

Zilch: Serendipity Creak Edition

Repository: <https://github.com/mikebjoyce/zilch-solver>

Game Rules

Objective: Be the player with the highest score over **10,000 points** after the final round is triggered.

Turn Structure

1. **The Roll:** On your turn, roll 6 dice.
 2. **Scoring Requirement:** After every roll, you must set aside at least one scoring die or set.
 3. **Zilch:** If a roll contains no scoring dice, you "Zilch," and *all points accumulated during that turn are lost.*
 4. **Decision Phase:** After setting aside scoring dice, you may choose to:
 - **Bank:** Add your current turn total to your game score and end your turn.
 - **Roll:** Roll the remaining non-scoring dice to increase your turn total.
 5. **Hot Dice:** If all 6 dice have scored (either in a single roll or accumulated), you may roll all 6 dice again to continue increasing your turn total.
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The Inheritance Rule (Passing)

When a player chooses to **Bank**, their turn total and the remaining non-scoring dice are passed to the next player.

The next player may choose:

- **Fresh Start:** Start a new turn with 6 dice and 0 points.
- **Inherit:** Start their turn with the previous player's banked points already in their running total, rolling only the remaining dice.

Risk: If the inheriting player Zilches, they lose those inherited points and their turn ends immediately.

Scoring Table

Points are calculated based only on the dice currently being rolled. Dice already set aside do not combine with new dice to form sets.

Single Dice

- One [1]: 100 points
- One [5]: 50 points

Multiples (Sets)

Number	3-of-a-Kind	4-of-a-Kind	5-of-a-Kind	6-of-a-Kind
[1]s	1000	2000	4000	8000
[2]s	200	400	800	1600
[3]s	300	600	1200	2400
[4]s	400	800	1600	3200
[5]s	500	1000	2000	4000
[6]s	600	1200	2400	4800

Special Combinations

- **Small Straight [1,2,3,4,5]:** 750 points (*Uses 5 dice*)
- **Large Straight [2,3,4,5,6]:** 750 points (*Uses 5 dice*)
- **Full Straight [1,2,3,4,5,6]:** 1500 points (*Uses 6 dice*)
- **Three Pair** (e.g., 1-1, 2-2, 3-3): 1500 points (*Uses 6 dice*)

Winning the Game

Once a player reaches **10,000 points**, the **Final Round** is triggered.

Every other player gets **one more turn** to beat the high score.

The highest total score wins.

Strategy Guide

This guide is generated from **1,000,000 Monte Carlo simulations** per die count.

Executive Summary & Risk Analysis

Consolidated Risk Table

Dice	Zilch %	Success %	Avg. Gain
1	66.57%	33.43%	74.90 pts
2	44.37%	55.63%	90.07 pts
3	27.79%	72.21%	119.98 pts
4	15.71%	84.29%	170.04 pts
5	7.71%	92.29%	266.18 pts
6	2.34%	97.66%	475.06 pts

Key Insight: Rolling 1-2 dice is statistically dangerous. Rolling 5-6 dice is statistically safe.

Expected Value (EV) Analysis

The "Break-Even" point is where the expected gain from rolling equals the potential loss of your current turn total.

Formula: $(EV = (\text{Success\%} \times \text{AvgGain}) - (\text{Zilch\%} \times \text{CurrentTurnTotal}))$

Dice	EV @ 0 pts	EV @ 500 pts	EV @ 1000 pts	Break-Even (Threshold)
1	25.04	-307.81	-640.66	~37 pts
2	50.11	-171.73	-393.57	~112 pts
3	86.64	-52.32	-191.27	~311 pts
4	143.33	64.80	-13.73	~912 pts
5	245.67	207.13	168.60	~3187 pts
6	463.95	452.25	440.54	~19825 pts

Key Insight: The Break-Even threshold tells you when to stop rolling. If your turn total exceeds the threshold, **bank immediately.**

Special Combinations

Frequency of rolling high-value combinations.

Dice	Small Straight	Large Straight	Full Straight	Three Pair
4	0.00%	0.00%	0.00%	0.00%
5	1.54%	1.55%	0.00%	0.00%
6	5.42%	5.41%	1.54%	4.49%

Note: 1-3 dice cannot form these combinations.

Tactical Guide

Opening Turn Strategy

With 6 dice, your EV starting from 0 is **463.95 points**.

The 400 Point Paradox:

While the math suggests rolling until you hit a much higher threshold, banking at **~400 points** on your first turn is a valid "**Tempo Play**."

Why?

It secures a lead and often leaves the next player with a difficult inheritance (1 or 2 dice), forcing them to take a risk or start fresh.

Endgame Tactics

Conservative Play:

If you are leading, adhere strictly to the **Break-Even Thresholds**. Do not give opponents a chance to catch up by taking unnecessary risks.

Chasing:

If you are behind, you must take "*Negative EV*" risks. Use the **EV Table** to see how much "theoretical value" you are sacrificing for a chance to win.

Final Round Inheritance:

If the player before you banks a low score (< 300) and leaves you 1 or 2 dice, *start fresh*. The risk of Zilching immediately is too high compared to the potential gain of a fresh 6-dice roll.

Multiplayer Dynamics: The "Blocking Strategy"

Banking is not just about securing points; it's about *weaponizing the Inheritance Rule*.

The Trap:

Leaving an opponent with 1 die (Zilch Risk: **66.57%**) or 2 dice (Zilch Risk: **44.37%**) is a powerful defensive move.

When to Trap:

If you have a moderate score (e.g., 400-500) and are down to 1 or 2 dice, *bank immediately*. You force the next player to choose between a high-risk inheritance or starting from 0 (negating your "gift").

Inheritance Bait Calculator

Use this table to determine if your banked score is high enough to "bait" a mathematically perfect opponent into taking a bad risk.

Bait Value: The minimum points you must pass to make it mathematically correct (Positive EV) for your opponent to take the risk.

Dice Passed	Opponent Zilch Risk	Bait Value (Min Bank)
1 Dice	66.57%	1313 pts
2 Dice	44.37%	744 pts
3 Dice	27.79%	523 pts

Decision Tools

Risk/Reward Decision Matrix

Quick reference for mid-game decisions.

Turn Total	1 Die	2 Dice	3 Dice	4 Dice	5 Dice	6 Dice
0-300	BANK	BANK	ROLL	ROLL	ROLL	ROLL
300-600	BANK	BANK	BANK	ROLL	ROLL	ROLL
600-1000	BANK	BANK	BANK	RISKY	ROLL	ROLL
1000+	BANK	BANK	BANK	BANK	ROLL	ROLL

Legend:

- **ROLL:** Positive EV. Statistically safe.
- **BANK:** Negative EV. You are likely to lose points by rolling.
- **RISKY:** Marginal EV (near zero). Context dependent (e.g., are you chasing?).

Inheritance Decision Tree

Incoming Dice	Condition	Action	Notes
1 Die	Banked Points > 1313	INHERIT	High risk, but mathematically justified
1 Die	Banked Points \leq 1313	FRESH START	Risk too high for the reward

Incoming Dice	Condition	Action	Notes
2 Dice	Banked Points > 744	INHERIT	Risk is acceptable
2 Dice	Banked Points \leq 744	FRESH START	Not worth the risk
3+ Dice	Banked Points > 100	INHERIT	Generally safe to inherit
3+ Dice	Banked Points \leq 100	FRESH START	Negligible points, start fresh