

Blackjack Cards Analysis – January 2026

The Directors

Entain Plc

This confirms that iTech Labs has examined the game logs for blackjack games from **January 1, 2026 to January 31, 2026**, as recorded by the respective game servers. The game logs were for blackjack games using 8 decks. iTech Labs analysed the blackjack cards for statistical randomness. The results of the analysis are given below.

For details on the gaming sites serviced by the Entain Plc game servers and used in this audit, refer to the [List](#).

1. Blackjack hand value

Blackjack hand value analysis involved creating subsets of data and conducting Chi-square tests on each subset. Opening hands are the value of the first two cards dealt. Final hand value is the hand value at the end of the game. The dealer's final hand value is based on the fixed rules of the game. The player's final hand value is dependent on the player's strategy choice, so it has no theoretical basis for comparison.

The null hypothesis for the chi-square test is that the observed frequencies of each type of hand match the theoretical values for a deck that has been shuffled using a perfect random number generator. The p-values observed in these multiple tests are expected to follow a uniform distribution for the range 0.0 to 1.0.

The analysis performs a KS Test (Kolmogorov-Smirnov test) for uniform distribution on the observed p-values, and the combined p-value result of this test is taken as the final result of the blackjack opening hand value statistics tests.

1.1 Player's opening score (from first two cards):

Test No.	DOF	ChiSqr	P-Value
1	17	24.94	0.09602
2	17	18.89	0.33461
3	17	20.02	0.27344
4	17	13.53	0.70006
5	17	9.69	0.91602
6	17	29.43	0.03076
7	17	7.14	0.98172
8	17	15.62	0.55123
9	17	14.66	0.62000
10	17	18.71	0.34571
11	17	15.02	0.59396
12	17	21.00	0.22621
13	17	8.95	0.94169

Test No.	DOF	ChiSqr	P-Value
14	17	15.59	0.55275
15	17	22.33	0.17230
16	17	14.63	0.62177
17	17	12.11	0.79345
18	17	15.09	0.58936
19	17	28.85	0.03595
20	17	20.57	0.24591
21	17	19.59	0.29575
22	17	13.94	0.67123
23	17	12.95	0.73957
24	17	16.00	0.52382
25	17	20.92	0.22977
26	17	14.36	0.64172
27	17	4.97	0.99785
28	17	22.26	0.17508
29	17	12.54	0.76663
30	17	11.79	0.81270
31	17	19.64	0.29328
32	17	24.38	0.10940
33	17	15.63	0.55003
34	17	19.72	0.28875
35	17	18.17	0.37821
36	17	18.75	0.34331
37	17	10.48	0.88222
38	17	15.38	0.56794
39	17	14.18	0.65441
40	17	14.15	0.65646
41	17	23.96	0.12054
42	17	9.91	0.90725
43	17	7.99	0.96676
44	17	29.98	0.02650

Test No.	DOF	ChiSqr	P-Value
45	17	13.99	0.66808
46	17	7.00	0.98353
47	17	27.04	0.05754
48	17	25.31	0.08803
49	17	7.85	0.96963
50	17	23.90	0.12220
51	17	30.53	0.02274
52	17	11.23	0.84460
53	17	10.74	0.86990
54	17	20.17	0.26561
55	17	15.31	0.57297
56	17	20.05	0.27155
57	17	21.30	0.21322
58	17	12.26	0.78440
59	17	13.37	0.71080
60	17	8.64	0.95087
61	17	13.48	0.70317
62	17	12.32	0.78011
63	17	20.17	0.26546
64	17	18.94	0.33227
65	17	22.31	0.17312
66	17	18.33	0.36841
67	17	13.33	0.71417
68	17	16.56	0.48473
69	17	26.27	0.06967
70	17	20.71	0.23960
71	17	13.45	0.70529
72	17	8.80	0.94624
73	17	28.26	0.04196
74	17	15.33	0.57172
75	17	20.63	0.24307

Test No.	DOF	ChiSqr	P-Value
76	17	21.05	0.22418
77	17	10.60	0.87652
78	17	15.94	0.52840
79	17	13.52	0.70060
80	17	18.10	0.38278
81	17	15.81	0.53710
82	17	20.60	0.24484
83	17	14.35	0.64233
84	17	15.03	0.59324
85	17	13.09	0.73008
86	17	9.01	0.93996
87	17	13.59	0.69564
88	17	18.55	0.35498
89	17	13.05	0.73267
90	17	24.11	0.11649
91	17	12.71	0.75552
92	17	12.54	0.76671
93	17	6.28	0.99107
94	17	21.94	0.18691
95	17	13.39	0.70945
96	17	10.17	0.89617
97	17	19.30	0.31165
98	17	25.14	0.09157
99	17	22.46	0.16762
100	17	16.44	0.49266
Combined P-Value for 100 tests (Using KS method)			0.63068

