**Coin Probability Activity**

Each group will be given a grid with large 5cm x 5cm squares, and a 1p and 2p coin.

You play a game in which you have to toss a coin onto the grid. **You win if the coin doesn’t overlap with any of the lines.** Don’t count throws if the centre of the coin is outside the play area.

**Task 1**

By repeatedly playing the game 30 times, determine a suitable experimental probability of winning with each coin. (You can also do with 5p if you like!)

|  |  |  |  |
| --- | --- | --- | --- |
| Coin | Wins Tally | Losses Tally | Relative Frequency |
| 1p |  |  |  |
| 2p |  |  |  |

**Task 2**

We now wish to determine the theoretical probability that we will win the game for each type of coin.

You should remember that a probability in general can be calculated using

It’s also possible to do this with areas:

1. Measure the diameter of each coin:   
     
   1p \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2p \_\_\_\_\_\_\_\_\_\_\_\_\_
2. Focus on a single square on the grid. As the coin can move about inside the square such that you win, what area is covered by the centre of the coin?  
     
   1p \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2p \_\_\_\_\_\_\_\_\_\_\_\_\_
3. Again focus on a single square. As the coin can move about inside the square such that the centre of the coin is within the confines of the square (but may overlap with a line), what area is covered by the centre of the coin?   
     
   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Hence determine the theoretical probability of winning for each type of coin. Compare this with your experimental probabilities.  
     
   1p \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2p \_\_\_\_\_\_\_\_\_\_\_\_\_

 What is the probability of winning if you have a grid of size squares and a coin of diameter ? Give your probability as an expression in terms of and .