпанами Европы.

ОСОБЕННОСТИ РАСТЕНИЯ?

В начале весны появляются яркие и нежные тюльпаны. Перед осенней посадкой взрослая луковица тюльпана имеет запасы питательных веществ, из которых весной следующего года развиваются придаточные корни, расположенные в нижней части донца (нижняя часть луковицы,) и появляются ростки.

*Укажите, подземные органы тюльпана!*

С макушки луковицы развиваются стебель цветка и листья. Удлинённо-ланцетные, зелёные, с гладкими или волнистыми краями и лёгким восковым налётом. Расположены очерёдно и охватывают стебель. Питательные вещества достоловяются в листья параллельными жилками. Они разваются орновременно. Нижний лист самый крупный, верхний, так называемый флаг-лист — самый маленький.

*Сравните, лиственные жилки цветка рисунок 160.2!*

В конце стебля, над поверхностью земли, выделяется изящный цветок тюльпана. По устройству цветов, плодов и по своему размеру тюльпан похож на другие известные садовые растения (лилия гиацинт), а околоцветник отличается от других растений. Элементы околоцветника называются листочками околоцветника, а цветок цветочной бутон.

Тюльпан цветет в продолжении нескольких дней, цветение зависит от температуры воздуха, они прекрасные температурные показатели. Они могут почуствовать не только довдливую погоду или холод, но и прохладные сумерки. В это время листочки цветка закрываются, защищая расположенные внутри пестик и тычинки. Утром, в солнечное время, цветок открается в форме бокала. В это время цветок посещают насекомые, так как в тычинке могут найти много пылинок. В это время насекомые осуществляют опыление цветка.

Из семенной коробочки отцветшего тюльпана, развивается сухой открытый плод, в котором много семян.

160.1. Описание тюльпана

160.2. Листья капусты и тюльпана

160.3. ➤ *Почему нельзя назвать бокальный одноцветник тюльпана – лепестками?*

ТЮЛЬПАН 161

КАК ДОЛГО ЖИВЕТ И КАК РАЗВИВАЕТСЯ ТЮЛЬПАН?

Тюльпан живет несколько лет. В луковице хранятся запасы питательных веществ, которые из года в год дает ростки, расцветает и приносит плод. Многолетнее растение*.

ЗАПОМНИТЬ!

**Тюльпан луковично- декоративное растение.**
**Особенности:**
- **придаточные корни главного корня;**
- **удлинённо-ланцетные листья расположены очерёдно и охватывают;**
- **В цветке тычинку и пестик защищают однодольные листочки околоцветника – цветочный бутон;**
- **коробочка плода:**
  - **сухие, раскрытый околоплодник;**
  - **много семян.**

ПРОВЕРКА ЗНАНИЙ!

1. Назовите части тюльпана!
2. Чем отличаются листья тюльпана от листьев капусты?
3. Значение выражения „многолетнее растение"?
4. Что характерно для бутона цветка?
5. Значение коробочки?

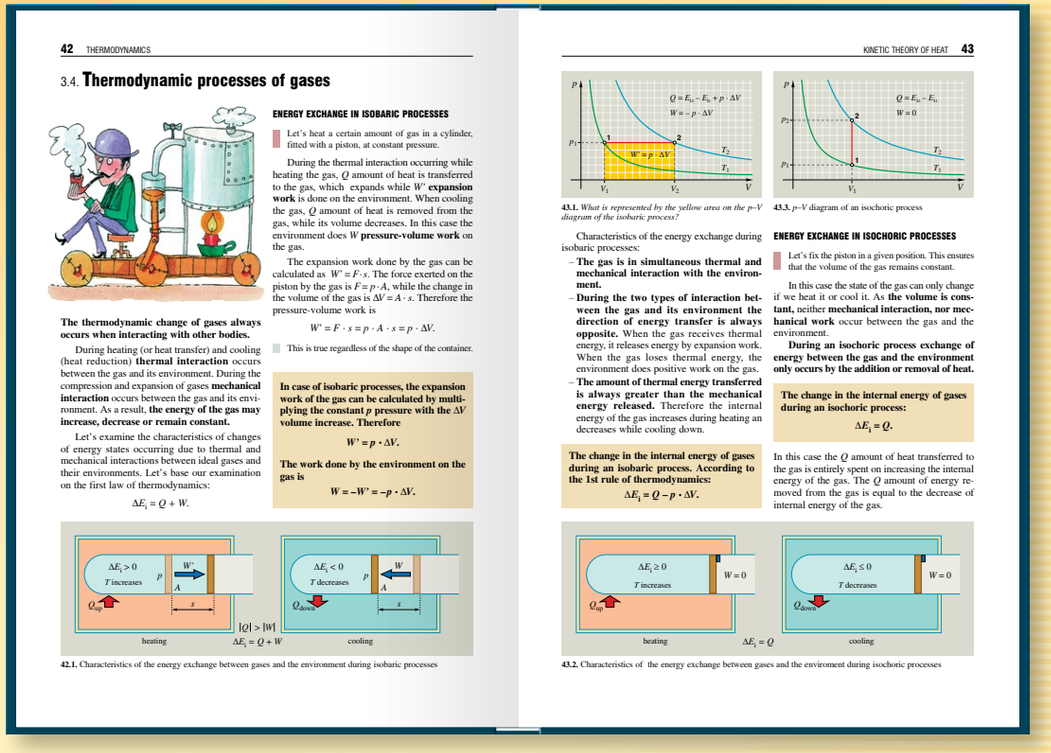
161.1. ➤ *Перечислить отличия и сходство двух плодов, при помощи рисунка?*

161.2. ➤ *Луковицу ростка тюльпана посадить в цветочный горшок, напалненный цветочной землей, и поливать систематично!*

161.3. ➤ *При помощи рисунка, указать происходящие изменения в жизни тюльпана!*

# Physics

*The textbooks contain a broad range of word problems, illustrations and activities. The learning material is organised in a clear thematic structure with built-in progression.*



42 THERMODYNAMICS

3.4. **Thermodynamic processes of gases**

**ENERGY EXCHANGE IN ISOBARIC PROCESSES**

Let's heat a certain amount of gas in a cylinder, fitted with a piston, at constant pressure.

During the thermal interaction occurring while heating the gas, $Q$ amount of heat is transferred to the gas, which expands while $W'$ **expansion work** is done on the environment. When cooling the gas, $Q$ amount of heat is removed from the gas, while its volume decreases. In this case the environment does $W$ **pressure-volume work** on the gas.

The expansion work done by the gas can be calculated as $W' = F \cdot s$. The force exerted on the piston by the gas is $F = p \cdot A$, while the change in the volume of the gas is $\Delta V = A \cdot s$. Therefore the pressure-volume work is

$$W' = F \cdot s = p \cdot A \cdot s = p \cdot \Delta V.$$

This is true regardless of the shape of the container.

**In case of isobaric processes, the expansion work of the gas can be calculated by multiplying the constant $p$ pressure with the $\Delta V$ volume increase. Therefore**

$$W' = p \cdot \Delta V.$$

**The work done by the environment on the gas is**

$$W = -W' = -p \cdot \Delta V.$$

**The thermodynamic change of gases always occurs when interacting with other bodies.**

During heating (or heat transfer) and cooling (heat reduction) **thermal interaction** occurs between the gas and its environment. During the compression and expansion of gases **mechanical interaction** occurs between the gas and its environment. As a result, **the energy of the gas may increase, decrease or remain constant.**

Let's examine the characteristics of changes of energy states occurring due to thermal and mechanical interactions between ideal gases and their environments. Let's base our examination on the first law of thermodynamics:

$$\Delta E_i = Q + W.$$

heating — $\Delta E_i = Q + W$ — cooling

42.1. Characteristics of the energy exchange between gases and the environment during isobaric processes

KINETIC THEORY OF HEAT 43

43.1. *What is represented by the yellow area on the p–V diagram of the isobaric process?*

43.3. *p–V* diagram of an isochoric process

Characteristics of the energy exchange during isobaric processes:
- **The gas is in simultaneous thermal and mechanical interaction with the environment.**
- **During the two types of interaction between the gas and its environment the direction of energy transfer is always opposite.** When the gas receives thermal energy, it releases energy by expansion work. When the gas loses thermal energy, the environment does positive work on the gas.
- **The amount of thermal energy transferred is always greater than the mechanical energy released.** Therefore the internal energy of the gas increases during heating an decreases while cooling down.

**The change in the internal energy of gases during an isobaric process. According to the 1st rule of thermodynamics:**

$$\Delta E_i = Q - p \cdot \Delta V.$$

**ENERGY EXCHANGE IN ISOCHORIC PROCESSES**

Let's fix the piston in a given position. This ensures that the volume of the gas remains constant.

In this case the state of the gas can only change if we heat it or cool it. As **the volume is constant,** neither **mechanical interaction, nor mechanical work** occur between the gas and the environment.

