 We have a winner!

Brief

Your class has been given a Galton Board (made with 7 rows) to run your class activity at the school fete. You need to come up with the criteria of how to win prizes, whilst making profit for your school’s fundraiser.

You have the following parameters:

* Cost to play is $2.
* You propose that there are 4 possible prize categories – small prize worth 50 cents, medium prize worth $1, large prize of $10 value and a monster prize worth $25.
* Students are to decide how the game is played and how the prizes are determined.
* Discuss the expectations of the game after 100 plays and potential profit in relations to the variables selected and the Normal Distribution data.
* Using [the math is fun website](https://www.mathsisfun.com/data/quincunx.html), students are to simulate the game with their criteria and determine their expected financial gain/loss.



Step 1

What is your original thought on how to award the prizes? Why do you think this?

Run the simulation for 100 players and screenshot and paste or copy the outcome of trial. What do you notice about the graph? (You may wish to note the features of symmetry, location of mean/ mode/ median/ range, general shape)

If you used your criteria for winning a prize, what would be the financial return using your suggested criteria?

Income from game:

100 plays @ $2 each = $200

Cost of game:

| Number of: | Prize prices | Cost of prizes |
| --- | --- | --- |
|       | Small Prizes @ $0.50 each |       |
|       | Medium Prizes @ $1.00 each |       |
|       | Large Prizes @ $10.00 each |       |
|       | Monster prizes @ $25 each |       |

Profit/loss:

Income – prize costs = $200 -       =$

Compare your results with other students or another trial – what do you notice?

Step 2

What is your thought now on how to award the prizes? Why do you think this?

Run the simulation for 100 players and screenshot and paste or copy the outcome of trial. What do you notice about the graph? (You may wish to note the features of symmetry, location of mean/ mode/ median/ range, general shape)

If you used your criteria for winning a prize, what would be the financial return using your suggested criteria?

Income from game:

100 plays @ $2 each = $200

Cost of game:

| Number of: | Prize prices | Cost of prizes |
| --- | --- | --- |
|       | Small Prizes @ $0.50 each |       |
|       | Medium Prizes @ $1.00 each |       |
|       | Large Prizes @ $10.00 each |       |
|       | Monster prizes @ $25 each |       |

Profit/loss:

Income – prize costs = $200 -       =$

Compare your results with other students and your previous trial– what do you notice?

Step 3

After listening to other students and their criteria, what ‘rules’ do you think the class should adopt for the game? Why?

Run the simulation for 100 players and screenshot and paste or copy the outcome of trial. What do you notice about the graph? (You may wish to note the features of symmetry, location of mean/ mode/ median/ range, general shape)

If you used your criteria for winning a prize, what would be the financial return using your suggested criteria?

Income from game:

100 plays @ $2 each = $200

Cost of game:

| Number of: | Prize prices | Cost of prizes |
| --- | --- | --- |
|       | Small Prizes @ $0.50 each |       |
|       | Medium Prizes @ $1.00 each |       |
|       | Large Prizes @ $10.00 each |       |
|       | Monster prizes @ $25 each |       |

Profit/loss:

Income – prize costs = $200 -       =$

What is your conclusion for the rules of the game as a class? How much do you expect to make from your fundraising?

Step 4

Explore one of the following situations by first making a prediction, then running the simulation and comparing your answers.

* Adding or subtracting another row of pegs to the game
* Moving where the balls are added to the game other than 50:50
* Changing the number of prizes
* Changing the cost of playing the game or prizes
* Another situation you wish to explore –write it here:

Situation:

| Situation | Prediction | Actual (simulation) | Notes |
| --- | --- | --- | --- |
| Graph |       |       |       |
| Number of prizes |       |       |       |
| Impact on Fundraising |       |       |       |

Where do you think being able to predict outcomes would be helpful in society?