Notes:

- 1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

1.2 Dealer's opening score (from first two cards):

Test No.	DOF	ChiSqr	P-Value
1	17	11.12	0.85039
2	17	17.52	0.41995
3	17	15.08	0.58958
4	17	6.05	0.99287
5	17	23.27	0.14078
6	17	12.56	0.76535
7	17	27.90	0.04614
8	17	15.63	0.54987
9	17	10.40	0.88609
10	17	12.14	0.79178
11	17	13.10	0.72947
12	17	13.14	0.72696
13	17	9.67	0.91679
14	17	17.01	0.45354
15	17	14.64	0.62136
16	17	11.73	0.81604
17	17	13.93	0.67219
18	17	17.98	0.38996
19	17	19.07	0.32448
20	17	15.26	0.57678
21	17	21.19	0.21796
22	17	25.78	0.07849
23	17	15.71	0.54463
24	17	22.09	0.18143
25	17	31.49	0.01739
26	17	15.45	0.56337
27	17	12.41	0.77451
28	17	17.26	0.43706
29	17	25.71	0.07993
30	17	17.47	0.42291

Test No.	DOF	ChiSqr	P-Value
31	17	30.50	0.02293
32	17	16.32	0.50150
33	17	17.44	0.42503
34	17	18.65	0.34924
35	17	19.63	0.29386
36	17	15.74	0.54243
37	17	13.20	0.72246
38	17	13.29	0.71628
39	17	19.46	0.30288
40	17	15.30	0.57368
41	17	21.31	0.21258
42	17	14.64	0.62149
43	17	3.54	0.99978
44	17	14.28	0.64715
45	17	13.40	0.70900
46	17	16.81	0.46709
47	17	11.81	0.81143
48	17	14.67	0.61935
49	17	15.88	0.53225
50	17	20.06	0.27133
51	17	16.77	0.46983
52	17	8.78	0.94685
53	17	21.09	0.22222
54	17	15.85	0.53470
55	17	17.89	0.39574
56	17	23.51	0.13331
57	17	10.00	0.90362
58	17	12.32	0.78019
59	17	36.01	0.00457
60	17	26.54	0.06523
61	17	17.71	0.40737

Test No.	DOF	ChiSqr	P-Value
62	17	16.51	0.48769
63	17	15.28	0.57523
64	17	24.28	0.11198
65	17	6.87	0.98520
66	17	15.02	0.59434
67	17	24.73	0.10103
68	17	18.26	0.37285
69	17	17.20	0.44060
70	17	19.09	0.32312
71	17	11.93	0.80425
72	17	10.98	0.85766
73	17	20.87	0.23221
74	17	14.38	0.64018
75	17	15.21	0.58067
76	17	20.24	0.26232
77	17	8.49	0.95484
78	17	11.37	0.83643
79	17	12.80	0.74915
80	17	19.62	0.29412
81	17	25.80	0.07827
82	17	34.78	0.00665
83	17	13.36	0.71159
84	17	23.76	0.12613
85	17	16.68	0.47595
86	17	22.48	0.16697
87	17	22.72	0.15874
88	17	14.68	0.61859
89	17	24.78	0.09965
90	17	11.93	0.80442
91	17	13.39	0.71000
92	17	8.18	0.96253

Test No.	DOF	ChiSqr	P-Value
93	17	20.98	0.22726
94	17	17.63	0.41258
95	17	21.07	0.22317
96	17	22.85	0.15415
97	17	12.37	0.77707
98	17	9.13	0.93622
99	17	18.42	0.36263
100	17	16.33	0.50083
Combined P-Value for 100 tests (Using KS method)			0.98880

Notes:

- 1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

1.3 Dealer's final score (total of all cards for hands with 3 or more cards):

Test No.	DOF	ChiSqr	P-Value
1	50	53.42	0.34419
2	50	37.40	0.90608
3	50	35.80	0.93500
4	50	40.61	0.82576
5	50	52.63	0.37268
6	50	42.08	0.77962
7	50	51.27	0.42349
8	50	56.59	0.24268
9	50	69.02	0.03852
10	50	46.61	0.61023
11	50	60.64	0.14409
12	50	40.02	0.84254
13	50	66.31	0.06102
14	50	42.80	0.75493
15	50	34.12	0.95799
16	50	43.61	0.72620