**During an isochoric process exchange of energy between the gas and the environment only occurs by the addition or removal of heat.**

**The change in the internal energy of gases during an isochoric process:**

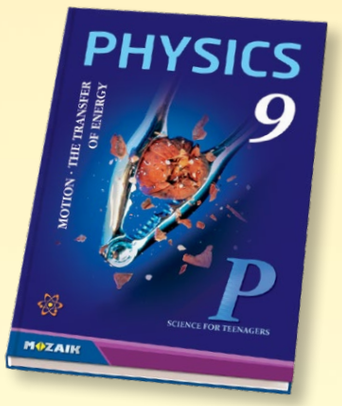
$$\Delta E_i = Q.$$

In this case the $Q$ amount of heat transferred to the gas is entirely spent on increasing the internal energy of the gas. The $Q$ amount of energy removed from the gas is equal to the decrease of internal energy of the gas.

heating — $\Delta E_i = Q$ — cooling

43.2. Characteristics of the energy exchange between gases and the enviroment during isochoric processes

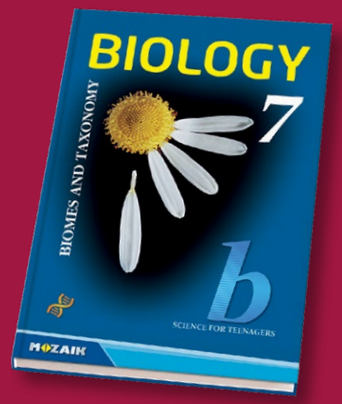
*The processing of the subject material always starts out from the specific practical everyday knowledge of students, this down-to-earth approach is more appealing to the students as concepts become easier to understand.*




- *The main goal of these books is to organise students' scientific knowledge and establish essential physical concepts.*
- *Test booklets help assess students' knowledge of the material, while the "Am I prepared?" workbook series offers extra help for practice at home.*
- *The textbooks support the development of a variety of skills by introducing and helping students practise the cognitive methods used in natural science.*

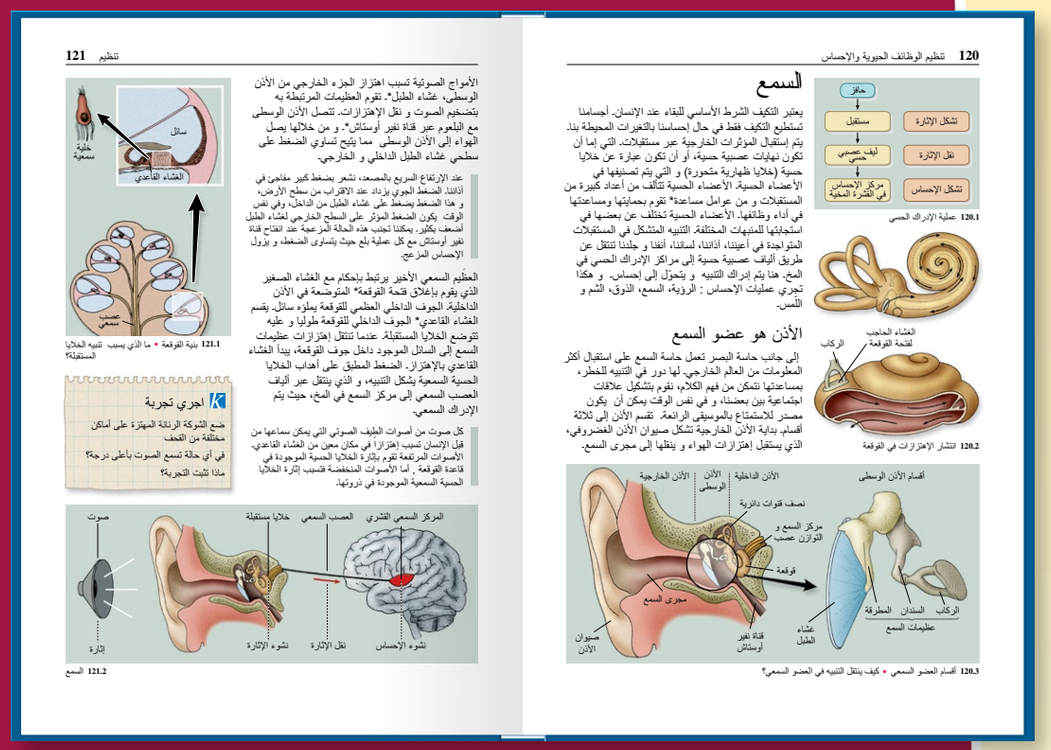
# Biology

*These textbooks introduce students to the basics of the rapidly developing science of biology. These books, which are one of the most beautiful series of the Science for Teenagers books, shed light on the ecological problems in our environment, helping students develop a commitment for the protection of Nature.*




- *Coloured outstanding illustations and images show the structure and functioning of cells, tissues and organs, as well as biological processes.*
- *Students learn about the structure of the human body and the daily personal hygiene.*

*The workbooks and test booklets form an integral part of the learning package. The exercises in the workbook and test booklets are built on the textbook, helping students with the subject material and teachers with student assessment.*



121 تنظيم




121.1 بنية القوقعة • ما الذي يسبب تنبيه الخلايا المستقبلة؟

**اجري تجربة**

ضع الشوكة الرنانة المهتزة على أماكن مختلفة من القحف

في أي حالة تسمع الصوت بأعلى درجة؟

ماذا تثبت التجربة؟

الأمواج الصوتية تسبب اهتزاز الجزء الخارجي من الأذن الوسطى، غشاء الطبل*. تقوم العظيمات المرتبطة به بتضخيم الصوت و نقل الإهتزازات. تتصل الأذن الوسطى مع البلعوم عبر قناة نفير أوستاش*. و من خلالها يصل الهواء إلى الأذن الوسطى مما يتيح تساوي الضغط على سطحي غشاء الطبل الداخلي و الخارجي.

عند الإرتفاع السريع بالمصعد، نشعر بضغط كبير مفاجئ في آذاننا. الضغط الجوي يزداد عند الاقتراب من سطح الأرض، و هذا الضغط يضغط على غشاء الطبل من الداخل، وفي نفس الوقت يكون الضغط المؤثر على السطح الخارجي لغشاء الطبل أضعف بكثير. يمكننا تجنب هذه الحالة المزعجة عند انفتاح قناة نفير أوستاش مع كل عملية بلع حيث يتساوى الضغط و يزول الإحساس المزعج.

العظيم السمعي الأخير يرتبط بإحكام مع الغشاء الصغير الذي يقوم بإغلاق فتحة القوقعة* المتوضعة في الأذن الداخلية. الجوف الداخلي العظمي للقوقعة يملؤه سائل. يقسم الغشاء القاعدي* الجوف الداخلي للقوقعة طوليا و عليه تتوضع الخلايا المستقبلة. عندما تنتقل إهتزازات عظيمات السمع إلى السائل الموجود داخل جوف القوقعة، يبدأ الغشاء القاعدي بالإهتزاز. الضغط المطبق على أهداب الخلايا الحسية السمعية يشكل التنبيه، و الذي ينتقل عبر ألياف العصب السمعي إلى مركز السمع في المخ، حيث يتم الإدراك السمعي.

كل صوت من أصوات الطيف الصوتي التي يمكن سماعها من قبل الإنسان تسبب إهتزازا في مكان معين من العشاء القاعدي. الأصوات المرتفعة تقوم بإثارة الخلايا الحسية الموجودة في قاعدة القوقعة , أما الأصوات المنخفضة فتسبب إثارة الخلايا الحسية السمعية الموجودة في ذروتها.




121.2 السمع

120 تنظيم الوظائف الحيوية والإحساس

## السمع

يعتبر التكيف الشرط الأساسي للبقاء عند الإنسان. أحيانا تستطيع التكيف فقط في حال إحساسنا بالتغيرات المحيطة بنا. يتم إستقبال المؤثرات الخارجية عبر مستقبلات. التي إما أن تكون نهايات عصبية حسية، أو أن تكون عبارة عن خلايا حسية (خلايا ظهارية متحورة) و التي يتم تصليفها في الأعضاء الحسية. الأعضاء الحسية تتألف من أعداد كبيرة من المستقبلات و من عوامل مساعدة* تقوم بحمايتها ومساعدتها في أداء وظائفها. الأعضاء الحسية تختلف عن بعضها في استجابتها للمنبهات المختلفة. التنبيه المتشكل في المستقبلات المتواجدة في أعيننا، آذاننا، لساننا، أنفنا و جلدنا تنتقل عن طريق ألياف عصبية حسية إلى مراكز الإدراك الحسي في المخ. هنا يتم إدراك التنبيه و يتحول إلى إحساس. و هكذا تجري عمليات الإحساس : الرؤية، السمع، الذوق، الشم و اللمس.




120.1 عملية الإدراك الحسي






120.2 انتشار الاهتزازات في القوقعة

### الأذن هو عضو السمع

إلى جانب حاسة البصر تعمل حاسة السمع على استقبال أكثر المعلومات من العالم الخارجي. لها دور في التنبيه للخطر، بمساعدتها نتمكن من فهم الكلام، نقوم بتشكيل علاقات اجتماعية بين بعضنا، و في نفس الوقت يمكن أن يكون مصدر للاستمتاع بالموسيقى الرائعة. تقسم الأذن إلى ثلاثة أقسام. بداية الأذن الخارجية تشكل صيوان الأذن الغضروفي، الذي يستقبل إهتزازات الهواء و ينقلها إلى مجرى السمع.




120.3 أقسام العضو السمعي • كيف ينتقل التنبيه في العضو السمعي؟

# Chemistry

*Could chemistry become one of students' favorite subjects? We think so. What we need is a clear and well-structured comprehensible curriculum and interesting examples that can make pupils see that chemistry is a very real part of everyday life, enabling them to discover and understand the exciting world that surrounds them.*

66 A NEMFÉMES ELEMEK ÉS VEGYÜLETEIK



66.1. A kén égésekor kén-dioxid keletkezik




66.2. Nagyobb mennyiségű kén-dioxidot (vegyifülke alatt) réz és kénsav kölcsönhatásával állíthatunk elő



66.3. A kén-dioxid-molekula kalott- és pálcikamodellje

*Milyen kötések találhatók a kén-dioxid-molekulában?*

## FONTOSABB KÉNVEGYÜLETEK

A kénatom 3. elektronhéján szabad helyek is találhatók, így molekulaképződéskor 4, illetve 6 kovalens kötés kialakítására is képes.

## A KÉN OXIDJAI ÉS A KÉNSAV

A KÉN-DIOXID

Helyezzünk késporral félig megtöltött égetőkanalat láng fölé! A kén néhány másodperc múlva megolvad, majd meggyullad. Tegyük az égő ként tartalmazó égetőkanalat gázfelfogó hengerbe, majd a hengert fedjük be!

*A kén* meggyújtva kékes lánggal *kén-dioxidá* ($SO_2$) *ég el*. **A kén-dioxid színtelen, szúrós szagú, a levegőnél nagyobb sűrűségű,** kőhögésre ingerlő, **mérgező gáz.**

$$S + O_2 = SO_2$$
*kén-dioxid*

Öntsünk a kén-dioxidot tartalmazó gázfelfogó hengerbe vizet! Rázzuk össze a henger tartalmát! Vizsgáljuk meg a keletkezett anyag kémhatását kék lakmuszpapírral!

