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KIDS
IN CLOUDS

TEACHING SCENARIO FOR IMPLEMENTATION OF THE INTERDISCIPLINARY PROJECT FOR STUDENTS

Project title:	Compass navigation
Related Subjects	geography, physics, mathematics
Key terms :	numerical scale, navigation, compass, Pythagorean teaching, digital navigation tools

Activity name:	Getting to know the numerical scale
Duration of Activity (min)	15 min

Detailed description of the activity:

As an introduction to working on an interdisciplinary project, share a presentation with students. You can ask students to open it on their devices or you can project it from your computer. You can access the presentation via the following link:

https://view.genial.ly/62909a681a98760011cc8364/presentation-copy-kompas-povijest

While presenting the presentation, start a discussion with the students so that the students understand the basic concepts related to the numerical scale and its use. Furthermore, continue the discussion by asking the following questions:

1. How do we measure distances when we travel somewhere?
2. What units of measurement do we use?
3. Did you see something new in the presentation, a concept or process that you have not known before?
4. In what ways do we measure different distances in everyday life?

Objectives of the activity:

- students will understand that there are different units of measurement in the metric system and that we use some of them to measure smaller and some to measure larger distances (and will recognize in which cases to use individual units)
- the activity will prepare students for the next exercise.

Adapting activities for students with disabilities

Adapted activities for gifted students and those who want to know more

Activity name:	Distance measurement on maps
Duration of Activity (min)	30 min

Detailed description of the activity:

Objectives of the activity
After this activity, students should be able to:

- determine the distances between places on the map and in nature using a numerical scale
- determine the size of the area on the map and in nature using a numerical scale

Following the previous discussion, ask students the following questions and encourage them to clarify their opinion:

1. Imagine that your favorite store is not open and you have to go to another store. How would you try to find your way to another store?

2. What would you use to find a way?
3. How would you check if you are on the right track during the trip?

Help students conclude that they can always find their way to a place on a map - whether it's a classic or digital map. To explain to students the concept of displaying distances on a map and numerical scale, use the quiz at the following link:

https://app.wizer.me/learn/O7RICC

Students will have 15 minutes to solve tasks related to determining distances on a map and in nature.

At the end of the designated time, read the results of the quizzes to the students. Let each pair evaluate their solutions independently. Finally, discuss with the students by asking the following questions:

1. If you don't have a mobile phone with navigation, would you be able to find your way around and get to a place with just a map?
2. Can you think of some jobs that people wouldn't be able to do without distances?

Adapting activities for students with disabilities

Adapted activities for gifted students and those who want to know more

Activity name:	Navigating with the assistance of a map
Duration of Activity (min)	20 min

Detailed description of the activity:

Objectives of the activity:

- students will be able to manually measure distances on a map using a numerical scale and ruler
- upon completion of the activity, students will be able to compare the functionality and convenience of using classic and digital maps

Divide the students into groups of 4 students. Distribute a copy of the numerical scale map to each group, and students will need a ruler and calculator to work. Point out to the students that they have 10 minutes to solve the task. Project the task to the students using the following link: **Table 1**

After 10 minutes, interrupt the students. Check the results the students have come up with. Begin the following discussion to complete the activity, which aims to give students an idea that determining distance on a map is actually a time-consuming process and that there has been no other way to determine distance in the past. If the situation in which the distance was to be determined was urgent, the person had to be skilled.

Discussion questions:

1. Were you able to complete the task on time? If not, why not?
2. What did traveling to distant places look like in the past? What did the process of determining the path and distance look like, what skills did people have to have?
3. Do you think technology has helped us determine distances and locations?
4. Do you use GPS / navigation? How do you determine locations, paths and distances in this way?

5. Would you rather go on a trip with just a map or just a GPS device? 6. After our task, would you be able to manage on the road only with a map (without GPS)? Would you need another orientation device? This free discussion will lead to the conclusion that a compass is needed for orientation when using original maps. Announce to students that in the next activity they will learn what a compass is and how to use it.
Adapting activities for students with disabilities
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Activity name:	Compass and its parts
Duration of Activity (min)	15 min
Detailed description of the activity:	
Share your presentation with students at the following link: https://www.youtube.com/watch?v=cZlKFQk9ToU By presenting the content, you will explain to students the development of the compass as a device throughout history and parts of the compass. After each segment (slide or portion of content), ask students a question about the content to keep their focus and check what they have memorized. Also, encourage students to ask questions and comment on the presentation.	
Adapting activities for students with disabilities	
Adapted activities for gifted students and those who want to know more	

Activity name:	A short quiz about the compass
Duration of Activity (min)	10 min
Detailed description of the activity:	
Announce to the students that each of them will solve a short quiz on their own to test their knowledge. Share with students the following link through which students will access the quiz: https://app.wizer.me/learn/2KJYEF Students will have 8 minutes to solve the quiz. Use the last 2 minutes to check the correct answers.	
Adapting activities for students with disabilities	
Adapted activities for gifted students and those who want to know more	

