



Concepts for teaching units

GREEN GEOMETRY

Environment	The learning environment for these activities should be indoors (in the class) and outdoors (in the open air), i.e. in a virtual environment where students can plan and give free play to their imagination, and in a real environment in full contact with nature. Working in groups will enforce both individual and cooperative learning, as single peculiarities are an added value for the whole group.
Age of students/grade	12-13 years (2 nd or 3 rd year in Lower Secondary School = Scuola Secondaria di primo grado)
Length of the unit	This teaching unit can be developed in 4-8 lessons, depending on the interest shown by the class and on the number of interdisciplinary connections proposed. In addition, it can be developed just from a theoretical point of view (through drawings and representations) or also through practical activities which could need more hours.
Materials needed	Interactive whiteboard, usual stationery, PC. Practical activities can be developed in an indoor or in an outdoor place at school, but always within reach of the students. They will need: tape measure, inert material for building, topsoil and plants, depending on their availability.
Objectives	<ul style="list-style-type: none"> • Using graduated scales in meaningful contexts • Expressing measurements through multiples and submultiples of a certain unit. • Learning to name different plane and solid figures; drawing these ones by means of appropriate tools (ruler, compasses, goniometer, geometry software) • Learning definitions and properties of the main plane figures (triangles, quadrilaterals, regular polygons, circle) • Calculating the area and perimeter of plane figures • Calculating the volume of solids, their capacity and density depending on the used materials • Describing complex figures and geometrical constructions in order to describe them to others, too • Solving problems using geometrical properties of figures (Pythagorean theorem, similitudes, equi-decomposability, equivalence)
Content related anchor points	<p>The activities with measurements can lead to a discussion about units of measurement which are different from ours and which are used in other countries. Their use in practical activities will be useful to get used to less famous multiples and submultiples, which exist and could be used.</p> <p>The key competences involved are connected not only to Mathematics but also to personal, social and digital competences, as well as learning to learn competence.</p>

	<p>Foreign students will be involved in group activities where they can share habits, traditions and aesthetic tastes from their native countries, looking for pictures and describing famous gardens in those countries.</p> <p>For a further interdisciplinary study in depth they can surf the net about the different vegetable species they can find in different environments and about their different growing rates in order to propose their use.</p> <p>The close connection with real gardening activities makes this kind of work useful for economic evaluations (costs for materials, total expenses, optimal use of a starting budget...)</p>
Methodology related anchor points	<p>The teaching method involved is highly inclusive; it implies an initial brainstorming where every student can have a role and give his/her contribution to the discussion. The teacher shows some pictures about gardens and green areas as a starting point and then the students can surf the net to add something to this material.</p> <p>The teacher, starting from the material provided by the students, will develop an activity based on the identification of the observed geometrical figures, making a general outline about plane figures and formulas to obtain perimeters and areas (maybe previously explained during preparatory lessons)</p> <p>The next step implies the inspection of the chosen place which has to be redesigned; in this way there will be small groups of students cooperating in collecting data and measurements.</p> <p>The planning as well as the designing activities will be developed by heterogeneous groups of students in order to foster sharing and interaction.</p> <p>This kind of work can be linked to several subjects: the ITC teacher can be involved for technical drawings or particular software used for drawing; the Art teacher can give some advice about the aesthetic taste and harmony of the project; the Science teacher can explain the different vegetable species to use and the peculiarities of that particular soil. The Civics teacher can speak about the basic rules to protect green areas and the Language(s) teacher(s) can transform these rules into simple orders or prohibitions.</p> <p>The design activity will be followed by the carrying out of the project, indoors (virtual planning) or outdoors depending on the available space and the economic resources of the school.</p> <p>At the end of the activity the groups will write an explanatory text which can be shown, for example, during school exhibitions.</p>
Language related anchor points	<p>During preparatory lessons the teacher will probably need to show the main plane figures which could be observed during the activities and to use explanatory maps with drawings and formulas, in order to make the work clearer and more comprehensible for everyone. In the same way this can be done with units of measurement and possible conversion tables.</p>

Appendixes

Examples of pictures you can find surfing the net (gardens and flowerbeds around the world, types of plants...)