**A kén-dioxid vízben jól oldódik.** A lakmuszpapír piros színe jelzi az oldat savas kémhatását, *kénessav* ($H_2SO_3$) keletkezik. A piros szín azonban hamarosan eltűnik.

A kén-dioxid és vizes oldata a szerves anyagokból oxigént képes elvonni, **redukáló hatású**.

Kísérletünkben a festékanyagot a kénessav színtelenné redukálta. A hordók kénezésekor a kén-dioxid baktériumölő tulajdonságát használják fel.

Kén-dioxid *előfordul* a vulkáni gázokban is. A fűtőanyagok többnyire tartalmaznak ként is, ezért elégetésükkor kén-dioxiddal szennyezik a levegőt. A levegőbe jutó kén-dioxid a csapadékban oldódik. A savas esők károsító hatását többek között ez is okozza.

A KÉN TRIOXID

A kén égésekor keletkező kén-dioxid kis része kén-trioxiddá ($SO_3$) oxidálódik. Magasabb hőmérsékleten

A KÉN OXIDJAI ÉS A KÉNSAV 67

a kén-dioxid katalizátor alkalmazásával kén-trioxiddá alakítható:

$$2\,SO_2 + O_2 = 2\,SO_3$$
*kén-trioxid*

A kén-dioxidban a kén négy elektronnal, 2–2 oxigénatommal alakít ki kettős kötést. A kén-trioxidban a kénatom hat elektronja három oxigénatommal hoz létre kettős kötéseket.

A kén-trioxidot vízzel reagáltatva kénsavat kapunk:

$$SO_3 + H_2O = H_2SO_4$$

A KÉNSAV

**A tömény kénsav ($H_2SO_4$) színtelen, olajszerű folyadék, sűrűsége majdnem kétszerese a vízének.**

Figyeljük meg a kénsav tulajdonságait! 200 $cm^3$-es főzőpoharat töltsünk meg félig desztillált vízzel! Helyezzünk el hőmérőt a főzőpoharba! Adjunk a poharban lévő vízhez kis részletekben, állandó kevergetés közben kb. 10 $cm^3$ tömény kénsavat (96–98 tömeg%-os)! Vizsgáljuk meg a híg kénsavoldat hőmérsékletét és kémhatását!

A kénsav hígítása erős felmelegedéssel jár. Ezért mindig **a kénsavat kell a vízbe önteni, lassan,** állandó kevergetés közben. A tömény kénsav **erősen nedvszívó** (higroszkópos), ezért egyes kémiai anyagok víztartalmának megkötésére is használják.

A kénsav vízben való oldódása során a kénsavmolekula protont ($H^+$) ad át a vízmolekulának. Oxóniumionok és szulfátionok keletkeznek. Az oxóniumionok megnövekedett mennyisége miatt az oldat savas kémhatású.

$$H_2SO_4 + 2\,H_2O \xrightarrow{2\,H^+} \underset{\text{szulfát-ion}}{SO_4^{2-}} + \underset{\text{oxónium-ionok}}{2\,H_3O^+}$$

Mártsunk gyújtópálcát tömény kénsavba! Érintsünk meg kénsavas üvegbottal vászondarabot, papírlapot! Öblítsünk át vízzel 100 $cm^3$-es főzőpoharat, majd tegyünk bele 2–3 cm vastagságban porcukrot! A cukrot néhány csepp vízzel nedvesítsük meg, majd öntsünk rá 8–10 $cm^3$ tömény kénsavat!

A tömény kénsavba mártott gyújtópálca megfeketedik. A papírlapra, vászondarabra cseppentett kénsav hatására az anyagok megfeketednek, kilyukadnak.



67.1. A kén-trioxid-molekula kalott- és pálcikamodellje



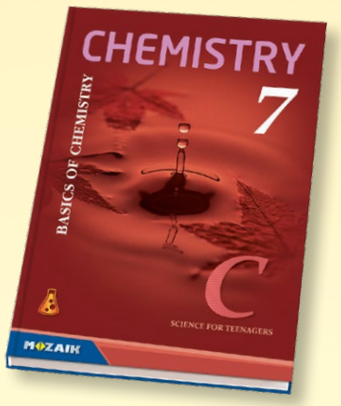

67.2. *Hasonlítsd össze az azonos tömegű kénsav és a víz térfogatát!*



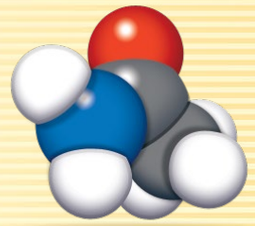

67.3. A kénsav hígítása és kémhatásának kimutatása

*Energetikai szempontból milyen folyamat a kénsav hígítása?*

*The main purpose of the textbooks is to familiarise students with the chemical properties and effects of the commonly occurring substances, to give them a better understanding of chemical phenomena and thereby enable them to handle substances consciously.*

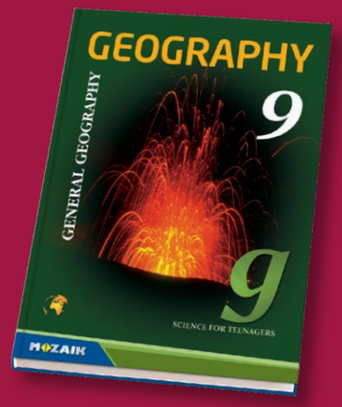



- *The modern approach to processing the material makes it possible for students to develop their critical thinking, communication and dexterity.*
- *All the experiments are illustrated with colour photographs, making these books especially valuable.*

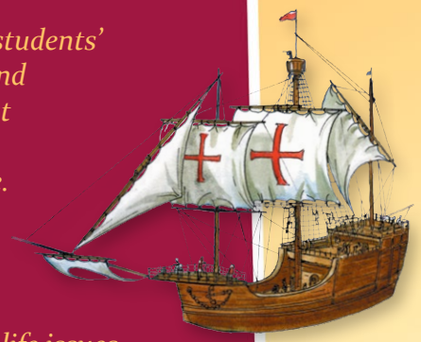


# Geography

*Geography textbooks are centered around the system of interactions between landscapes, Nature and people. Social geography textbooks help understand the typical processes and factors influencing world-economy. Innovative activities offer students opportunities to investigate, build skills, improve their geographic knowledge and conceptual understanding.*




- *The textbooks broaden students' geographical thinking and teach students to protect the environment and world's cultural heritage.*
- *Instead of simply providing details of topics, the material is arranged around real-life issues.*



*Different levels of individual learning are accounted for in the textbooks through a variety of graphs, thematic maps, statistical analyses, and additional reading. Enabling interested students to immerse themselves in the material.*

184 A TERMÉSZETFÖLDRAJZI ÖVEZETESSÉG

## A HIDEG ÖVEZET

FOGALOMTÁR

anticiklon, sarki szél, sarkköri és sarkvidéki öv, tundra éghajlat, tundra, tundratalaj, talajfolyás, állandóan fagyos éghajlat

A Föld leghidegebb, sarkkörökön túli területei egész évben az **anticiklonokat** szállító zord keleties **sarki szelek** hatása alatt állnak.

A sarkköröktől a sarkpontok felé távolodva 1 napról 6 hónapra nő a nappalok, illetve éjszakák hossza. Az állandó nappal idején is csak gyenge a felmelegedés, mivel a napsugarak kis hajlásszögben érik a felszínt. Télen a Nap a látóhatár alatt tartózkodik. Ilyenkor a felszín tartós kisugárzása miatt erős a lehűlés. Az évi középhőmérséklet 0 °C alatti.

A kevés csapadék túlnyomórészt **hó** formájában érkezik, ami a napsugarak nagy részét visszaveri.

A hőmérséklet alapján két övet különíthetünk el az övezetben: a **sarkkörit*** és a **sarkvidékit***.

KÉT ÉVSZAK

A sarkköri tájakon a **tundra éghajlat*** uralkodik. Itt két évszakot különböztetünk meg: a 8-10 hónapig tartó hosszú, kemény, száraz telet a sarki éjszakával, s a rövid, hűvös, csapadékos nyarat az éjféli Nap jelenségével. (A nyár időjárása a mi kora tavaszunknak felel meg.)

184.1. A hideg övezet övei




Az övben a csapadék évi mennyisége 200-300 mm, aminek 80%-a a hó formájában hull. Az alacsony hőmérséklet miatt a párolgás is csekély, ezért a kevés csapadék ellenére az öv vízháztartása nyereséges. A nyáron megolvadó hólé a fagyott altalajba nem tud leszivárogni, ezért jelentős kiterjedésű **mocsárvidékek** alakulnak ki.

A tundra **folyói** csak a rövid nyári időszakban jégmentesek. Többségük észak felé folyik. Ez olvadáskor komoly árvízveszélyt jelent: a délen korábban kezdődő olvadás vizét ugyanis nem tudják észak felé levezetni, hiszen ott még vastag jégpáncél állja útjukat.

*Keress példát az atlaszodban az ilyen jellegű folyókra!*

A természetes növénytakaró a **tundra***. A tajga felőli peremén a nyírfával keveredett fenyvesek erdős tundrát alkotnak. A sarkok felé haladva ezt először alacsony cserjék, majd rövid tenyészidejű füvek, pillangósvirágúak, zuzmók, mohák váltják fel.

Itt élnek a Föld legkisebb fás szárú növényei (sarki fűz, törpe nyír). Ágaik a talaj felszínén elterülnek, így védekeznek az erős szél ellen, s így próbálják a felszín által kisugárzott meleget megtartani.

Az állatvilág fajokban szegény. A sarkköri öv télen szinte kihalt, de nyáron benépesül. Vándormadarak érkeznek (pl. kormorán, sirály, jégmadár). A fókák, rozmárok, jegesmedvék a tengerből táplálkoznak. A ragadozásra csordában vándorolnak táplálékot keresve.

A terület talaja tápanyagban szegény, köves **tundratalaj**** fagyott altalajjal.

