

# Middle School Statistics Project

**CARNIVAL GAME PROJECT** \_\_\_\_\_ **Date** \_\_\_\_\_

**Team** \_\_\_\_\_

## Introduction

You are going to work in groups of 3 or 4 to design a probability game that you will host at our in-class carnival. This will count as a test grade. The game you will design needs to be fun, and it should have some sort of prize for the winner. The prize could be a high five, fake money, cookies, etc. You will use what you know about probability to create the game, find the probabilities of winning and losing, and play the game yourself to collect data on experimental probability.

GET THIS FORM SIGNED OFF ON THE DUE DATES. Write the name of the student representative for each task.

LESSON COMPONENT	Each Student (S) / Group Rep (G)	DUE DATE	Teacher Initials
1. Approve Topic	<b>G</b>	5/18 (End of Class)	_____
2. Submit Hypothesis	<b>G</b>	5/19 Beg. Of Class	_____
3. Create Carnival Game	<b>G</b>	5/20 (End of Class)	_____
4. Collect Experimental Data	<b>G</b>	5/21 (Beg of Class)	_____
5. Statistical Analysis of Winning and Losing (both experimentally and theoretically. It must include expected values, and checks for randomness.)	<b>G</b>	5/22 (Beg of Class)	
6. Video Presentations with Interpretations of Experimental Results, Conclusions and Recommendations	<b>Whole G</b>	5/26/20 (Attach video to Assessment)	
7. Submit Formal Project Summary to Teacher	<b>G</b>	5/26/20	
8. Grading of Classmates' Carnival Projects/Games (N/A this year)	<b>S</b>	5/26/20	

## Directions for Grading:

- The teacher must approve your carnival project and initial the top of this packet before your group starts.
- The group will submit a formal document including:
  - Hypothesis of what is expected
  - Data Collection
  - Analysis of Probabilities of Winning and Losing
  - Graphics and Visuals anticipated in real project
  - Interpretation of Experimental Results
  - Conclusions and Recommendations for Improving Carnival Project
  - Grading of All Other Group Carnival Projects
- The group will build the carnival game for class use on our class carnival day and for the school carnival day.

## **Directions for Carnival Project:**

There are four elements you must include to complete this project.

1. Rules for the Game
2. Model or Playable Scale Model
3. How your game will profit (Expected Value of the Profit)
4. Theoretical and Experimental Probabilities of Winning and Losing

### **1. Rules for the Game –**

- You must write clear rules so that anyone can walk up to your game, read the rules, and learn to play quickly and easily.
- Your rules must also include how to win a prize.

### **2. Model or Playable Scale Model –**

- Your model of the game can be the actual game itself with all parts and pieces included and ready to play.
- If your actual game is larger than is reasonable for a classroom, you must have a working scale model of the game that can be played inside.
- Use craftsmanship, color, and style when designing your game. Remember, it should make others want to play.

### **3. How your Game will Profit –**

- This is a written description of how your game will make money while giving players and opportunity to win prizes. An expected value of the profit calculation is appropriate:

Expected value of the profit = revenue(money earned) – costs (money spent)

$P(X) = (\$ \text{ for Winning})(\text{Probability of Winning}) - (\text{Entrant's Fee } \$)(\text{Probability of Losing})$

- This has everything to do with the probability of winning and losing. If people win your game too often, you will lose money. If people lose too often, no one will want to play.

### **4. Theoretical and Experimental Probabilities of Winning and Losing –**

- This will be an analysis of the probabilities of winning and losing.
- You must have a visual representation of the probabilities such as a list of outcomes, a counting tree, or another visual.
- You must also have a collection of data and a summary of the results from Experimenting with your game.

## **15. Scoring Rubric Guide**

### **4 – Above Standard**

- ☐ The rules of the game are clear, organized, and easy to read. They are well written and account for any variation in the play of the game.
- ☐ Your model or scale model is visually attractive, working, and makes people want to play the game. The game should be fun and interactive and you need to account for all the parts and game pieces you will need (if any)
- ☐ You must write a description of how your game will earn profit (based on the probability of winning and losing), which includes what you will charge to play and what the payout or prize will be for winning. Your description must be typed or written in pen and error free.
- ☐ You must analyze the probability of your game. You must have combined events worked into the rules and you must accurately calculate the probability of winning and losing based on those events. You will need a visual such as a frequency table or a list of outcomes as well as a set of data that shows you played the game at least 100 times. You must include a paragraph summary that compares the theoretical probability with the experimental probability.

### **3 – At Standard**

- ☐ The rules of the game are clear and easy to read. They account for any variation in the play of the game.
- ☐ Your model or scale model is complete, working, and makes people want to play the game. The game should be fun and interactive and you need to account for all the parts and game pieces you will need (if any).
- ☐ You must write a description of how your game will earn profit (based on the probability of winning and losing), which includes what you will charge to play and what the payout or prize will be for winning. Your description can be handwritten or typed.
- ☐ You must analyze the probability of your game. You must have either one event or combined events worked into the rules and you must accurately calculate the probability of winning and losing based on those events. You will need a visual such as a frequency table or a list of outcomes as well as a set of data that shows you played the game at least 50 times. You must show comparisons between the theoretical and experimental probabilities.

### **2 – Approaching Standard**

- ☐ The rules of the game are clear and easy to read. They account for many variations in the play of the game.
  - ☐ Your model or scale model is complete and working. The game should be fun and you need to account for all the parts and game pieces you will need (if any).
  - ☐ You must describe how your game will earn profit (based on the probability of winning and losing), which includes what you will charge to play and what the payout or prize will be for winning. Your description can be handwritten or just verbalized.
  - ☐ You must analyze the probability of your game. You must have one event and calculate the probability of winning based on that event. You will need a visual such as a frequency table or a list of outcomes as well as a set of data that shows you played the game at least 50 times. Then compare the experiment with the outcomes of your game.
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**Project Ideas:**

1. Penny Toss into cups
2. Bean bag toss into one of three holes
3. Captain Hook Ring Toss
4. Ring Toss Around Bottles
5. Cake walk
6. Pick a Pop
7. Guessing Booth: Estimate how much is in a jar, Who is the Teacher, etc.
8. Ping Pong Toss into Jars
9. Balloon Popping Games
10. Dart Games
11. Marbles
12. Pick a Duck from the Water Barrel
13. Dice Games
14. Card Games
15. Target Golf
16. Prize Spinning Wheels
17. Going Fishing
18. Twister
19. Throw a stick in the circle
20. Minion Bowling
21. Blow a Golf Ball off the Tee
22. Launch the Frog off a Pivot with a Mallet
23. Tic Tac Toe Toss
24. Bowling Games
25. Toy Mice Races
26. Raffles
27. Rock, Paper, Scissors Games
28. Deal or No Deal
29. Pass the Pigs
30. Lottery
31. Blind Taste Tests
32. ESP Tests

Category	Total Points	Your Points.
Title page, table of contents and hypothesis	5 points	
Data Collection	10 points	
Analysis	20 points	
Graphics and Visuals	20 points	
Interpretation of Data	10 points	
Conclusion and Recommendations for Improvement	5 points	
Creativity of Presentation	10 points	
Peer Grade (10 pts. for Others/10 pts. for Completion)	20 points	
TOTAL:	100 points	