# Math in soccer essay sample

Sport & Tourism, Football

The mathematician S. Gudder once stated, “ The essence of mathematics is not to make simple things complicated, but to make complicated things simple.” Although it seems extremely complex, the idea of mathematics seeks to simplify the unpredictable occurrences of life. Mathematics, the study of quantity, structure, space, and change, exists throughout the entire universe. It attempts to provide some solid explanation for the seemingly random chaos in the world. Mathematicians search for patterns that are present in life and that apply to the numerous laws of math. There are several fields of mathematics, some of the simpler ones being algebra, geometry, trigonometry, and calculus. One subject in particular that illustrates mathematical concepts is the game of football, or commonly known as soccer.\n\nI have been playing soccer for almost ten years, and it is my passion. I chose this particular topic to explore the mathematical relevance of the sport, to attempt to further my knowledge of the game, and possibly improve my play through mathematical research. Football, also known as “ the beautiful game”, is the most popular sport in the world, played by people of all ages and countries. It requires two teams of eleven players, including one goalkeeper, a regulation size field, a standard soccer ball, and an officiating team for official play. The objective of the game is to score the ball into the opposing team’s net, and with the exception of the goalkeeper and throw-ins, the players are not allowed to use their hands. Players use the rest of their body to dribble, pass, and shoot to drive toward the other opponents’ goal. The team with the most goals at the end of the match is declared the winner.\n\nOne aspect in which soccer relates to the mathematical concept of geometry is the dimensions and mechanics of the

field, also known as the pitch. A FIFA-regulation field is a rectangle, measuring 100 yards by 60 yards, divided in the center by the half-line, including two goals 24 feet wide and 8 feet tall. In the center, there is a circle with a radius of 10 yards that is used in the kick-off. On the ends near the goals, there is a rectangle, 44 yards wide and 18 yards deep, called the penalty area. In the center of penalty area is a penalty mark/spot used for penalty kicks which is 12 yards from the end-line. At the top of the penalty area, there is an arc 10 yards from the penalty spot. Around the goal, there is a goal area 20 yards wide by 6 yards deep establishing placement of a goal kick. Also, ate each corner, there is a 1 yard quarter circle signaling placement of a corner kick. The field is symmetrical and although confusing to some, consists solely of a combination of rectangles, circles, and arcs. Geometry is even evident in the construction of a soccer ball. The three-dimensional object is formed by a spherical association of hexagons and pentagons which are sewn together to form a ball with a 27 to 28 inch circumference.\n\nAnother aspect in which soccer pertains to geometry is in the angles. Angles play a large part in the game of soccer. In every kick, the angle at which the player swings his leg to strike the ball varies the strength and behavior of the ball when it is kicked. Also the angle at which the foot makes contact with the ball affects the power and behavior. A punt is a kick used by the goalkeeper where the keeper will hold the ball in front of him, drop it, and then kick it. It is commonly believed that the optimum angle for performing the perfect punt is at a 45˚ angle. In an experiment by Nicholas P. Linthorne, the angle used that achieved maximum distance was discovered to be between 40˚ to 44˚. Punting a ball between these angles

would result in a kick that yields the best optimum projector for a goalkeeper. By varying this angle of the leg swing, the angle at which the ball projects after the kick.\n\nFor example, striking the ball towards the upper third will create a low ball, striking the ball in the center third will result in a strong strike that has the potential to rise in the air, and striking the ball towards the bottom third will most likely cause it to lift off the ground and be a high ball. For instance, angles are utilized to the players' advantage to maneuver the ball around the opposing team. Some teams employ a triangle offensive which involves the players forming a triangle to pass around players. Defenders can minimize the effectiveness of enemy passes by cutting down the angle of space that the opposing player has to pass. To counter this, offensive players can move to a position that maximizes the angle.\n\nIn addition, the goalkeeper's positioning in a one on one situation also displays mathematical roots. In a situation where the goalkeeper is in this situation, they first must position themselves on an imaginary line that bisects the goal and connects with the ball. Also, the goalie should be equidistant from imaginary lines that extend from the goal posts to the ball. Depending on the distance between the attacker and the goal, the exact positioning of the goalie in terms of the attacker is usually closer to the attacker to cut off the angle of the shot. When diving, the goalkeeper should dive slightly forward as to cut off the amount of open goal as much as possible. However, the attacker can counter this tactic by attempting to curve the ball. This can be achieved by striking the ball at one of the sides with enough force to cause it to curve around the goalie and into the goal.\n\nThe sport of football has a surprising relevance to the field of

mathematics, proving the importance of math in our daily life. From the simple task of kicking the ball, to the goalkeeper’s complex angle-cutting tactics, math has a play in all occurrences. On a broader scale, math provides explanation and insight to the phenomenon of life. Math simplifies the seemingly intricate complexities of life.