Activity name:	With three points to - triangulation!
Duration of Activity (min)	25 min
Detailed description of the activity:	
Objectives of the activity: • students will apply their knowledge of distance determination on maps and in nature to understand the concept of triangulation for modern, digital methods of orientation and navigation • upon completion of the activity, students will understand how modern GPS systems based on triangulation work. Start the activity by setting an interesting topic for the task: "You are lost in nature, but you can see objects around you. Learn how we can use three points to determine our location! " Announce to students that they will find their location using two more familiar points (locations). Point out that this method is called triangulation. Next, divide the students into groups of 3 students. Then share with students the following link where the group assignment is: **Table 2** at the end of the document. During the task, students will determine their location in the classroom with the help of two more points (objects) in the classroom. Objects can be the edge of a table, a handle, certain bookshelves or the edges of a board. The task will be done by measuring the distance to the selected objects, which is why each group should get a meter ruler to measure. Also, students will make a sketch of the classroom floor plan on which they will draw their location, the location of the two objects and the measured distances. Students will find other detailed instructions at the link provided. Use the last 7 minutes of the activity to check the results and discuss with the students the process they have done.	
Adapting activities for students with disabilities	
Adapted activities for gifted students and those who want to know more	

Activity name:	Triangulation and Pythagoras
Duration of Activity (min)	20 min
Detailed description of the activity:	
This activity will link triangulation and Pythagoras ' teaching describing how to find the unknown based on two known values. Objectives of the activity After this activity students will be able to: • explain Pythagoras' teaching and use it in calculations • explain the connection of Pythagoras' teaching with navigation. With the help of the board, remind students of the concept of Pythagoras' teaching, how it was discovered and how it is used to find the unknown based on two known values.	

https://www.youtube.com/watch?v=JH9V3bWA1T0

Then announce to the students that each student will do the next exercise independently. With the help of the exercise, they will connect the current knowledge of Pythagoras' teaching with navigation and modern ways of determining the location. Share the digital worksheet with students using the following link:

https://quizizz.com/admin/quiz/6290c4db334a59001d2b3f00

Students will solve tasks with the help of their calculators. Spend the last 5 minutes checking the results so that each student reads the answer to one question.

Conclude the activity by emphasizing that the exercise served to understand the importance of mathematical skills for determining location and that in the continuation of the project, they will learn how to determine locations based on this principle and satellites (i.e. GPS systems).

Adapting activities for students with disabilities

Adapted activities for gifted students and those who want to know more

Activity name:	Introduction to satellite navigation techniques
Duration of Activity (min)	15 min

Detailed description of the activity:

Learning objectives
After this activity students will be able to:

- briefly explain how satellites determine the location of objects
- explain how satellites use the triangulation method.

Share with students the following presentation or project it with your computer:

https://www.youtube.com/watch?v=4O3ZVHVFhes

Using the content of the presentation, explain to the students :

- what are satellites
- how satellites work, how they determine the location of objects on Earth
- how GPS devices work thanks to satellites and triangulation.

Adapting activities for students with disabilities

Adapted activities for gifted students and those who want to know more

Activity name:	Let's study the world with the help of satellite images
Duration of Activity (min)	30 min

Detailed description of the activity:

In the introductory part of the activity, point out that some satellite images are easily accessible to us and that we can use them every day. Then open Google Earth (https://earth.google.com/web/) and project a classroom view. "Rotate" the view of the Earth, explaining to students that satellites have made it possible to record the Earth, and based on these images, we can today use a tool like this that gives us something like a digital globe. Moreover, interest the students in the question: “Can we accurately show the house / building / place where we live on the globe? Can we do this with this tool? ”

Then divide the students into pairs. Announce that students will be doing home research around the world and taking notes on their research. Students should open Google Earth on their devices , answer the questions below, and write down their observations and answers. Students will have 15 minutes to practice. The tasks are as follows:

1. Find the houses / buildings you live in.
2. Now set off from your home to travel the world - find 4 more homes around the world. Every home must be located on a different continent. Write down in which city / town and continent are the 4 homes you have chosen.
3. Describe the space around all 4 selected homes - as seen in the satellite image. Try to notice as many details as possible: are there many other buildings around the house, what is the nature around the house, is it near rivers / mountains / sea, what are the roads near the house, is there a park or airport, try to describe what is the life and culture of that place just based on satellite imagery.

After 15 minutes, ask a few pairs to present their results.

Then, start the final class discussion by asking the following questions:

1. How were you able to move to those 4 chosen homes?
2. Has Google Earth helped you explore the world?
3. How has modern technology (satellites and imagery) changed the way we can observe the world?
4. In what situations do technology and satellites help us every day?

Conclude the activity and interdisciplinary project by asking students to summarize what they have learned in one sentence. Write that sentence on the board.

Adapting activities for students with disabilities

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Annex 1

Exercise:

Make sure you have: a pen, a ruler, a protractor, a compass and an eraser

Guidelines

1. Read each question carefully before answering it.
2. Don't spend too much time answering one question.
3. Try to resolve each issue.
4. Make sure your answers seem logical to you.
5. Share your results with classmates.

1 . The map has a ratio of 1 cm: 3 kilometers.

