

# Maximizing Wins vs. Maximizing Scores

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16 October 2025

Hi Mah Jongg Fans. The last report shows which 2025 hands are easiest to make, at least in theory. My favorite comment on the last report is: “As if this helps us!” Maybe not, but if you can’t find a hand to make, looking for one of the easier ones might help. The previous “maximizing wins” results are interesting, but raise a few questions, including “What about those harder, higher-score hands – should I ever try to make those?” Maximizing wins makes sense for beginners or anyone who doesn’t care about scores, just about winning. The computer player’s Artificial Intelligence (AI) logic for maximizing win odds doesn’t consider hand values. It only calculates how easy hands are to make (based on tiles you currently have and what has happened so far). This is not necessarily the same as maximizing your score. Some harder hands can get a higher score and may be worth the extra risk. This report looks at maximizing your score and how that compares with maximizing wins.

As for the maximizing wins analysis, I played 4 computer players (CPs) against each other for 6000 random games. The AI logic in this case is adjusted to account for harder hands having higher scores. This logic depends on the probability of winning for each hand, the probability of being jokerless, AND the value of each hand. Maximizing score logic details are given later in the advanced discussion section.

Figure 1 compares max win and max score win percentages of higher-value hands, sorted by win %. The “Max Wins” column uses logic designed to maximize the number of wins (odds of winning). The “Max Score” column uses logic derived to maximize the average score.

Category	Hand # (Line)	X/C	Value	Win % (of 6000 games)	
				Max Wins	Max Score
Quints	1	X	40	3.0	10.3
Consecutive Run	7	X	30	4.9	6.7
Quints	2	X	45	0.9	3.6
Quints	3	X	45	0.2	1.3
2025	3	X	30	0.6	0.6
Winds-Dragons	7	X	30	0.4	0.6
369	6	C	30	0.4	0.6
Consecutive Run	8	C	30	0.4	0.4
13579	8	X	30	0.1	0.3
Any Like Numbers	2	X	30	0.8	0.2
Any Like Numbers	3	C	30	0.5	0.2
13579	9	C	30	0.2	0.2
Winds-Dragons	8	C	30	0.1	0.2
2025	4	C	30	0.0	0.1
2468	8	C	30	0.0	0.1
Singles and Pairs	1	C	50	0.0	0.1
Singles and Pairs	2	C	50	0.0	0.1

**Figure 1.** *Win Percentage for Higher-Value Hands when Maximizing Score*

Based on these results, the most effective higher-value hands for maximizing score are Quints all 3 lines, and Consecutive Run line 7. The first two Singles and Pairs lines made the list, but at the bottom. Any Like numbers lines 2 and 3 decreased win percentage when maximizing score. I think this is because Quints line 3 is a similar “Any Like Numbers” hand, but has an even higher value. All the win % values must add up to 100%, so if some lines increased, other lines had to decrease.

The results for all 2025 card lines are shown below in the order on the card.

Category	Hand # (Line)	X/C	Value	Win % (of 6000)	
				Max Wins	Max Score
2025	1	X	25	1.7	1.7
	2	X	25	0.4	0.8
	3	X	30	0.6	0.6
	4	C	30	0.0	0.1
2468	1	X	25	1.6	1.2
	2	X	25	1.0	1.0
	3	X	25	0.1	0.1
	4	X	25	9.7	8.8
	5	X	25	0.4	0.4
	6	X	25	0.2	0.2
	7	X	25	1.4	0.8
	8	C	30	0.0	0.1
Any Like Numbers	1	X	25	3.0	0.1
	2	X	30	0.8	0.2
	3	C	30	0.5	0.2

Category	Hand # (Line)	X/C	Value	Win % (of 6000)	
				Max Wins	Max Score
Quints	1	X	40	3.0	10.3
	2	X	45	0.9	3.6
	3	X	45	0.2	1.3
Consecutive Run	1	X	25	0.9	0.9
	2	X	25	9.5	7.0
	3	X	25	4.4	2.4
	4	X	25	11.0	7.4
	5	X	25	3.5	3.3
	6	X	25	1.1	1.2
	7	X	30	4.9	6.7
	8	C	30	0.4	0.4