Test No.	DOF	ChiSqr	P-Value
17	50	35.58	0.93841
18	50	51.75	0.40535
19	50	49.06	0.51095
20	50	43.55	0.72813
21	50	58.86	0.18288
22	50	61.24	0.13250
23	50	47.56	0.57204
24	50	51.49	0.41505
25	50	62.04	0.11806
26	50	61.81	0.12202
27	50	47.47	0.57566
28	50	39.30	0.86207
29	50	38.31	0.88616
30	50	47.15	0.58846
31	50	49.79	0.48182
32	50	39.93	0.84521
33	50	45.82	0.64172
34	50	53.49	0.34188
35	50	68.51	0.04209
36	50	70.39	0.03020
37	50	56.36	0.24917
38	50	47.76	0.56385
39	50	42.51	0.76500
40	50	46.97	0.59570
41	50	49.31	0.50116
42	50	79.12	0.00541
43	50	66.09	0.06323
44	50	72.10	0.02202
45	50	58.06	0.20262
46	50	69.99	0.03243
47	50	46.81	0.60218

Test No.	DOF	ChiSqr	P-Value
48	50	63.99	0.08820
49	50	59.90	0.15932
50	50	43.04	0.74638
51	50	43.03	0.74700
52	50	57.52	0.21672
53	50	48.32	0.54112
54	50	38.39	0.88433
55	50	44.45	0.69475
56	50	44.66	0.68684
57	50	45.93	0.63750
58	50	41.45	0.79985
59	50	36.19	0.92857
60	50	44.79	0.68178
61	50	34.02	0.95916
62	50	58.47	0.19248
63	50	33.90	0.96044
64	50	61.23	0.13262
65	50	47.00	0.59466
66	50	46.87	0.59980
67	50	58.37	0.19491
68	50	57.83	0.20850
69	50	53.56	0.33943
70	50	42.66	0.75996
71	50	43.90	0.71550
72	50	40.41	0.83168
73	50	56.95	0.23239
74	50	57.72	0.21150
75	50	63.79	0.09098
76	50	54.62	0.30330
77	50	54.79	0.29773
78	50	55.28	0.28204

Test No.	DOF	ChiSqr	P-Value
79	50	58.27	0.19745
80	50	63.75	0.09153
81	50	40.94	0.81594
82	50	44.92	0.67693
83	50	48.09	0.55020
84	50	59.32	0.17214
85	50	63.91	0.08926
86	50	67.24	0.05225
87	50	39.89	0.84634
88	50	34.61	0.95206
89	50	49.81	0.48103
90	50	51.53	0.41369
91	50	39.26	0.86320
92	50	64.02	0.08781
93	50	59.91	0.15922
94	50	57.02	0.23043
95	50	48.80	0.52178
96	50	53.57	0.33900
97	50	62.51	0.11020
98	50	35.07	0.94583
99	50	52.06	0.39379
100	50	44.38	0.69756
Combined P-Value for 100 tests (Using KS method)			0.36545

Notes:

- 1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

2. Blackjack rank statistics

The blackjack rank analysis aims to establish that the rank of the cards to player and dealer was equally distributed in one of the 13 possible ranks (2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K, A).

The blackjack rank analysis involved creating subsets of data and conducting Chi-square tests on each subset. The analysis performs a KS Test (Kolmogorov-Smirnov test) for uniform distribution on the observed p-values, and the combined p-value result of this test is taken as the final result of the Ranks statistics tests.

2.1 Blackjack rank statistics for all player cards:

Test No.	DOF	ChiSqr	P-Value
1	12	17.80	0.12194
2	12	9.08	0.69568
3	12	24.63	0.01669
4	12	10.28	0.59162
5	12	12.27	0.42405
6	12	27.62	0.00628
7	12	7.61	0.81477
8	12	18.29	0.10718
9	12	13.66	0.32327
10	12	10.87	0.54036
11	12	16.47	0.17057
12	12	9.11	0.69324
13	12	7.14	0.84799
14	12	7.68	0.80938
15	12	6.49	0.88952
16	12	16.18	0.18297
17	12	21.77	0.04018
18	12	10.65	0.55870
19	12	9.93	0.62251
20	12	23.70	0.02234
21	12	29.11	0.00379
22	12	4.11	0.98138
23	12	6.98	0.85891
24	12	14.72	0.25714
25	12	3.68	0.98856
26	12	7.62	0.81431
27	12	7.78	0.80192
28	12	12.31	0.42118
29	12	10.82	0.54399
30	12	20.71	0.05481

