Math file

# Math A

Result: Absolutely terrifying. Even a group of 1k rounds shows too many problems.

(Might caused by program bugs)

|  |  |  |  |
| --- | --- | --- | --- |
| 10000x | 1 | X100 | 1 |
| 5000x | 19 | X20 | 29 |
| 2500x | 200 | X10 | 700 |
| 1000x | 1500 | X5 | 4450 |
| 500x | 3500 | X3 | 12600 |
| 250x | 8000 | X2 | 28000 |
| 100x | 15000 |  |  |
| 50x | 20000 |  |  |
| 25x | 40000 |  |  |
| 10x | 80000 |  |  |
| 5x | 95000 |  |  |
| 2x | 220000 |  |  |
| 1x | 481000 |  |  |

## Math A2

Approach: rewrite the entire thing to make it much harder

Result: A bit too bad, Top 10 in a group of 1k only being 2175-5965.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Object | Per 10M | Total | Object | Per 10M | Total |
| 10000 | 3 | 9856600 | x100 | 2 | 143400 |
| 5000 | 47 |  | x20 | 28 |  |
| 2500 | 300 |  | x10 | 870 |  |
| 1000 | 1250 |  | x5 | 2700 |  |
| 500 | 5000 |  | x3 | 27800 |  |
| 250 | 15000 |  | x2 | 112000 |  |
| 100 | 45000 |  |  |  |  |
| 50 | 140000 |  |  |  |  |
| 25 | 400000 |  |  |  |  |
| 10 | 800000 |  |  |  |  |
| 5 | 1600000 |  |  |  |  |
| 2 | 2350000 |  |  |  |  |
| 1 | 4500000 |  |  |  |  |

## Math A3

Added BONUS Symbol, which pays based on the amount of BONUS landed.

3 BONUS: 80x

4 BONUS: 200x

5 BONUS: 500x

Chance of getting BONUS per block is determined by the existing BONUS symbol count. Use CTRL+F to search

*bonus\_chances =*

in the code.

The odd of getting multiplier is also increased, to a total of 2.4%

Also added more fields in the database to easier to figure out what’s going on.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Object | Per 10M | =% per block | Total | Object | Per 10M | =% per block | Total |
| 10000 | 3 | 0.0000% | 9760000 | x100 | 15 | 0.0002% | 240000 |
| 5000 | 117 | 0.0012% |  | x20 | 185 | 0.0019% |  |
| 2500 | 480 | 0.0048% |  | x10 | 1800 | 0.0180% |  |
| 1000 | 2250 | 0.0225% |  | x5 | 9500 | 0.0950% |  |
| 500 | 11000 | 0.1100% |  | x3 | 57500 | 0.5750% |  |
| 250 | 27900 | 0.2790% |  | x2 | 171000 | 1.7100% |  |
| 100 | 67000 | 0.6700% |  |  |  |  |  |
| 50 | 170000 | 1.7000% |  |  |  |  |  |
| 25 | 370000 | 3.7000% |  |  |  |  |  |
| 10 | 770000 | 7.7000% |  |  |  |  |  |
| 5 | 1350000 | 13.5000% |  |  |  |  |  |
| 2 | 2400000 | 24.0000% |  |  |  |  |  |
| 1 | 4591250 | 45.9125% |  |  |  |  |  |

Current Time: 2024-09-05 15:04:46, Progress: Round 1 finished

Current Time: 2024-09-05 15:07:07, Progress: Round 10000 finished

So the speed is 70 rounds per second. 1M round will take almost 4 hours. My fault, can’t afford a better gaming PC.

Next step is going to be optimize code to make it run faster, as well as do a 1M rounds simulation while I’m sleeping (if the program didn’t crash for whatever reason.)