184.2. A tundra nyáron







185.1. A hideg övezetben nyáron soha nem nyugszik le a Nap

A felszín formálásában a fagy okozta **aprózódás** a legjelentősebb, amelynek eredményeként a hegységek lábánál kőtengerek halmozódnak fel. Gyakori jelenség a **talajfolyás**.** A nagyobb mélységekben a víz fagyott állapotban van. A nyári felmelegedés hatására a felső rétegek felolvadnak, majd a lejtős területeken a fagyott altalajon megcsúsznak, „lefolynak".

A sarkköri öv összefüggő sávot alkot az északi félgömbön a Jeges-tenger partvidékein és szigetein. A déli félgömbön csak néhány szigeten fordul elő tundra éghajlat.

JÉGSIVATAG EGYETLEN ÉVSZAKKAL

A sarkvidéki övben az **állandóan fagyos éghajlaton*** egyetlen évszak alakult ki, a zord, kemény **tél.** A 3-6 hónapig tartó éjszakát a hosszú ideig tartó nappali besugárzás sem tudja ellensúlyozni. A hőmérséklet még a legmelegebb hónapban sem emelkedik 0 °C fölé. Az öv Földünk legszelesebb területe.

A csapadék évi mennyisége 200 mm-nél is kevesebb, s finom hókristályok formájában hull. A felszínt vastag **jégtakaró** fedi, mert a lehullott hó csak részben olvad el, s felhalmozódva jéggé préselődik össze. Ilyen környezetben növény- és talajtakaró nem alakulhat ki, bár egyes algafajok megélnek.

Az állatvilágot az északi szigetvilág partjain a ragadozó rozmár, fóka és jegesmedve, az Antarktiszon a pingvin képviseli.

A sarkvidéki öv területei **lakatlanok.** Az időjárási adatokat kutatóállomások szolgáltatják.

Az utóbbi években eddig ismeretlen fertőzések sora terjed az antarktiszi élővilág körében. Bár bizonyítani még nem sikerült, valószínűsíthető, hogy emberek hurcolták be a betegségeket. A kutatók úgy vélik, hogy a fő ok a gondatlanság – pl. óriási veszélyt jelent az élőlényekre a kutatóállomások tisztítatlanul kibocsátott szennyvize.

SZŰKÖS MEGÉLHETÉS A HIDEG ÖVEZETBEN

A kisszámú (pl. eszkimó, lapp) lakosság **halászik, vadászik, rénszarvast tenyészt.**



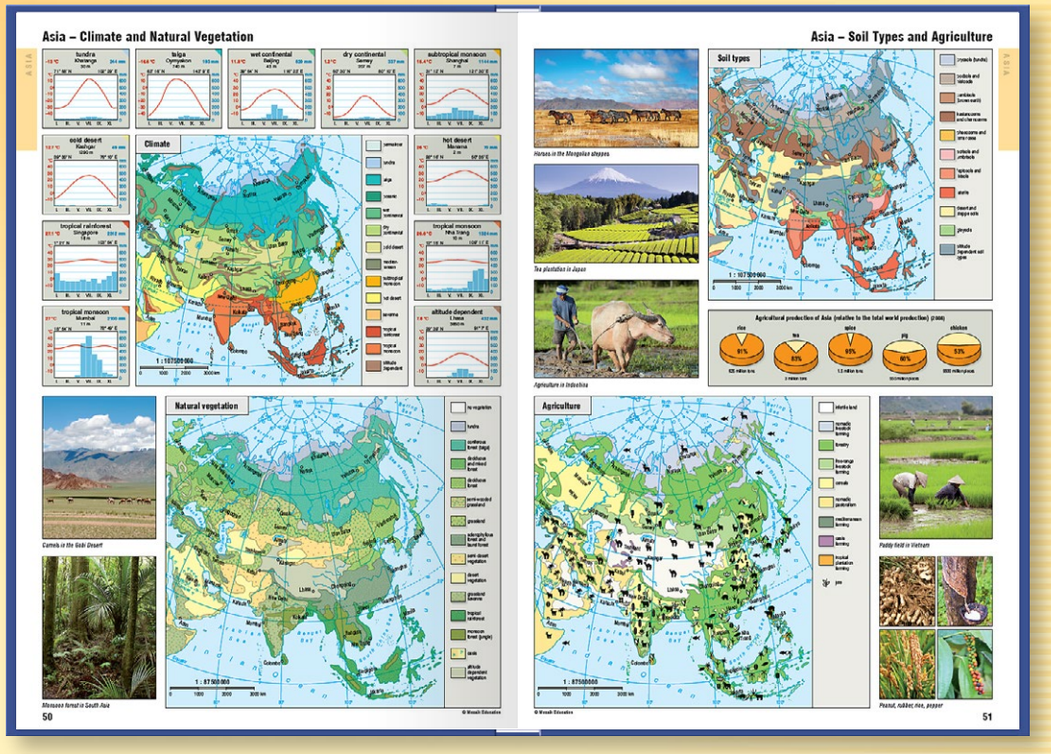

185.2. *Hasonlítsd össze a tundra (balra) és az állandóan fagyos éghajlatok diagramját!*

185.3. A sarkvidéki öv élővilága szegényes

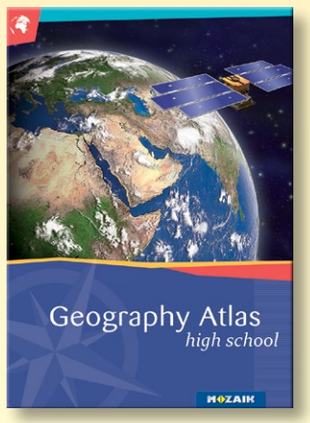


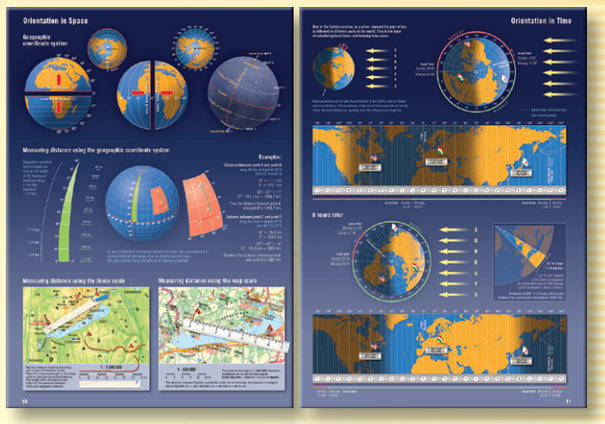
# Geography Atlases

*Our atlases from elementary to high school account for age-related learning peculiarities, the information is in tune with todays social and economic changes as well as the approach of all of our geography books. In addition to the usual topics several problem oriented thematic maps are included as well. These enable the atlas to function as a useful tool.*



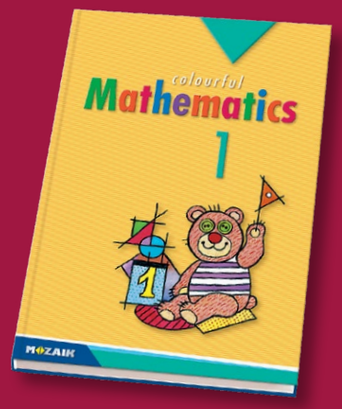

- *Drawings, aesthetic diagrams and photographs help the formation of true-to-life concepts and the development of further levels of knowledge.*
- *The images promote independent learning, while the diagrams help with the discovery of more complex relationships.*