Category	Hand # (Line)	X/C	Value	Win % (of 6000)	
				Max Wins	Max Score
13579	1	X	25	0.9	0.6
	2	X	25	2.1	1.8
	3	X	25	1.4	1.0
	4	X	25	2.4	1.8
	5	X	25	4.7	3.7
	6	X	25	0.4	0.2
	7	X	30	0.9	1.3
	8	X	30	0.1	0.3
	9	C	30	0.2	0.2

Category	Hand # (Line)	X/C	Value	Win % (of 6000)	
				Max Wins	Max Score
Winds - Dragons	1	X	25	2.0	1.8
	2	X	25	4.4	6.4
	3	X	25	0.6	0.4
	4	X	25	5.5	5.8
	5	X	25	4.2	3.9
	6	X	25	2.7	2.5
	7	X	30	0.4	0.6
	8	C	30	0.1	0.2
369	1	X	25	1.3	1.5
	2	X	25	0.8	0.8
	3	X	25	1.4	1.4
	4	X	25	2.6	2.1
	5	X	25	0.0	0.1
	6	C	30	0.4	0.6

Category	Hand # (Line)	X/C	Value	Win % (of 6000)	
				Max Wins	Max Score
Singles and Pairs	1	C	50	0.0	0.1
	2	C	50	0.0	0.1
	3	C	50	0.0	0.0
	4	C	50	0.0	0.0
	5	C	50	0.0	0.0
	6	C	50	0.0	0.0

Also of interest are wall game percentage and the average game score, Table 1.

**Table 1.** Comparison of Wall Game % and Average Score

	Maximizing Wins	Maximizing Score
Percentage of Wall Games	9.7	14.1
Average Score	134.5	145.3

As expected, the percentage of wall games goes up when all the players are trying to maximize their score by playing harder hands. Also, the average score goes up by about 10 points.

### Advanced Discussion

Are those Quints hands tempting you with their higher values? What’s the deal with Quints and what makes them harder and higher value? Getting 5 of a kind when there are only 4 of a particular tile is obviously harder. You need at least one joker unless it is a set of flowers. JLMahJongg calculates the odds of getting the needed tiles, including jokers. These calculations are complicated, but straight forward. When Quints odds are calculated the same way as all other hands, the Quints odds are too high. This would make Quints recommended and used by the CPs too much. Other factors make Quints harder that must be considered when calculating win odds. These include:

1. If you use a joker to call one of the sets that is <5, you typically are using the joker tile you need for one or more of the quint sets. You must replace this joker.
2. It is hard to get to the point where you can call a tile to complete a quint set
3. If you call a tile to make a quint set, in addition to using a joker, you eliminate most or all flexibility to change your hand. At a minimum, you are restricted to Quints.

Accounting for these factors exactly in odds calculations is difficult without requiring too many and too complex computations. JLMahJongg accounts for these factors by scaling down the Quints hand odds by a factor that depends on the number of jokers you have. This can scale the odds down by as much as 50% (0.5). These scale factors have been selected to make the Quints hands used and recommended only when it appears to make sense (admittedly Ad Hoc).

In all the results presented so far, all 4 players have been given the same skill level and AI logic type. The two logic types are: 1) Maximize Wins, and 2) Maximize Score. The new “Maximize Score” logic type is the JLMahJongg default for “Pro” CP players, but can be changed in the Advanced Menu. When set to “Max Score,” the Potential or Predicted Score, P.Score, is

calculated for each hand and used to make hand selections. This P.Score depends on hand win probability and joker probability according to:

$$\text{P.Score} = P_w [V (8 - 4P_j) + 28.1] - 28.1 \quad (1)$$

where,

$P_w$  = Probability (odds) of getting Mah Jongg with the hand,

$V$  = Value with joker (use  $\frac{1}{2}$  of Singles and Pairs values that include x2 jokerless factor),

$P_j$  = Probability of having a joker when you call Mah Jongg,

and

28.1 = Factor equal to average winning or losing hand value when maximizing score.