The distance between the two cities on the map is 7 cm.

What is the actual distance between the two cities?

Include units of measure in your answer.

.....

2. The sketch shows the position of the school and shop (blue symbol X).

School

Trade

The scale on the map is: 1 cm = 100 meters.

Calculate the actual distance between the school and the store.

Express your answer in meters.

..... m

3. The scale of the map is 1 cm: 4 kilometers.

The actual distance between the two cities is 52 kilometers.

What is the distance between the cities on the map?

..... cm

5. The scale of the map is 1 cm: 100 kilometers.

C_____D

(a) Use a sketch to calculate the actual distance between the points shown in letters C and D.

..... km

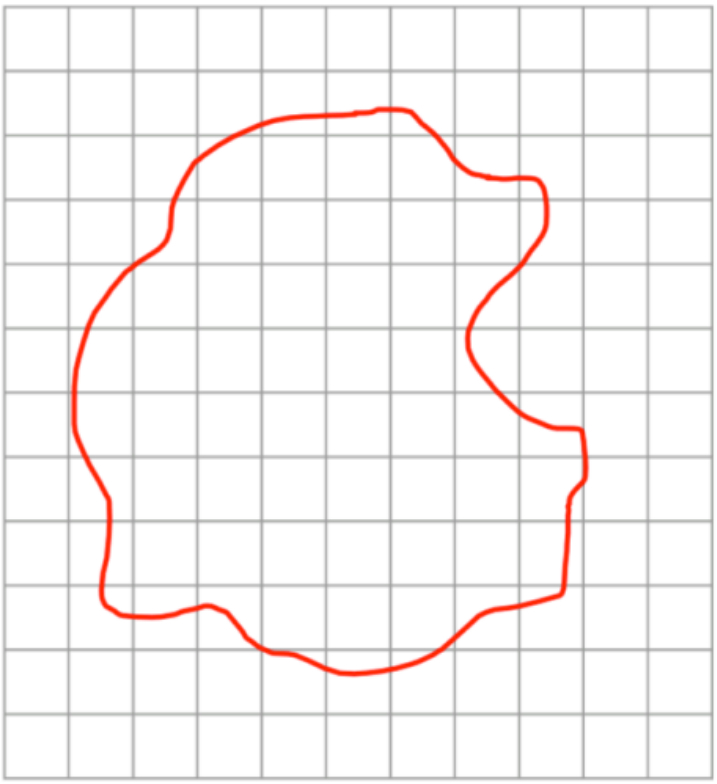
(b) Point E in nature is located 300 km south of point C. Show point E in the sketch.

5. The sketch shows points on the map showing two cities - Leek and Milton. The scale of the map is 1: 10000.

(a) Use a sketch to calculate the actual distance between cities.

..... km.

6. A drawing of the island is shown.



- Each square of netting has an area of 1 cm²
- 1cm² represents 10km²
- Estimate the area of the island.

Give your answer in km²

..... km²

7. The map has a scale according to which 1 cm on the map represents 2 km in nature.

What is the actual length of the road that is 5.5 cm long on the map?

..... km

8. The map has a scale according to which 1 cm on the map represents 50 meters in nature.

(a) Circle the ratio that represents this measure:

1:50 1: 500 1: 5000 1: 50000 1: 500000 1: 5000000

The distance between the two shops on the map is 4.5 cm.

(b) What is the actual distance between stores, expressed in meters?

9. The map has a ratio of 8 cm: 1 km.

(a) Write this scale in its simplest form.

.....

The distance between the two lakes is 4.5 km.

(b) How much will it be on the map?

..... cm

10. The scale of the map is 1: 4000

The distance between the two houses on the map is 9 cm.

What is the actual distance between the houses?

Express your answer in meters.

..... m

Annex 2

Exercise in the classroom

From the earliest times, people wanted to determine their location to know in which direction they should move.

In the past, researchers have relied on stars to assess where they are.

We can say that today there are constellations of navigation satellites orbiting the Earth that provide us with very accurate information about our position on land, sea or in the air.

Satellites help travelers calculate their latitude, longitude, altitude and even speed and direction of movement with great accuracy.

GPS (global positioning system) with the help of 3 points (3 satellites) determines the location - this is called the method of triangulation.

Triangulation and you - find the lost hunter!

You have to find the hunter lost in the woods. One member of the group is a hunter.

The other member of the group is the mountain. He or she stands about 2 feet from the lost hunter.

The third member of the team is the TV tower. The tower is about 2 meters away from the hunter. All three, together form the vertices of the triangle.

Record your positions by mapping points on a piece of paper, drawing three points, and using a scale to record distances.

Add another reference point to your map. This point will show a tree that is 6 feet away from the hunter, so the mountain, TV tower and tree also form another triangle.

Using 3 reference points, now triangulate the hunter position.

This is how GPS works. Instead of mountains, TV towers and other points, triangulation is done with the help of satellites. Receivers constantly communicate with satellites orbiting the Earth, and satellites send distance information to a specific point. This allows the receiver to display a specific location with an accuracy of 100 meters.