Title: Future map ("architects" and "surveyors")

Topic: Complex design proposal of a children playground including the choice of play items/elements, their spatial arrangement and the financial demands.	**Time**: 1 day (8 x 45 min) outdoor activity	**Age**: 5-7 grade, primary school, 10 – 13-year old pupils

Differentiation

Lower level

The basic outcome of pupils is the design proposal of a children playground. It can be either drawn on paper (worksheet) or in digital form (with the use of applet).

Higher level

In addition, children can make a map of the current state of the given area, which would also reflect the immediate surroundings of the playground. The map can be created either on paper or in GeoGebra software. In the end, the results of both groups can be interconnected into one map including both the current state of the area and the design proposal of a new playground.

Guidelines, ICT support etc.

- Pupils work in groups all the time. Recommended size of a group is 2-6 pupils.
- Pupils use commercial catalogues available on the Internet when choosing play items for playground.
- Pupils use the applet or worksheets when designing the playground.
- In their final presentation pupils need to present not only their final design proposals, but also their main objectives, their target group, main criteria etc.
- In case the Extension activity is also realized, pupils in role of 'surveyors' follow the principles of geodetic measurements.
- Various tools and equipment can be used for measuring the distances and angles in the terrain.
- If the mapped area is not very extensive, software GeoGebra can be used for drawing the final map.
- Two teachers are required if the activity is extended.

Equipment needed for this activity

- worksheets
- computer with internet connection
- Small architectural elements catalogue – catalogues with prices and sizes of children playground elements (swings, slides, climbing frames, sand boxes etc.) benches, trash bins, shelters, gazebos etc.
- Drafting supplies – pencils, compasses, rulers.
- Paper – graph paper, size A3.

In case of extended activity:

- Measuring tape or digital distance meter, large angle measurer, spirit-level, pegs for mark the measuring points, twine, compass.

Required knowledge:

- elementary arithmetic operations
- computing with decimals
- geometry
- scale

Health and Safety:

No special requirements.

Learning outcomes for this activity

All: Pupils can choose elements from catalogues based on their functionality, sizes, prices, they are able to calculate total price, they can add decimals and divide/multiply number in given ratio, they can convert length and area units and they are able to name and draw basic geometric shapes.

Most: Pupils can combine prices to minimize the final costs, they can combine arrangement of different elements to use chosen area effectively, sketch and draw more complicated planar structures to scale.

Some: Pupils are able to work with worksheets and applets, create presentations and they can use GeoGebra software for drawing maps.

Lesson description

Starter Activity

In the beginning of the activity it is necessary to choose a right place for a pupils´ project. A proper place is a grassed area in a chosen part of town or in the schoolyard where there is not a playground. It is important to adapt an area size to time allocated to the activity. Recommended minimal size of the area is 200 square meters. The task of pupils is to design a new proper use of a chosen area – a playground.

Main Activity

Main activity consists of five steps:

1. Setting of the main goal (what exactly is going to be proposed), of the target group (who is the proposal for) and basic criteria of the proposal (e.g. price, purpose, safety, surroundings conditions). Initial brainstorming of suggestions to an area design.
2. Individual work with catalogues of small architecture elements. Every pupil chooses the elements which they like and also comply with the basic criteria. They write down the name, size, price of an item and company selling it, in order to be easily found again later.
3. Pupils' presentation of chosen items and discussion about their suitability. In the end of the step, it is necessary to do a shortlist of the most suitable items. To combine them later, there can be chosen more of them and also can be made more alternatives of suggestions. For example, the most economic, attractive, optimal etc.
4. Choice of the elements – preparation of a layout and a budget. Pupils combine items, sum prices, do layouts and try to draw their suggestion of items in a chosen area. In the end of the step pupils have chosen elements, which fit in selected area and they know the final price.
5. Creating the final map with specific scale. The next step elements positions are definitely set in the area. Pupils combine these elements in place to create optimized arrangement. They must consider where they locate large playing areas, smaller ones, benches, trash bins etc. At the end pupils create final layout drawing with a scale. They create overall budget for the purchase of selected elements. They prepare presentation which contains all elements of their work.