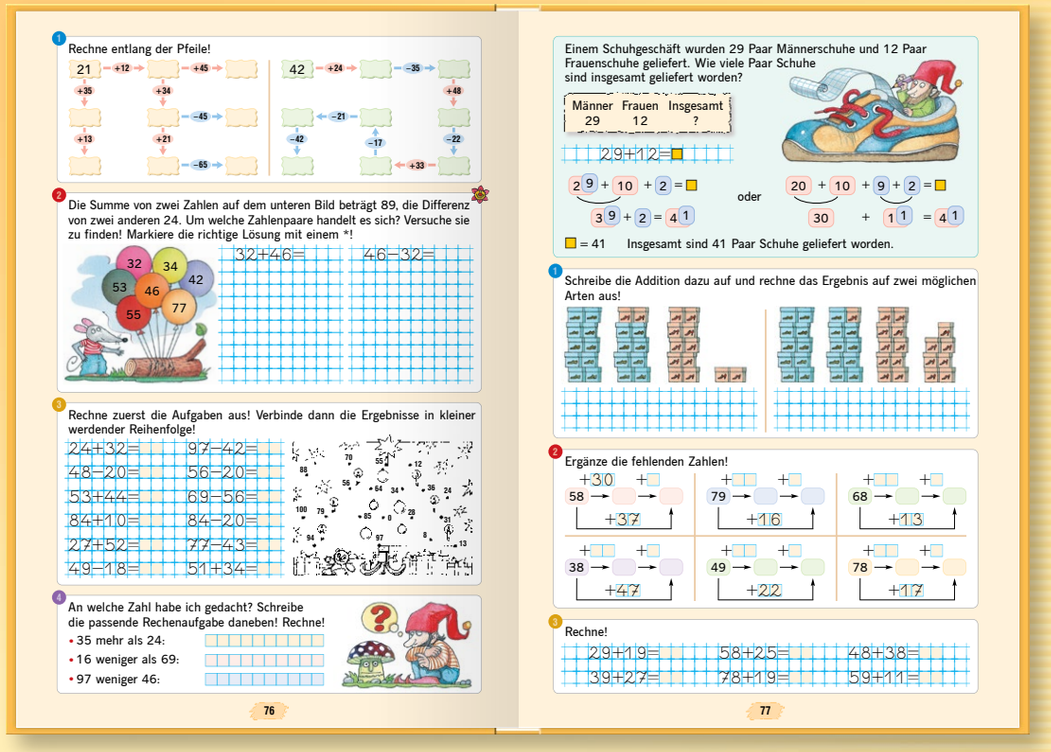



# Mathematics
## *elementary school*

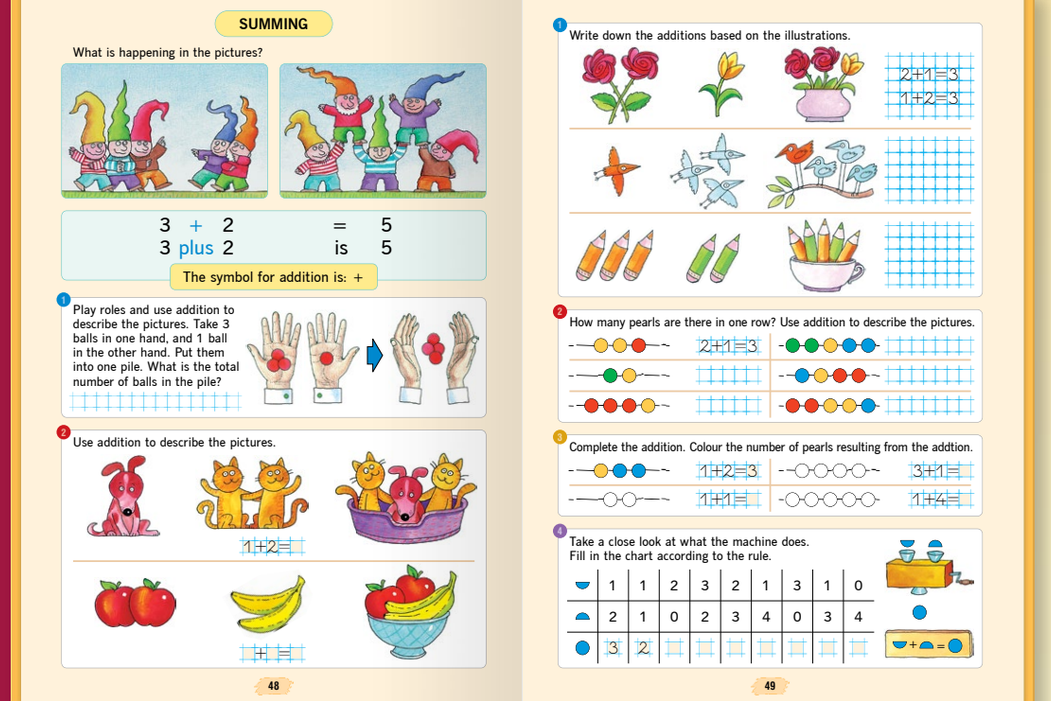
*The material in the books is arranged in a clear and aesthetic manner. "Self explanatory" excercises are abundant throughout the textbook. The authors used the small steps principle when writing the books, so that the joy of independent work is not interrupted by constant preparation and explanation by the teacher.*




- *These books establish the foundations of mathematics in a playful and colourful way, allowing students to develop their individual creative thinking.*
- *This series covers the core requirements of most curriculums, but it can also be used to develop gifted students with clearly marked exercises.*



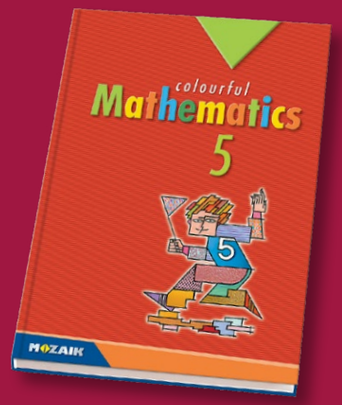

- *Students discover the basics of mathematical principles while solving simple problems taken from everyday life experiences.*
- *This series adheres to the principle of gradualism in education.*
- *Mathematical calculations are taught in small steps.*
- *The pages are arranged so that pupils can easily navigate between exercises, while cheerful illustrations give the books a friendly tone.*



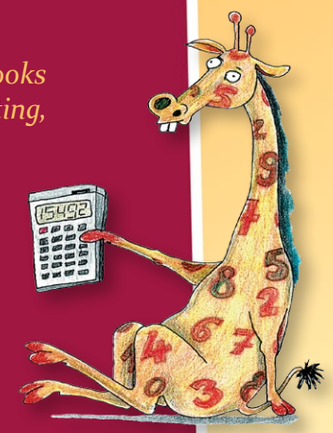

*The Counting workbook can be used with any Maths textbook, or even on its own to practice new skills and deepen the learnt material.*

# Mathematics
## grades 5–12

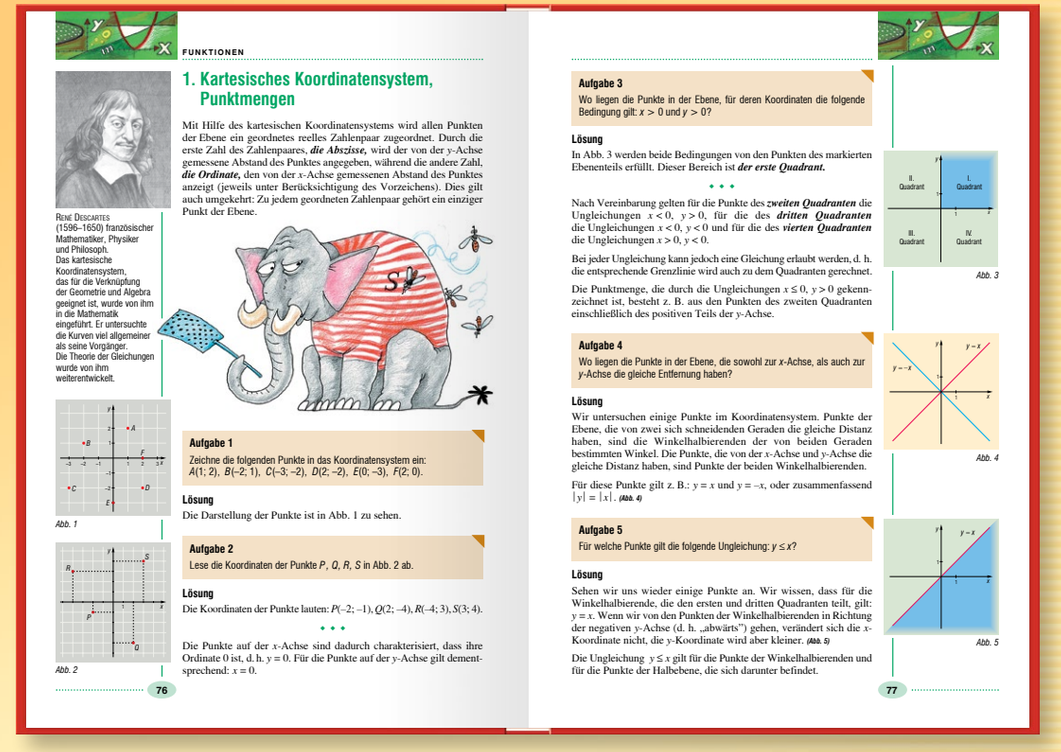
*The 'Colourful Mathematics' series takes students from grades 1 to 12 on an enjoyable journey through the world of Mathematics. The textbooks help students understand the learning material step by step through illustrative examples.*




*The main goal of these textbooks is to develeop students' counting, problem solving and combinatory skills as well as their spatial perception. The textbooks contain an abundance of exercises, sufficient for in-class practice and homework.*



*The topics begin with examples taken from real-life situations, during the solving of which, students learn new rules and acquire knowledge seemingly by themselves.*



FUNKTIONEN

## 1. Kartesisches Koordinatensystem, Punktmengen



René Descartes (1596–1650) französischer Mathematiker, Physiker und Philosoph. Das kartesische Koordinatensystem, das für die Verknüpfung der Geometrie und Algebra geeignet ist, wurde von ihm in die Mathematik eingeführt. Er untersuchte die Kurven viel allgemeiner als seine Vorgänger. Die Theorie der Gleichungen wurde von ihm weiterentwickelt.

Mit Hilfe des kartesischen Koordinatensystems wird allen Punkten der Ebene ein geordnetes reelles Zahlenpaar zugeordnet. Durch die erste Zahl des Zahlenpaares, ***die Abszisse,*** wird der von der $y$-Achse gemessene Abstand des Punktes angegeben, während die andere Zahl, ***die Ordinate,*** den von der $x$-Achse gemessenen Abstand des Punktes anzeigt (jeweils unter Berücksichtigung des Vorzeichens). Dies gilt auch umgekehrt: Zu jedem geordneten Zahlenpaar gehört ein einziger Punkt der Ebene.






Abb. 1

**Aufgabe 1**

Zeichne die folgenden Punkte in das Koordinatensystem ein:
$A(1; 2)$, $B(-2; 1)$, $C(-3; -2)$, $D(2; -2)$, $E(0; -3)$, $F(2; 0)$.

**Lösung**

Die Darstellung der Punkte ist in Abb. 1 zu sehen.




Abb. 2

**Aufgabe 2**

Lese die Koordinaten der Punkte $P$, $Q$, $R$, $S$ in Abb. 2 ab.

**Lösung**

Die Koordinaten der Punkte lauten: $P(-2; -1)$, $Q(2; -4)$, $R(-4; 3)$, $S(3; 4)$.

• • •

Die Punkte auf der $x$-Achse sind dadurch charakterisiert, dass ihre Ordinate 0 ist, d. h. $y = 0$. Für die Punkte auf der $y$-Achse gilt dementsprechend: $x = 0$.



**Aufgabe 3**

Wo liegen die Punkte in der Ebene, für deren Koordinaten die folgende Bedingung gilt: $x > 0$ und $y > 0$?

**Lösung**

In Abb. 3 werden beide Bedingungen von den Punkten des markierten Ebenenteils erfüllt. Dieser Bereich ist ***der erste Quadrant.***

• • •

Nach Vereinbarung gelten für die Punkte des ***zweiten Quadranten*** die Ungleichungen $x < 0$, $y > 0$, für die des ***dritten Quadranten*** die Ungleichungen $x < 0$, $y < 0$ und für die des ***vierten Quadranten*** die Ungleichungen $x > 0$, $y < 0$.

Bei jeder Ungleichung kann jedoch eine Gleichung erlaubt werden, d. h. die entsprechende Grenzlinie wird auch zu dem Quadranten gerechnet.

