** Mathematics Assignment 12**

**Penny Pushers**

**Date:** Due

**Overview:**

You may enjoy playing a game that involves pushing a penny across a smooth surface and scoring points depending on where the penny ends up. This game is similar to other games such as shuffleboard and curling. In this project, you will design a game that involves pushing a penny and calculate the probabilities involved.

**Preparation Work and Tasks:**

1. Create a design for the Penny Pusher game board. You will have to decide how to score points, and how to make sure your game is fair. **(5)**
2. Compare your game design with another student’s design. Decide whose game is more fair. How can you tell? **(2)**
3. Determine the theoretical probabilities of scoring for your game. **(3)**
4. Make alterations to your own game to make it more fair. **(2)**
5. Play your Penny Pusher game with a partner. Record your results. **(3)**
6. The results of your game are your experimental probability data. Record your results in a chart. **(3)**
7. Compare the theoretical probability of your Penny Pusher game to the experimental probability. **(2)**
8. If the theoretical probability is close to the theoretical probability, explain why. If it isn’t, how can you make the experimental probability closer to the theoretical probability? **(5)**
9. Create a spinner to represent your Penny Pusher game where the outcome is purely chance. Spin the spinner in rounds of four spins. Record your results. **(5)**
10. Compare the results from the spinner to the results you had when you played the Penny Pusher game. What conclusions can you make about your skill level in the game? **(5)**
11. Design another simulation to model the probability of your Penny Pusher game. How will you ensure that the simulation represents the theoretical probability of achieving the score? **(5)**

**Evaluation:**

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| **Category** | **Level 4** | **Level 3** | **Level 2** | **Level 1** | **%** |
| Depth of Understanding | Demonstrates thorough understanding of concepts. | Demonstrates considerable understanding of concepts. |  |  | 20 |
| Problem Solving / Thinking | Use of procedure includes almost no errors or omissions. | Use of procedures is mostly correct, but there may be a few minor errors and / or omissions. |  |  | 20 |
| Application of Learning | Demonstrates sophisticated ability to make connections between mathematics learning and the real world. | Demonstrates considerable ability to make connections between mathematics learning and the real world. |  |  | 20 |
| Explanation and Justification of Concepts, Procedures, and Problem Solving | Provides thorough, clear and insightful explanations / justifications, using a range of words, pictures, symbols, and / or numbers. | Provides complete, clear and logical explanations / justifications, using appropriate words, pictures, symbols, and / or numbers. |  |  | 20 |
| Use of Mathematical Vocabulary | Uses a broad range of mathematical vocabulary to communicate clearly and precisely. | Uses mathematical vocabulary with considerable clarity and precision. |  |  | 20 |