Extension activity

The main activity can be extended to create a map of the current state. For creating map pupils use surveying techniques. Position of the objects placed in the area is measured from measuring points using angles and distances measurement. Final proposals can be presented on the map together with already existing objects – pathways, trees, benches etc. The extension activity is equally time consuming which allows for two groups of pupils, first for making proposal and second for drawing a map. In this case we get a group to work with

differentiated tasks. This activity consists of these steps:

1. Recognition of interest area and existing objects. Choosing the map scale. Establishing measuring points, and measuring their position with GPS system. Indicate the northerly direction.
2. Measuring the size of the objects and their conversion to the scale.
3. Determine the position of objects in view to the measuring points. Pupils can choose the surveying technique: measuring angles, measuring distances or combination of measuring angles and distances. The third one is called Tachymetry.

Drawing objects in the map to scale. Create map legend and directional rose. For map drawing, pupils can also use drawing software such as GeoGebra.

Plenary

Pupils integrate the proposal of architects using the map of the current state created by surveyors and present their work at the end of the day.

Reflections on the activity – experience for sharing with teachers and lectors

The suggested program was fully implemented during children summer camp which took place in the grounds of vacation area Jedliny. Altogether 16 pupils aged from 10 to 16 years participated in the program. In the opening phase pupils were divided into two groups of “architects" and "surveyors".

The joint goal of both groups was detailed mapping of chosen area of vacation area and proposition of a new functional use of the area from the children point of view.

Group of geodesist focused on production of a map of the actual condition using geodetic measuring methods. Group of architects worked out a model of solution focused on families with children. The outcome was implemented into the map made by group of surveyors. Group of surveyors obtained at the beginning all the necessary information to make the map of the current state. They were familiarized with the technique of measuring methods of the map making. The group then made a comprehensive plan of mapping consisting of 8 steps. This plan was gradually completed while being supervised by teachers.

1. GETTING TO KNOW THE AREA OF INTEREST: Group of surveyors correctly considered it important to get to know the area. Therefore, time was spent examining the grounds and premises.

2. CHOOSING THE KEY OBJECTS: After examining the area a discussion was held to decide which features would be put in the map. The pupils had to make a clear decision. As key objects they marked buildings, trees, foot paths, swimming pools, and play fields.

3. SKETCHING THE AREAS LAYOUT: To increase efficiency of the following steps it was necessary to make a sketch of the map comprising the key objects chosen by pupils, and

to determine the scale for the map. Pupils defined the shapes of the objects.

4. SETTING THE MEASURING POINTS: For successful map making it is essential to accurately assess the distances, sizes and angles, as well as to place the key points wisely. Therefore setting the measuring points is a very important step when map making. The group of surveyors chose 14 points and after consultation with teachers the four best sites were used.

5. CHOOSING THE MOST SUITABLE METHOD: Tachometry-method of measuring the distances and angles was chosen by pupils.

6. REALISATION OF MEASURING: The most time-consuming part of the mapping process, since the sizes of objects, distances and angles need to be manually measured.

7. DRAWING THE MAP IN SCALE: On a blank map sheet measuring points based on angles, distances and objects were drawn in the scale.

8. FINALIZATION OF THE MAP: At last, a scale, legend and a compass card was given in the map. A similar plan was made by a group of architects being supervised by teachers.

1. GETTING TO KNOW THE AREA OF INTEREST: Also architects had chosen to get familiar with the area for their first step. During realization of this step they focused on acquiring information about the object of interest and its immediate surroundings. Main source of their information was not only observation but also a conversation with the owner of the resort and study of available materials about the area.

2. EVALUATION OF CURRENT CONDITIONS: After acquiring enough information pupils tried to evaluate current condition of object and its services using brainstorming and discussion.