Die Punktmenge, die durch die Ungleichungen $x \leq 0$, $y > 0$ gekennzeichnet ist, besteht z. B. aus den Punkten des zweiten Quadranten einschließlich des positiven Teils der $y$-Achse.




Abb. 3

**Aufgabe 4**

Wo liegen die Punkte in der Ebene, die sowohl zur $x$-Achse, als auch zur $y$-Achse die gleiche Entfernung haben?

**Lösung**

Wir untersuchen einige Punkte im Koordinatensystem. Punkte der Ebene, die von zwei sich schneidenden Geraden die gleiche Distanz haben, sind die Winkelhalbierenden der von beiden Geraden bestimmten Winkel. Die Punkte, die von der $x$-Achse und $y$-Achse die gleiche Distanz haben, sind Punkte der beiden Winkelhalbierenden.

Für diese Punkte gilt z. B.: $y = x$ und $y = -x$, oder zusammenfassend $|y| = |x|$. *(Abb. 4)*




Abb. 4

**Aufgabe 5**

Für welche Punkte gilt die folgende Ungleichung: $y \leq x$?

**Lösung**

Sehen wir uns wieder einige Punkte an. Wir wissen, dass für die Winkelhalbierende, die den ersten und dritten Quadranten teilt, gilt: $y = x$. Wenn wir von den Punkten der Winkelhalbierenden in Richtung der negativen $y$-Achse (d. h. „abwärts") gehen, verändert sich die $x$-Koordinate nicht, die $y$-Koordinate wird aber kleiner. *(Abb. 5)*

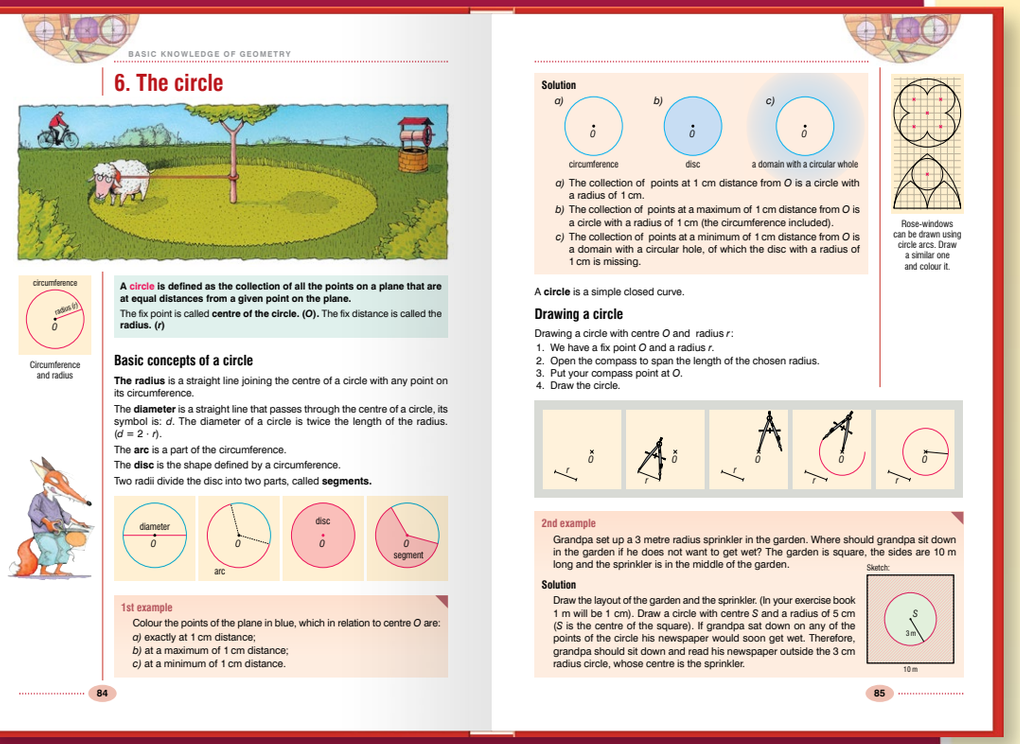



Abb. 5

Die Ungleichung $y \leq x$ gilt für die Punkte der Winkelhalbierenden und für die Punkte der Halbebene, die sich darunter befindet.



*The books, workbooks and collection of mathematical exercises are excellent for developing mathematical capabilities, e.g. combinatorial thinking.*



BASIC KNOWLEDGE OF GEOMETRY

## 6. The circle






Circumference and radius

**A circle is defined as the collection of all the points on a plane that are at equal distances from a given point on the plane.**

The fix point is called **centre of the circle. (*O*).** The fix distance is called the **radius. (*r*)**

### Basic concepts of a circle

**The radius** is a straight line joining the centre of a circle with any point on its circumference.

The **diameter** is a straight line that passes through the centre of a circle, its symbol is: $d$. The diameter of a circle is twice the length of the radius. ($d = 2 \cdot r$).

The **arc** is a part of the circumference.

The **disc** is the shape defined by a circumference.

Two radii divide the disc into two parts, called **segments.**






**1st example**

Colour the points of the plane in blue, which in relation to centre $O$ are:
*a)* exactly at 1 cm distance;
*b)* at a maximum of 1 cm distance;
*c)* at a minimum of 1 cm distance.



**Solution**




*a)* The collection of points at 1 cm distance from $O$ is a circle with a radius of 1 cm.
*b)* The collection of points at a maximum of 1 cm distance from $O$ is a circle with a radius of 1 cm (the circumference included).
*c)* The collection of points at a minimum of 1 cm distance from $O$ is a domain with a circular hole, of which the disc with a radius of 1 cm is missing.

A **circle** is a simple closed curve.

### Drawing a circle

Drawing a circle with centre $O$ and radius $r$:
1. We have a fix point $O$ and a radius $r$.
2. Open the compass to span the length of the chosen radius.
3. Put your compass point at $O$.
4. Draw the circle.




**2nd example**

Grandpa set up a 3 metre radius sprinkler in the garden. Where should grandpa sit down in the garden if he does not want to get wet? The garden is square, the sides are 10 m long and the sprinkler is in the middle of the garden.

**Solution**

Draw the layout of the garden and the sprinkler. (In your exercise book 1 m will be 1 cm). Draw a circle with centre $S$ and a radius of 5 cm ($S$ is the centre of the square). If grandpa sat down on any of the points of the circle his newspaper would soon get wet. Therefore, grandpa should sit down and read his newspaper outside the 3 cm radius circle, whose centre is the sprinkler.






Rose-windows can be drawn using circle arcs. Draw a similar one and colour it.



GEOMETRY

## 1. The area

Make the figures in the image using the pieces of the Tangram.

Placing different plane figures next to each other, following a set of rules is the basis of several mathematical games.

One of these is the Tangram, an ancient Chinese game. A square was cut into pieces according to the image.

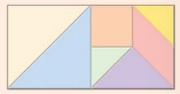
The elements:
– 5 equilateral right triangles:
  • 2 small,
  • 1 medium,
  • 2 large;
– 1 square;
– 1 parallelogram.

If you search the internet, you can find several exercises using these figures.

**Example 1**

Cut the figures seen in the image above out of a square and make a rectangle out of them.

**Solution**



The area of the original square and the area of the rectangle are the same, since they are made of the same plane figures.

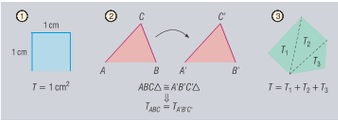
M. C. Escher (1898–1972) Dutch artist was a master of covering surfaces with different figures. His images are still popular and thought provoking.



We can assign a positive number to each of these plane figures with the following properties:
1. the area of a square with one unit long sides (unit square) is 1 area unit;
2. the area of congruent plane figures is equal;
3. if we cut a plane figure into parts, the sum of the areas of the parts is equal to the area of the original figure.

This number is the area of the plane figure.

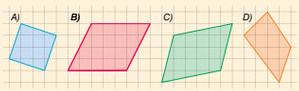
The concept of area




A few units used to measure area:
1 m²: the area of a square with 1 m long sides.
1 cm² = 0.0001 m²;
1 dm² = 0.01 m²;
1 km² = 1 000 000 m².

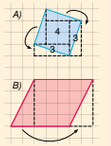
**Example 2**

We drew a few plane figures on graph paper. What is their area if each square is 1 area unit?




**Solution**

Try to determine certain areas by cutting. The following figures show a few examples of this.




