
Colouring In Mathematics: Venn Diagrams

What would it be if the world is without colors? At some point in time, television shows in black and white. In the world that we live today, the advancement of technology brings color everywhere. It changed the way we live, communicate, travel, and learn. Classrooms have evolved from the blackboard (green in color) with yellow chalk to electronic devices with thousands of colors. There are various resources that teachers can now use in encouraging students to learn. Colors enable us to see the world more precisely. We are living in the era where people have understood the power of colors and their effects on human life.

According to Barrett (2008), colors can be used as a way of finding information or an object in a classroom by giving signals to the brain (as cited in Rhinehart Neas, 2012). Children usually learn about colors during their preschool years. It is a milestone in the child's cognitive process when they are already capable to identify colors. Some institutions include it as a part of their screening for development and educational admittance. Early identification of colors helps to create the cognitive link between visual clues and words. They can understand better, when letters, numbers, and characters are distinguishable. The eyes will automatically focus on what is unique and different. Feelings, attention, and behavior of people can be affected when learning merely by the selection of the right color. In the study of Pan (2012) as cited in Olurinola and Tayo (2015), visual geometrical shapes with various colors were used. The participants were asked to remember the colors and shape of the items. He found that participants performed better in recognizing the color of the items than shapes. Therefore, it can be concluded that colors are effective tools to increase memory performance and to produce a higher level of attention. Moore, Stammerjohan and Coulter (as cited in Dzulkifli & Mustafar, 2013) noted that color can be very effective in academic setting, communication, advertising or even sport. It is one of the important elements affecting individuals' consideration, state of mind towards the product, and decision-making in advertisements.

One of the fundamental subjects in mathematics is set theory. According to Weiss (2008), Set Theory provides a foundation for the rest of mathematics and is considered as the milieu of mathematics. It is a basic requirement to know the concepts of set theory in learning mathematics. Mehta and Yadav (2014) stated that the concept of set theory could not be disregarded. It is very important as it is utilized in many areas of science and mathematics from formulating logical foundation for geometry, calculus and algebra to biology, chemistry and physics. It is also commonly applied in computer and electrical engineering. Moreover, Limin (2008) stated that in order for students to cope with real life successfully, it is necessary to understand and master the basic concepts and skills in Mathematics (as cited in Baking et. al, 2015). Man will base his life on critical thinking and scientific work rather than on trial and error.

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However, Dogan-Dunlap (2006) as cited in Razmjooei (2013) stated that many students have difficulty in understanding subsequent mathematics topics because of lack of mastery of prerequisite knowledge. When students were introduced in set theoretic contexts, they are confused even with the word set. They failed to distinguish between sets and elements. Problems on sets and sets operations are usually solved through Venn diagrams. It is imperative to understand the concept of a set before moving on to understanding Venn diagrams. Venn diagram is an efficient way of representing and analyzing sets and performing set operations. It is the most common visual register in set theory. Named after the English logician John Venn, it is a visual organizer that is used to compare and contrast defined concepts. Two or more overlapping circles were used in a Venn diagram.

According to John Venn "On the Diagrammatic and Mechanical Representation of Propositions and Reasoning" (1880: 59) as cited in Junaid (2012), these circles help the learners to easily visualize the similarities and differences between the defining characteristics of the defined concepts. Venn diagram helps in clarifying the difference in related concepts that share some or many characteristics. In addition, it is a method that is easy to understand and can enhance non-linguistic visual reasoning. Also called as Set diagrams or Logic diagrams, Venn diagrams are widely used in mathematics, logic, statistics, linguistics, computer science and business. Mulford (2016) emphasized that Venn diagrams are helpful in dealing with problems or any situations.

According to him, the little space found when two circles meet is where you can uncover the solution to the problem. Schools used Venn diagrams to teach basic math concepts such as sets, unions and intersections. They are also used to solve complex problems in advanced mathematics. Teachers also use Venn diagrams to improve the reading comprehension skills of the students. Students can draw diagrams to compare and contrast ideas they are reading about. On the other hand, statisticians use Venn diagrams to predict the probability of certain occurrences as well as in the field of predictive analytics. Data sets are being compared to find the areas where there is commonality or differences.

In fact, Liu and Zhu (2016) stated that when set theory and Venn diagram and the use of propositional logic are applied to qualitative reasoning, it could increase the student's learning about basic statistics with quantitative data. In Logical Reasoning, Venn diagrams are useful tools to determine the validity of particular arguments and conclusions. Also, Venn diagrams are being used by programmers to visualize computer languages and hierarchies. Venn diagrams are commonly used in presentations and reports because they clearly visualize data. Moreover, in the world of business, Venn diagrams are effective communication tools in illustrating comparisons of products, services, and processes.

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