3. DEFINITION OF PRIOR MEASURMENTS: Critical assessments enable pupils to find solutions, identify weak points of the objects and consequent suggestions for improvement. Group of architects came up with an idea and proposal for a playground for children as there is not any in the resort. This would be appreciated by families and schools alike, being frequent visitors to the area.

4. FORMING THE CRITERIA FOR SUGGESTED CHANGES: Before elements of the playground can be chosen pupils have to set basic criteria to which they will refer when choosing play items. The following criteria were chosen: adequate size, reasonable price, variety of use, harmony with surroundings, safety, longevity.

5. SELECTION OF THE AREAS FOR NEW FUNCTIONAL USE: Base element influencing construction factor is allocation. Pupils found a suitable place for the playground near the swimming pool, 200 square meters of green area.

6. SELECTING PARTICULAR COMPONENTS: Using printed and online catalogues of garden architecture pupils were choosing a variety of swings, slides, playpits etc. according to their suggested criteria and place possibilities. The result of this is a narrow selection of components suitable for and agreed by both groups.

7. MAKING THE BUDGET: This step was realized along with the previous steps. Because

price was an important factor when choosing components, it was inevitable to calculate and combine individual proposals so that budget would not be exceeded. For the potential proposal the budget was made.

8. REGISTRATION OF PROPOSALS: The final step is completing the map prepared by geodesist group including the changes proposed by architects group. This way a map of "what could be" is made by pupils.

In conclusion of a suggested program we prepared a presentation of pupils' readouts where pupils in prepared presentation described the process of the mapping and creation of the proposal. They introduced the final product of their effort "A MAP OF THE FUTURE". Involvement and enthusiasm of pupils during the presentation, pride in their own results, disclosed experiences from the implementation of the results, and actual quality of the resulting maps are positive feedback for us and reflect the percentage of our teaching efforts.

Future map

Worksheet for „architects"

Dear architects, we have got an important and responsible role for you. As the experts on children playgrounds, you have to design a new functional use of a grassy area. In an area where there is only grass at the moment you have to design a new children playground. Besides the playing zones, which are the basic elements of the playground, you should design other small architectural elements (benches, dustbins, etc.), as well.

Before you start working on the proposal you have to consider which small architectural elements will be used and what their purpose is. Write down your decisions in the table below.

	small architectural elements	**purpose**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Example:

	small architectural elements	**purpose**
1	benches	Comfortable sitting place for parents of the playing children.

If you know what a part of your proposal will be, it is important to clarify the basic criteria of the proposal. Work in a group of 5 architects and make a common agreement of your 5 own criteria which will be considered in your selection of small architectural elements.

Criteria selected:

_____

_____

_____

_____

_____

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_____

_____

_____

_____

_____

(e.g. price, purpose, safety, surroundings conditions).

Budget

Now you can start working on your proposal. Choose the small architectural elements (SAE) from the SAE catalogue which suit your criteria. Write down in the table below what types of element are planned, their dimensions, prices, number of pieces (pcs) and total prices. At the end, write down the total price of your proposal.

Example:

