**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Circle your teacher’s name:**

Mr Humphreys, Ms Long, Ms Potter, Mr Sydney-Smith

**2022 Year 12 Mathematics Essentials**

**Practical Investigation: Using Probability in the Real World**

**Mark:**

**Conditions:**

* Time Allocation: Due Friday 26th August by 11:59pm
* Type of Submission: Written (typed) report submitted digitally on Teams
* Include headings and sub-headings
* Resources Available: Open book (anything)
* Word count: 150-250 words

**Marking Allocations**

|  |  |
| --- | --- |
| **SECTION** | **MARKS**  **AVAILABLE** |
| **Introduction** | **4** |
| **Research Method** | **3** |
| **Results** | **5** |
| **Discussion** | **4** |
| **Conclusion** | **4** |
| **TOTAL** | **20** |

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A company sells bottles of water and each bottle cap has one of 4  letters written on the inside. The letters being S,T,A,R. The company offers a prize if you collect all 4 of the letters and so can make the word. We will assume that each of the 4 letters is as likely as any other letter. In other words, there is a 1 in 4 chance of getting any letter.

Your task is to design a method to simulate the experiment to work out how many bottles need to be bought to collect all 4 letters.

Your report needs to reflect the statistical investigation process as stated below:

1. Clarify the problem and pose one of more questions that can be answered with data
2. Design and implement a plan or obtain appropriate data (data has been collected for you).
3. Select and apply appropriate graphical or numerical techniques to analyses the data.
4. Interpret the results of this analysis and relate the interpretation to the original questions.
5. Communicate findings in a systematic and concise manner (follow the structure on the next page).

**Structure of report:**

1. **Introduction** (minimum 4 sentences)

* Provide some background information of the topic.
* Explain what the report is about.
* **Estimate** the most likely number of bottles you believe a person would need to buy to acquire all 4 letters.

1. **Research Method**
   * Design a way to simulate the experiment using technology or dice
   * State what was used for the simulation.
   * Explain your method used to collect the data.

1. **Results**
   * Include the raw data table of data collected.
   * Create a frequency table where the number of bottles varies from 4 to 14 and >14.
   * Perform the experiment 40 times and complete the table.
   * What is the probability that a person acquires all 4 letters in less than 10 purchases of bottled water?

1. **Discussion** (minimum 4 sentences)

* Explain why simulations are used.
* State the mode of your data.
* Explain what your mode represents in terms of the real life sales.
* Add anything else that you notice of relevance.

1. **Conclusion** (minimum 4 sentences)

* Summarise your process
* Summarise your findings and conclusions.
* How could retailers change this situation to improve their sales.
* How did your mode compare to your estimate?