I'm explaining how P.Score is defined because the P.Score value is shown with the hand's odds value when you view the "Best Hands" display in JLMahJongg and "AI Logic" is set to "Max Score." The "Best Hands" are then ranked by "P.Score." The "AI Logic" feature and "Max Score" will be available starting in JLMahJongg v10.0.3.

I warned you that this is "Advanced Discussion." I have been called an "Idiot Savant" at useless math, but I'm probably imagining the Savant part.

Note that if you are definitely getting Mah Jongg,  $P_w=1$ , and if you will also have at least one joker,  $P_j=1$ , then the P.Score is  $4V$ . This is the score you would get if someone throws the tile you need for Mah Jongg (1 player  $2V$  + 2 player's  $V = 4V$ ). You would get more points if you draw the tile yourself,  $6V$  (all 3 players  $2V$ ). However, the P.Score calculations are designed to select between hand choices. Because the odds for one hand compared to another do not depend on if you draw or call the Mah Jong tile, it does not matter which is assumed for the P.Score calculation.

### Answers to Previous Questions

I showed what I called the number of "Unique Hands" in the previous report on easiest hands. Someone asked the good question: "What are Unique Hands?"

Each card line is an example pattern that shows specific sets of 14 tiles giving you Mah Jongg. The category (Any Like Numbers, for example) and/or text next to the pattern give alternate ways the pattern can be used – typically saying "Any This" or "Any That." If you take the text and the pattern(s) on the line and generate all the specific sets of 14 tiles that satisfy the requirements, the resulting number of ways to get Mah Jongg for that line is the number of "Unique Hands." An example may make this clearer. Consider 2025 line 1: FFFF g2025 r222 b222, where g means green, r means red, and b means blue, or in color, FFFF 2025 222 222.

The pattern form with r, g, and b is used by the JLMahJongg card editor, and in case it's not printed in color. Flowers and winds don't have a suit, but the three different colors mean three different suits must be used for the number sets. The text says the 2's can be either 2's or 5's. Note that 2025 is all singles and the 0 (soap or white dragon) used as a zero does not have a suit. Writing out all the possibilities using 3 different suits, as required:

1. FFFF 2025 (bams) 222 (craks) 222 (dots)
2. FFFF 2025 (bams) 222 (dots) 222 (craks)
3. FFFF 2025 (craks) 222 (dots) 222 (bams)
4. FFFF 2025 (craks) 222 (bams) 222 (dots)
5. FFFF 2025 (dots) 222 (craks) 222 (bams)
6. FFFF 2025 (dots) 222 (bams) 222 (craks)
7. FFFF 2025 (bams) 555(craks) 555 (dots)
8. FFFF 2025 (bams) 555 (dots) 555 (craks)
9. FFFF 2025 (craks) 555 (dots) 555 (bams)
10. FFFF 2025 (craks) 555 (bams) 555 (dots)
11. FFFF 2025 (dots) 555 (craks) 555 (bams)
12. FFFF 2025 (dots) 555 (bams) 555 (craks)

I'm intentionally including some hands that are not "Unique" to indicate what "Unique" means. Hands 1 and 2 are the same except the order of dots and craks is swapped. These two hands are really the same (not unique) because they are just the same tiles in a different order. This is also true for each pair of hands above, 3&4, 5&6, 7&8, 9&10, 11&12. Eliminating the "Non-Unique" or redundant hands and rewriting:

1. FFFF 2025 (bams) 222 (craks) 222 (dots)
2. FFFF 2025 (craks) 222 (dots) 222 (bams)
3. FFFF 2025 (dots) 222 (craks) 222 (bams)
4. FFFF 2025 (bams) 555(craks) 555 (dots)
5. FFFF 2025 (craks) 555 (dots) 555 (bams)
6. FFFF 2025 (dots) 555 (craks) 555 (bams)

So, for 2025 line 1, there are 6 "Unique Hands." Remember the tile order does not make a difference to if it's Mah Jongg or not (but if you put them in a different order than on the card (5202 instead of 2025, for example, other players will complain). Lines with more unique hands tend to be easier because there are more ways to make Mah Jongg. But the difficulty level also depends on the set sizes and values.

Have Fun!