**PRIMO Lesson Four Handout**

**Probability on the Coordinate Plane**

When doing counting and probability problems, it is sometimes useful to construct a model on a geometrical coordinate plane and derive the answer from the model. Some ways that the coordinate plane could be applied to probability as listed below.

**Marking Numbers**

Some problems can be transformed to the calculation of the number of paths of a point on the coordinate plane. Each lattice point on the coordinate plane here is represented by a number indicating the number of ways to reach this point and is derived from the sum of all possible points that can directly reach this point.

**Finding the Area**

Other counting problems may be transformed into area-finding problems through transformation. To accomplish this, you must find a way to fit the probability problem into geometrical shapes, and finally calculate the “shaded area”.

**Q1.** Starting from the origin of the coordinate plane,how many ways are there to go to (5,4) if, per move, you can go 1 unit up, 1 unit right, or 1 unit up and 1 unit right?

**Q2.** Mamba and Mamma both arrive at the same farm at some point between 1:14 PM and 5:14 PM, each staying for half an hour. Find the probability that they meet.

**Q3.** How many ways are there for Fake Madrid to end up with 25 points after round 14, given that the next round will be round 8, Fake Madrid currently has 14 points, 3 points are rewarded for winning a round, 1 point is rewarded for drawing, 0 points are rewarded for a loss, and that Fake Madrid is equally likely to win, draw, or lose any round?

**Q4**. Gey and Jay are playing a game called “gayme”. Each round there will be a winner, and Gey wins if he wins more than the square of the amount of the rounds that Jay wins, while Jay wins if he wins more than three rounds of the wins of Gey.

Find the number of ways for Gey to win after round 13.