

Long before the time of recorded history, geometry originated out of practical necessity; it was the science of measuring land. The first geometrical considerations “had their origin in simple observations stemming from human ability to recognize physical form and to compare shapes and sizes”.



Maria Montessori devised beautiful materials—the geometric solids (which show spheres, cubes, rectangular prisms, cylinders, cones, etc.)—to demonstrate three dimensions of shape. From a very young age, the child has experienced this type of geometry through playing with objects. After the child has explored forms and shapes, he begins to understand figures and their details. Additional materials include the geometry stick box and command cards. Now, the child is learning the different parts and types of lines, angles, triangles, and other shapes.



Montessori made it a point to show the connections across all areas of the curriculum, to give the vision of the whole world and allow the development of the whole child. In line with her philosophy, the study of history connects to the child’s study of geometry. The beginnings of geometry can be traced back to ancient Egypt, from around 3000 BC. To captivate the child’s interest, the guide can tell the Story of Geometry to educate the child about these ancient beginnings. The story is set in the desert of Egypt and tells that when Spring would come, it would rain so much that it would flood the land...

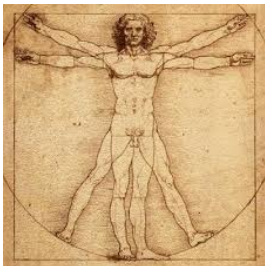
“This was a good thing, since plants could only grow near the banks of the Nile River, it allowed for the land to be fertilized. With this fortune was confusion, for the lines that separated the farmer’s fields would be washed away and arguments would arise. Resolutions came from a group of people called ‘harpenodapta’, which means ‘rope-stretchers’ in Greek. They would stretch a rope that had knots at certain intervals, and weigh it down at the knots, bringing the ends together. This created triangles; flipping the triangle over, they could measure a rectangle. Using this method, they could measure the land and figure out which land belonged to which farmer.”



And so, in determining ownership, geometry began—man measured the earth. Quickly thereafter, geometry began to be applied to many other disciplines, most notably astronomy. The intersection of astronomy and geometry enabled scientists to determine the placement and movement of stars and planets. The concept of the curve was found in flowers and the sun, a parabola was represented by tossing an object, and spider webs posed an excellent example of regular polygons. Symmetry could be seen in many living objects, including man, and the idea of volume had to have been addressed when constructing a device to hold water. We can look to the history of ideas, and how they evolved with geometric principles in place. In the Montessori environment, the child's work with geometry is parallel to the creation of the universe, the earth, the land, and human intervention. We use geometry to create our buildings, furnishings, art, utensils, machines, clothing and urban plan, and geometry in the natural environment is incalculable.



Geometry is everywhere. It is the way the Universe speaks. It is the way energy expresses itself. 'From the microscopic to the galactic, everything follows the patterns of energy'. Furthermore, if the child understands that energy is everywhere, and therefore geometry is everywhere, then he can begin to see that the natural shape of a solid object gives us clues to the nature of the energy that



formed it. As the child has gained such knowledge about the science of geometry, and an idea of man's past, he has gained the power of intellectual consideration. His possibilities are now limitless. With appreciation of his study, the child will gain a better understanding of how natural forces interact in the development of society and culture and perhaps be able to discover practical techniques for bridging science and spirit, all while deepening his relationship to the world around him.

“WE MUST HELP THE CHILD TO ACT FOR HIMSELF, WILL FOR HIMSELF, THINK FOR HIMSELF; THIS IS THE ART OF THOSE WHO ASPIRE TO SERVE THE SPIRIT.”
MARIA MONTESSORI



One can find geometric shapes and patterns in timeless structures across the world, or daily workings of the natural world. Geometrical concepts are introduced in the Montessori curriculum at the sensorial level in the primary classroom through the exploration of geometric shapes and patterns. Early geometry materials include the triangle boxes, the geometric cabinet, and the geometric bases and solids. Through these early activities, the child simply learns the names of shapes and begins to associate the name with the shape. These activities do more than introduce geometric concepts; they also increase hand and eye coordination and fine motor skills as the child traces the outline of the shape with a fingertip or pencil.

The concepts of forms and shapes in the Children’s House are explored further in the lower elementary classroom when the child begins to understand the figures in more detail: precise language, understanding the

GEO
(Greek)
means “earth”.

METRIA
(Greek)
means “measure”.

differences and relationships of the figures, as well as the mathematical aspects of these geometric figures.

The exploration of geometric solids, lines, angles, and shapes form an important foundation for further study of geometrical concepts. In addition to the geometry

materials used in the primary classroom, lower elementary students also begin to use the geometry stick box, nomenclature cards, and command cards,

offering an open ended field of exploration in which the child is able to discover important principles and relationships. The child will learn the nomenclature for the figures in the geometric cabinet: basic shapes, triangles, rectangles, polygons, circles, quadrilaterals, and curved figures. Through various lessons the child will be provided with knowledge of the names of the figures, their etymologies, and their properties. The child will go on to explore constructive triangles and discovers how various triangles construct quadrilaterals. New knowledge is always applied to the environment (such as finding right triangles in the floor, walls, and furniture) and extends to the creation of a piece of artwork as well. Along his geometric journey, the child develops a new sense of awareness in his every day activity.

Maria Montessori saw geometry as firmly rooted in reality, and built a curriculum that leads students to concepts through sensorial experimentation, concrete experiences and their own creative research.