## Math A4

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Coin | Per 10M | =% per block | Total weight | Multi | Per 10M | =% per block | Total weight |
| 10000 | 3 | 0.0000% | 9830000 | 100 | 10 | 0.0001% | 170000 |
| 5000 | 117 | 0.0012% |  | 20 | 115 | 0.0012% |  |
| 2500 | 480 | 0.0048% |  | 10 | 1200 | 0.0120% |  |
| 1000 | 2250 | 0.0225% |  | 5 | 9225 | 0.0923% |  |
| 500 | 16000 | 0.1600% |  | 3 | 36450 | 0.3645% |  |
| 250 | 39900 | 0.3990% |  | 2 | 123000 | 1.2300% |  |
| 100 | 85000 | 0.8500% |  | **Average multi value** | | **2.451618** |  |
| 50 | 130000 | 1.3000% |  |  |  |  |  |
| 25 | 325000 | 3.2500% |  |  |  |  |  |
| 10 | 475000 | 4.7500% |  |  |  |  |  |
| 5 | 1450000 | 14.5000% |  |  |  |  |  |
| 2 | 3000000 | 30.0000% |  |  |  |  |  |
| 1 | 4306250 | 43.0625% |  |  |  |  |  |
| **Average coin value** | | **6.86381** |  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| Chance of getting C on every block (default value) | | **0.0135** |
| Chance of getting C decrease for every previous C | | 0.425 |
| Minimum value of Chance of getting C |  | 0.0015 |
| (Multiply those numbers by 100 for % value) |  |  |

### (Click to expand) 50k simulated rounds

After 50k simulated rounds it looks much better.

Since the max win is set to 250Kx I’m aiming for a price tag of 600x thus avg value should be ~580x.

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Average and Median

Average result: 516.58

Median result: 228

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Leaderboard

# 1: 223912

# 2: 195155

# 3: 128491

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Top percentile

Top 1% percentile: 4725

Top 2% percentile: 2947

Top 5% percentile: 1576

Top 10% percentile: 982

Top 25% percentile: 478

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Bottom percentile

Bottom 25% percentile: 117

Bottom 10% percentile: 72

Bottom 5% percentile: 58

Bottom 2% percentile: 49

Bottom 1% percentile: 45

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Thresholds

Rounds >= 500: 12010 (1 in 4.16)

Rounds >= 1000: 4887 (1 in 10.23)

Rounds >= 2500: 1280 (1 in 39.06)

Rounds >= 5000: 459 (1 in 108.93)

Rounds >= 10000: 152 (1 in 328.95)

Rounds >= 20000: 41 (1 in 1219.51)

Rounds >= 50000: 7 (1 in 7142.86)

## Math A5

This is the finalized version of Math A.

Average = 579.19

Median = 235

RTP if 600x per buy:: 96.53%

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Coin | Per 10M | =% per block | Multi | Per 10M | =% per block |
| 10000 | 3 | 0.0000% | 100 | 7 | 0.0001% |
| 5000 | 117 | 0.0012% | 20 | 95 | 0.0010% |
| 2500 | 480 | 0.0048% | 10 | 1200 | 0.0120% |
| 1000 | 2250 | 0.0225% | 5 | 8725 | 0.0873% |
| 500 | 16000 | 0.1600% | 3 | 40150 | 0.4015% |
| 250 | 39900 | 0.3990% | 2 | 139523 | 1.3952% |
| 100 | 85000 | 0.8500% | Total weight | 189700 | 1.8970% |
| 50 | 125000 | 1.2500% | **Average multi value** | | **2.412868** |
| 25 | 304800 | 3.0480% | Existing | Chance of getting | |
| 10 | 491000 | 4.9100% | BONUS | another BONUS | |
| 5 | 1400000 | 14.0000% | count | (per block) | |
| 2 | 2853200 | 28.5320% | 0 | 4.20% |  |
| 1 | 4492550 | 44.9255% | 1 | 3.70% |  |
| Total weight | 9810300 | 98.1030% | 2 | 3.20% |  |
| **Average coin value** | | **6.780521** | 3 | 2.70% |  |
|  |  |  | 4 | 1.85% |  |
|  |  |  | 5+ | No |  |

|  |  |  |
| --- | --- | --- |
| Chance of getting C on every block (default value) | | **1.3500%** |
| Chance of getting C decrease for every previous C | | 42.5000% |
| Minimum value of Chance of getting C |  | 0.1500% |

### (Click to expand) 1M simulated rounds

Top percentile

Top 1% percentile: 5398

Top 2% percentile: 3403

Top 5% percentile: 1789

Top 10% percentile: 1092

Top 25% percentile: 513

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Bottom percentile

Bottom 25% percentile: 119

Bottom 10% percentile: 72

Bottom 5% percentile: 58

Bottom 2% percentile: 49

Bottom 1% percentile: 44

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Thresholds

Rounds >= 500: 256153 (1 in 3.90)

Rounds >= 600: 210170 (1 in 4.76)

Rounds >= 1000: 111347 (1 in 8.98)