$T_A = 4 + 3 + 3 = 10$ area units

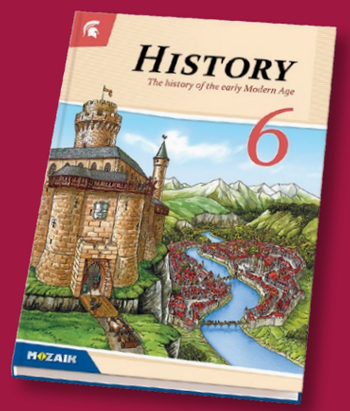
$T_B = 5 \cdot 4 = 20$ area units

Cutting

$T_{parallelogram} = a \cdot m_a$

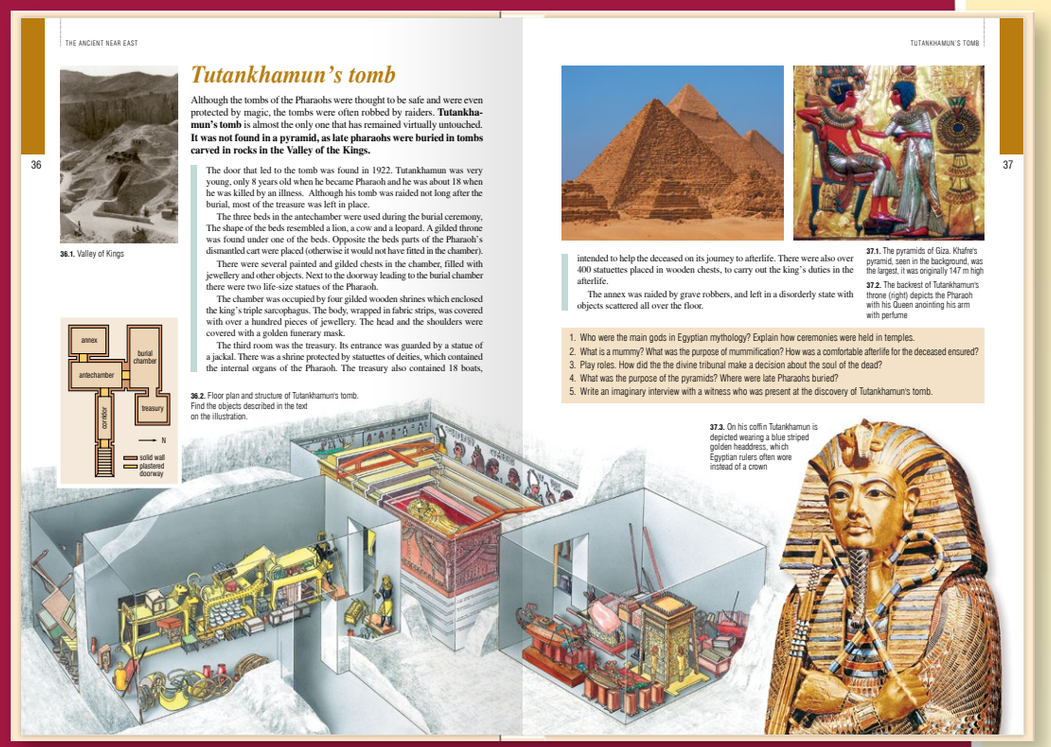
# History

*The images make the past come alive. A detailed, realistic illustration of daily life, or a reconstruction drawing often mean more to 10–14 year olds than a pageful of text.*




*Moral values, honesty, the role of the family, the respect for other nations and ethnic groups are heavily emphasised in each of our textbooks. Our textbooks, conveying modern knowledge of the past, try to bring students closer to history, by placing emphasis on daily life and lifestyles of the past.*

*Historical texts, structural diagrams and complementary material allow for differentiated education. The workbooks closely associated with the textbooks and atlases allow students to practice and deepen their knowledge.*



THE ANCIENT NEAR EAST

36

## Tutankhamun's tomb

Although the tombs of the Pharaohs were thought to be safe and were even protected by magic, the tombs were often robbed by raiders. **Tutankhamun's tomb** is almost the only one that has remained virtually untouched. **It was not found in a pyramid, as late pharaohs were buried in tombs carved in rocks in the Valley of the Kings.**

The door that led to the tomb was found in 1922. Tutankhamun was very young, only 8 years old when he became Pharaoh and he was about 18 when he was killed by an illness. Although his tomb was raided not long after the burial, most of the treasure was left in place.

The three beds in the antechamber were used during the burial ceremony. The shape of the beds resembled a lion, a cow and a leopard. A gilded throne was found under one of the beds. Opposite the beds parts of the Pharaoh's dismantled cart were placed (otherwise it would not have fitted in the chamber).

There were several painted and gilded chests in the chamber, filled with jewellery and other objects. Next to the doorway leading to the burial chamber there were two life-size statues of the Pharaoh.

The chamber was occupied by four gilded wooden shrines which enclosed the king's triple sarcophagus. The body, wrapped in fabric strips, was covered with over a hundred pieces of jewellery. The head and the shoulders were covered with a golden funerary mask.

The third room was the treasury. Its entrance was guarded by a statue of a jackal. There was a shrine protected by statuettes of deities, which contained the internal organs of the Pharaoh. The treasury also contained 18 boats,

**36.1.** Valley of Kings

annex
burial chamber
antechamber
treasury
corridor
N
solid wall
plastered doorway

**36.2.** Floor plan and structure of Tutankhamun's tomb. Find the objects described in the text on the illustration.

TUTANKHAMUN'S TOMB

37

intended to help the deceased on its journey to afterlife. There were also over 400 statuettes placed in wooden chests, to carry out the king's duties in the afterlife.

The annex was raided by grave robbers, and left in a disorderly state with objects scattered all over the floor.

**37.1.** The pyramids of Giza. Khafre's pyramid, seen in the background, was the largest. It was originally 147 m high

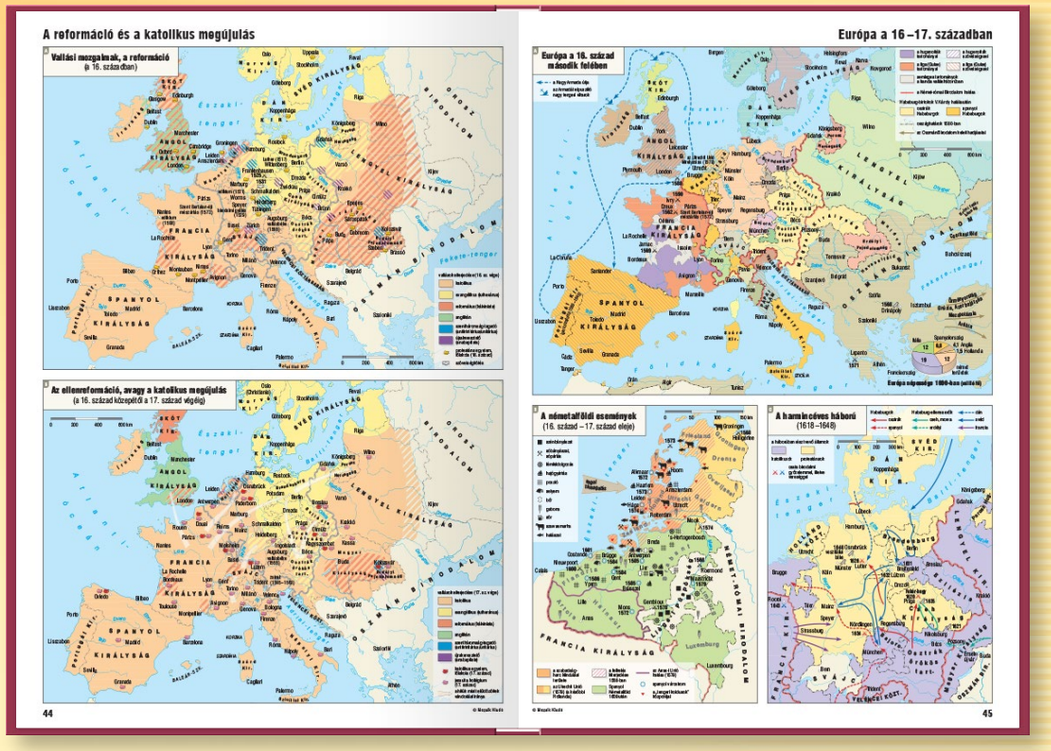
**37.2.** The backrest of Tutankhamun's throne (right) depicts the Pharaoh with his Queen anointing his arm with perfume

1. Who were the main gods in Egyptian mythology? Explain how ceremonies were held in temples.
2. What is a mummy? What was the purpose of mummification? How was a comfortable afterlife for the deceased ensured?
3. Play roles. How did the the divine tribunal make a decision about the soul of the dead?
4. What was the purpose of the pyramids? Where were late Pharaohs buried?
5. Write an imaginary interview with a witness who was present at the discovery of Tutankhamun's tomb.

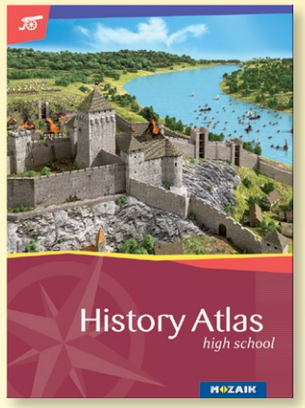
**37.3.** On his coffin Tutankhamun is depicted wearing a blue striped golden headdress, which Egyptian rulers often wore instead of a crown

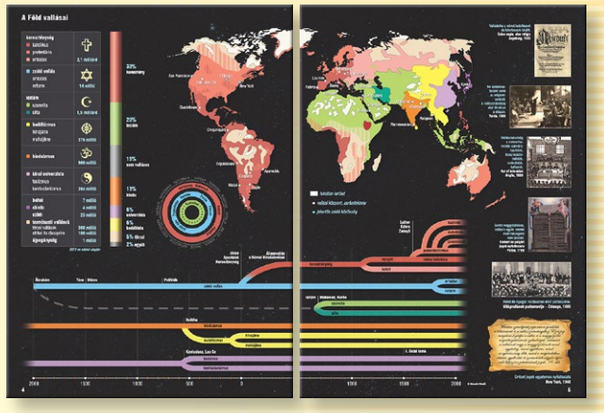
## History Atlases

*Our atlases designed for primary and secondary school students present topics from the formation of the Earth to the present day, with maps covering the entire course material. We were led by three aspects when designing the atlases: historical accuracy, clarity and communication of information.*



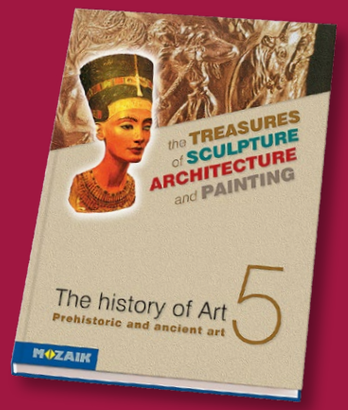

- *The atlases are full of images, thus students can learn about historical events and art history at the same time.*
- *Students can learn visual processing skills and acquire lasting knowledge visually.*
- *The table of contents and index of names enable users to quickly navigate in the atlases.*