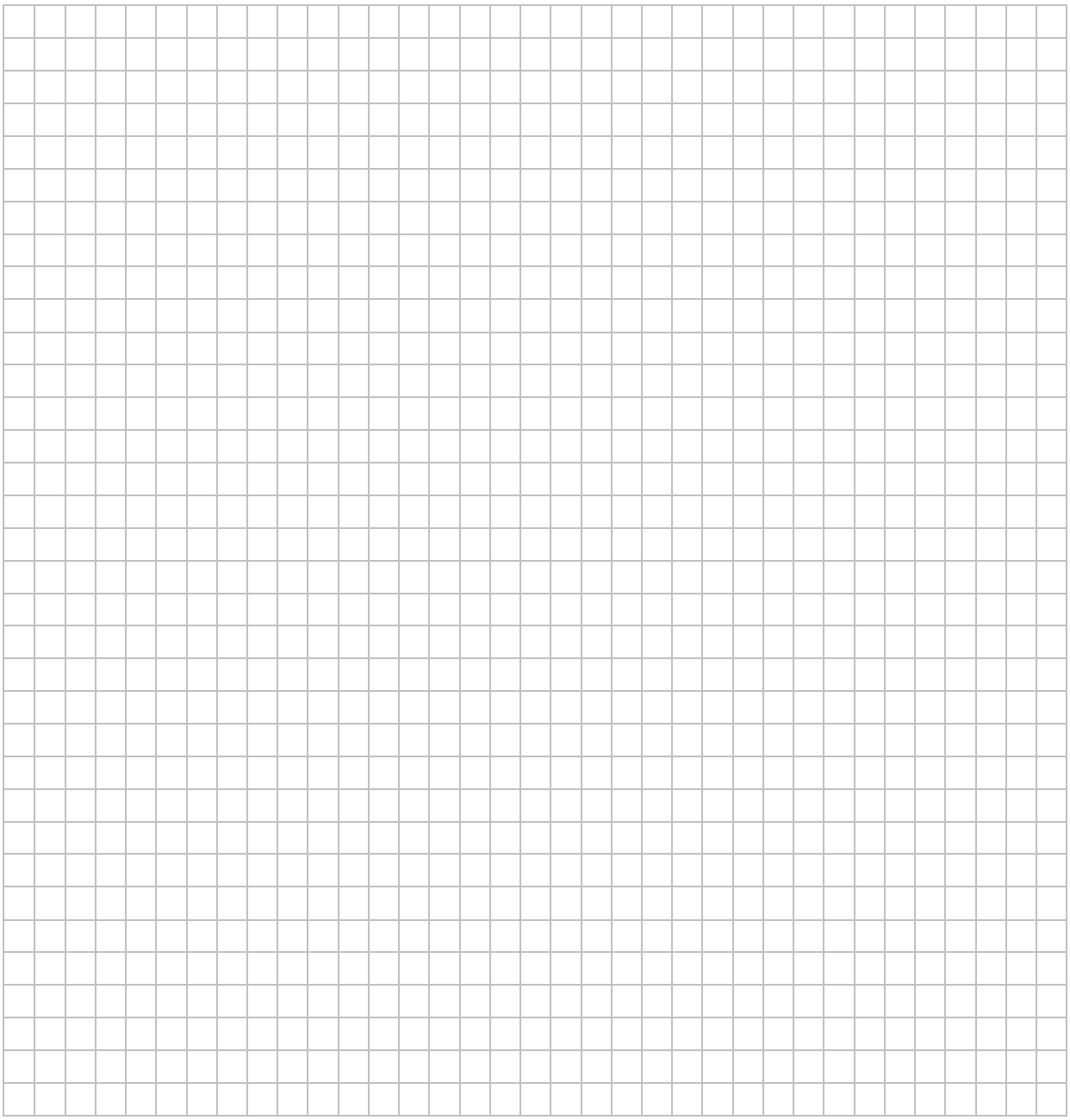
	SAE planned	Type, catalogue no.	Dimensions in meters (length and width)	Price per pcs in €	No. of pcs.	Total price in €
1	Bench	BestOne WD-Brnch	2 x 0,8	85	4	340
2	Climber	SuperFun 2345	3,5 x 4,2	410	1	410
				Total		**750 €**

	SAE planned	Type, catalogue no.	Dimensions in meters (length and width)	Price /pcs.	No. of pcs.	Total price
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
				Total		

Sketch of your proposal

Your last task is to place your SAEs into the playground area. Draw a sketch of individual SAEs and consider the following:

- Total area of playground cannot be increased,
- Real dimensions of the elements and their safe distance from the other elements,
- Logical arrangement of individual elements.



Graphic scale: 0 m Numerical scale: 1 :

(Write down the values of your scale, example: 0 1 2 3 m , 1 : 100)