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|  | **Eastern Goldfields College**  Mathematics Essentials 2019  Lead Up Activity  Investigation – Probability and Simulations 1 |
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Name:

**This booklet will be your notes for the assessment**

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**I want to win Lotto!**

Lotto is a gambling activity. You pay to enter according to how many games you purchase. Each game is one chance of winning a prize. The barrel is filled with numbered balls and a set amount of winning numbers are randomly selected from the barrel.

**Starting small.**

Let’s assume that there are only a total of 5 balls numbered 1 to 5 and you need to choose one ball to win.

1. What are all the possible results of the draw?
2. What is the probability that you win in any one week if you purchase just one entry?
3. Describe how you could simulate this.
4. Conduct a simulation of 20 trials and record your results below.
5. If 4 was the winning number, what was the probability of winning based on **your** simulation.
6. How close did your experiment get to the theoretical probability?

Now let’s assume that there are two balls drawn out of the five balls.

1. What is the sample space?
2. If you purchase a single game, what is the likelihood that you will win?
3. Would it be more or less likely that you will win than when only one ball is drawn? Explain.

Next, let’s assume there are three balls drawn out of the five balls in the barrel?

1. List all the possible outcomes and work out the probability of winning? (Order does not matter. That is; 1, 2, 3 is the same winning combination as 3, 2, 1.)
2. Is it harder to win than when two balls are drawn? Why?

**Getting bigger**

Let’s go back to looking at a Lotto draw where you need to draw two balls, but this time we’ll work with a barrel of ten balls.

1. There are 45 possible outcomes in this Lotto draw. What is the theoretical probability of

winning?

1. Design a simulation to find what the likelihood of winning is based on experimentation.

Describe your method in detail.

1. How many games (trials) are you going to play? Justify your choice.
2. Run your simulation and write your results into a table.

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| The winning two numbers drawn are 2 followed by 7. |

1. Record your results below;

|  |  |
| --- | --- |
| Wins |  |
| No win |  |
| Total |  |

1. How close did your experiment get to the theoretical probability?
2. How could you be sure of getting a result close to the theoretical probability?

15. Identify a factor that may cause your simulation to no longer model the real world event.