Rounds >= 2500: 31607 (1 in 31.64)

Rounds >= 5000: 11545 (1 in 86.62)

Rounds >= 10000: 3907 (1 in 255.95)

Rounds >= 20000: 1317 (1 in 759.30)

Rounds >= 50000: 283 (1 in 3533.57)

Rounds >= 100000: 99 (1 in 10101.01)

Rounds >= 150000: 61 (1 in 16393.44)

Rounds >= 200000: 37 (1 in 27027.03)

Rounds >= 250000: 23 (1 in 43478.26)

# Math B

## Seed

**New element: Seed**

Seed will determine part of the performance, with a better seed = higher chance of winning big.

Unless otherwise specified, a higher tier seed will have equal or better odds of getting high value coins, high multipliers, and Collect ( C ).

Rank: AAA being the highest and F being the lowest.

Note: an AAA seed in 96% version is technically equivalent to an AAA seed in 87% version.

**However I think I to messed up something, currently it’s pretty harsh and much more volatile than the final version of Math A.**

**SPECIAL (Avg 5835.49)**

**Very significantly** more multiplier, to a total of 6.30%

**Very significantly** less collect.

Another side effect: The quality of coins has been reduced, with 2500x-10000x coins being removed.

It’s kind of crazy because you can land a few multipliers and go crazy or miss all of them and get absolutely nowhere. Here’s the result of 200k simulated rounds:

Average is ~10x Median.

And the gap between top 1%/2%/5%/10%/25% percentile is also insane.

**AAA (Avg 6610.41)**

Guaranteed ALL 3 types of good things in the first spin:

There are 3 types of “good things”:

100x or higher coin., Multiplier, C (Collect).

**AA (Avg 2986.65)**

Guaranteed 2 types of good things in the first spin:

**A (Avg 1208.39)**

Guaranteed 1 type of good things in the first spin:

**B (Avg 460.23)**

All odds are somewhat better than a C seed.

**C (Avg 277.40)**

The average seed. Nothing special.

**D (Avg 224.23)**

10000x coin, x100 multi removed.

No longer possible to land more than 6 scatters.

**E (Avg 202.51)**

In additional to seed D,

5000x, 2500x coin, x20 multi removed.

No longer possible to land more than 5 scatters.

**F (Avg 156.55)**

In additional to seed E,

1000x coin removed.

No longer possible to land more than 4 scatters.

**1st Draft**

Not pasting the data here but anyway first draft went really wrong, volatility too high. Also I allocated pretty much similar amount of RTP onto seed AAA to D which is definitely very wrong.

**Math A Final version:**

Median=Average\*41.94%

Top 5/5-10/10-15/15-20/20-25% percentile: 42.61/11.88/7.99/6.07/5.01% of total RTP (100%)

Top 0.5/0.5-1/1-1.5% percentile: 40.88/13.14/9.54% of total top 5% RTP.

Volatility: 2436.55

**Math B draft 1**

Median=Average\*34.09%

Top 5/5-10/10-15/15-20/20-25% percentile: 49.91/11.04/7.08/5.34/4.12% of total RTP (100%)

Top 0.5/0.5-1/1-1.5% percentile: 47.75/12.62/8.59 of total top 5% RTP.

Volatility: 3034.18

From the Median to Average ratio you know I really messed up. Those powerful seeds are too good which makes the variance very big. The player will be very happy when they get an AA or AAA seed, well, the side effect is much higher chance of getting upset when get a bad seed and a bad result.

One of the main purpose of Math B are those seeds, and if the difference between different seeds are insignificant then

# Math C

**(not yet)**

More game modes

**Lite version:**

Cheaper, but only have 9 blocks instead of 25 blocks.

**Guaranteed Multi+Collect version:**

Begin with a random multi and a C on the board.

**Premium version:**

Begins with a mystery symbol on the center of the board.

It will be revealed after first round of coin reveal but before any multiplier/collect takes action.

Mystery symbols can also land during gameplay.

There are 2 types of Mystery symbol. The weaker one being “?”, and the stronger one being “???”

“?” Symbol will contain one of the following:

70%: A coin. (Min 50x)

22%: A multiplier.

8%: A collect. (If no pending Collect is on the board)

“???” Symbol will contain one of the following:

63%: A coin. (Min 250x)

26%: A multiplier (Min 5x)

11%: A collect. (If no pending Collect is on the board)