

How to Beat the Midway

Using Probability to Win Prizes

GAMERS

QUEST 4 AQR

STATE FAIR OF TEXAS CURRICULUM

Everyone wants to win a prize at the Fair. Who wants to pay money and come away with nothing? Nobody wants to throw money away, so how can you decide what games to spend your money on? The probability of wins to losses, if known, could help determine the best games for your buck.



During this Gamer Quest, you will:

- ★ Create and design your own game, based on research you conduct at the State Fair



Learning Standards

- ★ Math (AQR) TEKS: 4E; 4F
- ★ Art: Art I – 1A, 1B, 2B, 4A; Art II – 1B, 2B
- ★ ELAR TEKS: E4(1)(A); E4(15)(D)
- ★ Career Development TEKS: PS.1.C; PS.1.F; PS.1.G; EC.4.C



Before You Go – 15 min prep time, 90 min teaching time

- ★ Ask students to define “theoretical” and “experimental.” Have students discuss and write up their ideas to share with the class.
- ★ Come to an agreement on definitions for both terms.
- ★ Create groups of 2–4 students and have them find the theoretical probability of rolling a number (you pick). Then have them find the probability of 2 different numbers.
- ★ Once the group has their theoretical probability, give the group a die and ask them to find the experimental probability of rolling that same number and then the same 2 numbers.
- ★ Now have the students do the same steps as above, but with a bag or box filled with colored blocks.
- ★ Ask for the theoretical probability of one color with replacement and one color without replacement.
- ★ Finally, have groups compare their theoretical and experimental probabilities.



Invitation

- ★ Now it's time to pick your 2 favorite games at the Texas State Fair. Head to the Fair to discover which game is the best choice for your money to win a prize.



Plan Your Route

- ★ Head to the Midway and survey the games.
- ★ Pick your 2 favorites to analyze.

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STATE FAIR MAP



Optional Materials to Bring

- ★ Pen or Pencil
- ★ Notebook or Paper
- ★ Smartphone or Tablet



While You're There

The objective of your visit is to find the experimental probability of winning a prize.

★ **HOW DO I WIN A PRIZE?** Pick 2 different games that you enjoy, and record data:

- o Pick your 1st game. Observe the players.
- o Record the number of total players (at least 10) and the numbers that win.
- o Also record the cost of playing this particular game.
- o Then move on doing the same thing at a 2nd game.
- o You may do more than two if you have trouble picking just two.
- o Record your results in a notebook, device, or use the tables on the right:

| Name of Game 1 | |
|----------------|------------------------|
| Cost per Play | |
| Player | Win/Lose Circle One |
| 1 | W / L |
| 2 | W / L |
| 3 | W / L |
| 4 | W / L |
| 5 | W / L |
| 6 | W / L |
| 7 | W / L |
| 8 | W / L |
| 9 | W / L |
| 10 | W / L |

| Name of Game 2 | |
|----------------|------------------------|
| Cost per Play | |
| Player | Win/Lose Circle One |
| 1 | W / L |
| 2 | W / L |
| 3 | W / L |
| 4 | W / L |
| 5 | W / L |
| 6 | W / L |
| 7 | W / L |
| 8 | W / L |
| 9 | W / L |
| 10 | W / L |

★ **AESTHETICS (ART COMPONENT):** What is it about your two favorite games that attracts you to them?

- o Pay special attention to design and colors.
- o What about the concept behind the game?
- o If possible, interview a few people and ask them why this is their game of choice.
- o Are there other games that people are more drawn to? If so, what about the design of those games is more intriguing?
- o Record any useful information for use during the Art Component of your project!



After the Fair - 90 min project

When you return to class following your State Fair visit, you will:

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- ★ Use your data to create a presentation of your findings (technology required).
- ★ Find the experimental probability of each game.
- ★ Decide which game has a better chance of winning.
- ★ Include in your presentation:
 1. Name of the game
 2. Description of the game
 3. Math to get to your experimental probability
 4. Type of prize possible
 5. Cost of playing the game
 6. Explanation of which game is the best to spend your money on at the Fair



ART PORTION

Before you go: Discussion

What is it about your two favorite games at the State Fair that attracts you to them? Is it the design? The colors? What about the concept behind the game? When fairgoers enter the Midway, they are surrounded by enticing lights, sounds, and colors that have been carefully crafted in such a way as to attract customers, so how do they work to make theirs stand out?

While You're There

- ★ See "While You're There" in the main portion of the lesson



After the Fair

Think about what you learned about probability and the aesthetics of game design regarding the attraction of fairgoers while at the State Fair. Now it's time to create and design your own game!

Aesthetics

As you are creating your design, think about important aspects such as color, shape, balance, etc.

- ★ Will you have lights? What about sound?

- ★ In addition to creating your own outward design, create your own original game to play as well!

Probability

Once you have created your own original concept and design, figure out the experimental probability of winning your game.

Presentation

Present your game to the class and invite them to come up and play.

- ★ In your presentation, discuss the way that you incorporated elements of design within your piece, and why you made the creative choices that you did.
- ★ Explain why you think that fairgoers would choose your game over others based on your observations while at the State Fair.
- ★ You could also work in groups to create a Midway within the school or classroom.



ENGLISH COMPONENT

Imagine that instead of giving spontaneous speeches convincing you to play their game, game owners passed out pamphlets convincing you to choose their game instead. Create a pamphlet for the game that you determined to have the highest possibility of winning. The pamphlet should include all of the information needed to persuade fairgoers that they have a higher probability of winning a prize playing the game you chose. The pamphlet is the face of the game and should include:

1. The name of the game
2. Eye pleasing charts/graphs that include the data recorded at the Fair
3. Explanation of the data in the charts/graphs
4. Photos of the game
5. Three reasons that fairgoers should choose your game supported by data (evidence) recorded at the Fair