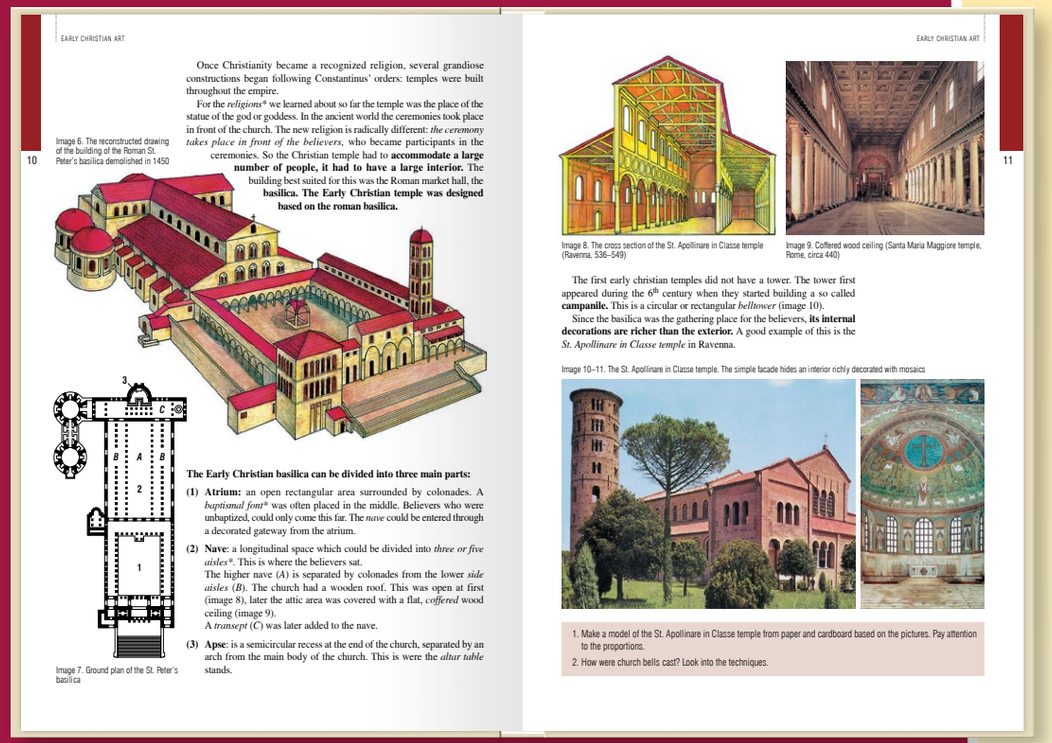



# Art History

*Our series introduces students to the great works of art of the past 3000 years, and teaches them to understand and make others understand.*




*By describing and analysing works of arts, the textbooks introduce students to the styles and movements in the history of art. In doing so, the books not only build and affirm students in their knowledge of history but also make the subject come alive with humorous pictures. The learning process is accompanied by comparative analyses, exercises, questions, revisions, colour reproductions, sculptures and drawings.*



EARLY CHRISTIAN ART

10

Once Christianity became a recognized religion, several grandiose constructions began following Constantinus' orders: temples were built throughout the empire.

For the *religions** we learned about so far the temple was the place of the statue of the god or goddess. In the ancient world the ceremonies took place in front of the church. The new religion is radically different: *the ceremony takes place in front of the believers*, who became participants in the ceremonies. So the Christian temple had to **accommodate a large number of people, it had to have a large interior.** The building best suited for this was the Roman market hall, the **basilica. The Early Christian temple was designed based on the roman basilica.**

Image 6. The reconstructed drawing of the building of the Roman St. Peter's basilica demolished in 1450

**The Early Christian basilica can be divided into three main parts:**

**(1) Atrium:** an open rectangular area surrounded by colonades. A *baptismal font** was often placed in the middle. Believers who were unbaptized, could only come this far. The *nave* could be entered through a decorated gateway from the atrium.

**(2) Nave**: a longitudinal space which could be divided into *three or five aisles**. This is where the believers sat.
The higher nave (*A*) is separated by colonades from the lower *side aisles* (*B*). The church had a wooden roof. This was open at first (image 8), later the attic area was covered with a flat, *coffered* wood ceiling (image 9).
A *transept* (*C*) was later added to the nave.

**(3) Apse**: is a semicircular recess at the end of the church, separated by an arch from the main body of the church. This is were the *altar table* stands.

Image 7. Ground plan of the St. Peter's basilica

EARLY CHRISTIAN ART

11

Image 8. The cross section of the St. Apollinare in Classe temple (Ravenna, 536–549)

Image 9. Coffered wood ceiling (Santa Maria Maggiore temple, Rome, circa 440)

The first early christian temples did not have a tower. The tower first appeared during the 6th century when they started building a so called **campanile.** This is a circular or rectangular *belltower* (image 10).

Since the basilica was the gathering place for the believers, **its internal decorations are richer than the exterior.** A good example of this is the *St. Apollinare in Classe temple* in Ravenna.

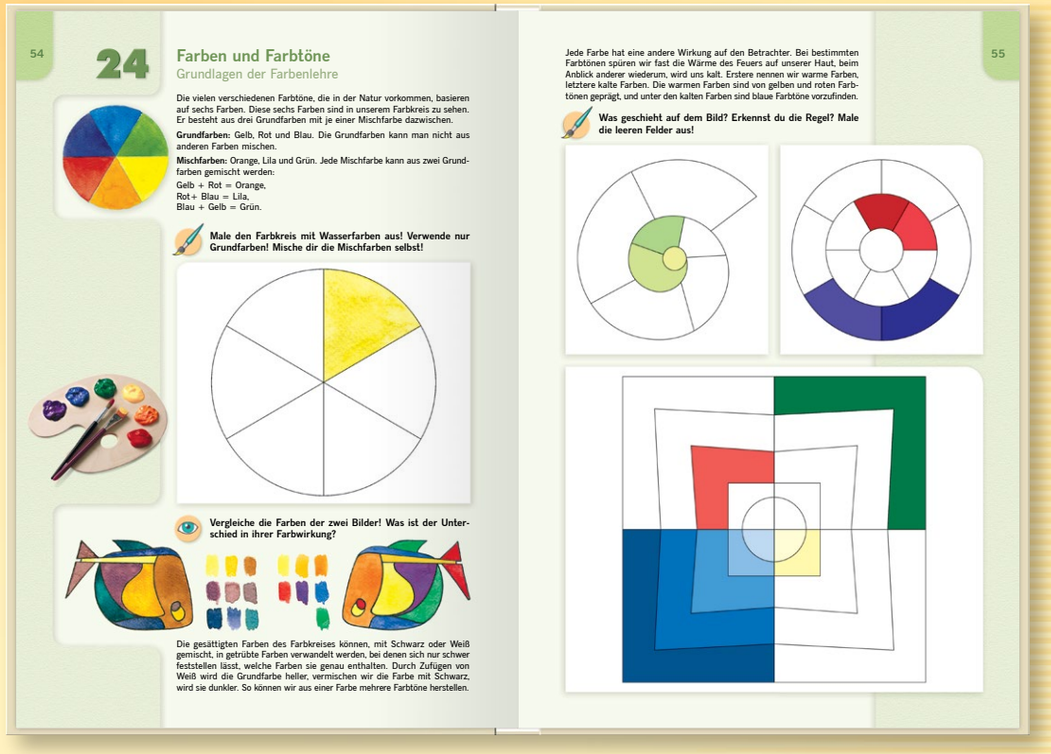
Image 10–11. The St. Apollinare in Classe temple. The simple facade hides an interior richly decorated with mosaics

1. Make a model of the St. Apollinare in Classe temple from paper and cardboard based on the pictures. Pay attention to the proportions.
2. How were church bells cast? Look into the techniques.

*The informal tone, the playful exercises, the rich and impressive pictures allow teachers to introduce the great periods of art without the need for any supplementary material.*

# Drawing

*In addition to art, creative work and the basics of art history, our workbooks place great emphasis on visual communication. They contain a variety of exercises from simple life studies to abstract visual thinking projects.*



54

**24**

**Farben und Farbtöne**
Grundlagen der Farbenlehre

Die vielen verschiedenen Farbtöne, die in der Natur vorkommen, basieren auf sechs Farben. Diese sechs Farben sind in unserem Farbkreis zu sehen. Er besteht aus drei Grundfarben mit je einer Mischfarbe dazwischen.

**Grundfarben:** Gelb, Rot und Blau. Die Grundfarben kann man nicht aus anderen Farben mischen.

**Mischfarben:** Orange, Lila und Grün. Jede Mischfarbe kann aus zwei Grundfarben gemischt werden:
Gelb + Rot = Orange,
Rot + Blau = Lila,
Blau + Gelb = Grün.

**Male den Farbkreis mit Wasserfarben aus! Verwende nur Grundfarben! Mische dir die Mischfarben selbst!**

**Vergleiche die Farben der zwei Bilder! Was ist der Unterschied in ihrer Farbwirkung?**

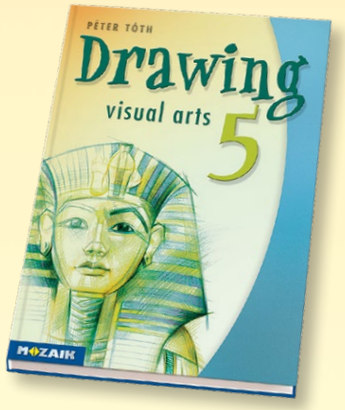
Die gesättigten Farben des Farbkreises können, mit Schwarz oder Weiß gemischt, in getrübte Farben verwandelt werden, bei denen sich nur schwer feststellen lässt, welche Farben sie genau enthalten. Durch Zufügen von Weiß wird die Grundfarbe heller, vermischen wir die Farbe mit Schwarz, wird sie dunkler. So können wir aus einer Farbe mehrere Farbtöne herstellen.

55

Jede Farbe hat eine andere Wirkung auf den Betrachter. Bei bestimmten Farbtönen spüren wir fast die Wärme des Feuers auf unserer Haut, beim Anblick anderer wiederum, wird uns kalt. Erstere nennen wir warme Farben, letztere kalte Farben. Die warmen Farben sind von gelben und roten Farbtönen geprägt, und unter den kalten Farben sind blaue Farbtöne vorzufinden.

**Was geschieht auf dem Bild? Erkennst du die Regel? Male die leeren Felder aus!**

*Students are introduced to various drawing techniques, ranging from clay modelling to mixed media. By solving the exercises students can complete an exciting journey from traditional drawing techniques to the wonders of the man-made environment.*




## *Best European Schoolbook Awards*

*Our 5th grade textbook received the Bronze Medal in the Best European Textbook competition at the Frankfurt International Book Fair.*