Test No.	DOF	ChiSqr	P-Value
31	12	15.88	0.19685
32	12	23.80	0.02167
33	12	10.71	0.55431
34	12	17.05	0.14766
35	12	13.95	0.30395
36	12	14.36	0.27812
37	12	3.59	0.98975
38	12	13.92	0.30577
39	12	12.94	0.37342
40	12	13.69	0.32103
41	12	11.99	0.44677
42	12	16.55	0.16741
43	12	5.74	0.92878
44	12	16.30	0.17784
45	12	6.67	0.87885
46	12	6.34	0.89795
47	12	13.91	0.30676
48	12	15.41	0.21954
49	12	18.76	0.09444
50	12	16.21	0.18174
51	12	13.04	0.36640
52	12	10.95	0.53312
53	12	7.73	0.80591
54	12	12.04	0.44223
55	12	12.49	0.40691
56	12	6.52	0.88771
57	12	14.86	0.24896
58	12	10.32	0.58777
59	12	10.37	0.58389
60	12	9.86	0.62799
61	12	15.06	0.23839

Test No.	DOF	ChiSqr	P-Value
62	12	8.09	0.77798
63	12	16.27	0.17930
64	12	18.59	0.09880
65	12	12.01	0.44468
66	12	10.30	0.58944
67	12	15.60	0.21034
68	12	8.52	0.74297
69	12	9.91	0.62424
70	12	17.44	0.13390
71	12	10.55	0.56753
72	12	12.83	0.38175
73	12	10.00	0.61605
74	12	27.67	0.00617
75	12	6.27	0.90173
76	12	10.57	0.56640
77	12	12.13	0.43516
78	12	9.87	0.62719
79	12	26.24	0.00994
80	12	12.63	0.39613
81	12	9.80	0.63363
82	12	9.70	0.64200
83	12	8.51	0.74449
84	12	12.88	0.37819
85	12	9.74	0.63885
86	12	16.05	0.18878
87	12	15.55	0.21281
88	12	14.51	0.26915
89	12	8.21	0.76818
90	12	6.58	0.88399
91	12	15.95	0.19358
92	12	18.79	0.09380

Test No.	DOF	ChiSqr	P-Value
93	12	6.97	0.85929
94	12	14.58	0.26537
95	12	18.69	0.09635
96	12	13.93	0.30543
97	12	5.56	0.93660
98	12	14.68	0.25955
99	12	21.61	0.04218
100	12	3.52	0.99063
Combined P-Value for 100 tests (Using KS method)			0.29204

Notes:

- 1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

2.2 Blackjack rank statistics for all dealer cards:

Test No.	DOF	ChiSqr	P-Value
1	12	6.18	0.90666
2	12	14.93	0.24507
3	12	10.40	0.58087
4	12	19.91	0.06890
5	12	14.77	0.25439
6	12	7.20	0.84378
7	12	14.48	0.27092
8	12	4.62	0.96955
9	12	11.89	0.45484
10	12	8.18	0.77121
11	12	6.97	0.85953
12	12	14.83	0.25078
13	12	5.90	0.92115
14	12	15.32	0.22448
15	12	14.28	0.28309
16	12	4.78	0.96498

Test No.	DOF	ChiSqr	P-Value
17	12	16.80	0.15711
18	12	12.89	0.37684
19	12	11.28	0.50484
20	12	13.22	0.35318
21	12	11.62	0.47691
22	12	7.35	0.83399
23	12	5.61	0.93451
24	12	7.45	0.82645
25	12	14.59	0.26465
26	12	10.70	0.55521
27	12	11.21	0.51084
28	12	11.66	0.47307
29	12	11.15	0.51613
30	12	20.02	0.06670
31	12	12.92	0.37476
32	12	8.47	0.74759
33	12	5.46	0.94081
34	12	22.93	0.02833
35	12	21.48	0.04379
36	12	19.11	0.08582
37	12	10.65	0.55897
38	12	11.87	0.45625
39	12	13.79	0.31412
40	12	15.92	0.19498
41	12	14.59	0.26437
42	12	14.69	0.25866
43	12	11.33	0.50085
44	12	16.53	0.16830
45	12	12.95	0.37297
46	12	4.83	0.96336
47	12	7.67	0.81015

Test No.	DOF	ChiSqr	P-Value
48	12	3.63	0.98923
49	12	14.21	0.28731
50	12	9.09	0.69541
51	12	9.16	0.68924
52	12	9.34	0.67344
53	12	7.87	0.79522
54	12	4.54	0.97154
55	12	14.20	0.28804
56	12	13.82	0.31267
57	12	11.02	0.52696
58	12	4.42	0.97464
59	12	13.46	0.33663
60	12	15.64	0.20852
61	12	10.12	0.60564
62	12	4.24	0.97864
63	12	12.00	0.44556
64	12	21.10	0.04900
65	12	8.45	0.74882
66	12	10.50	0.57207
67	12	10.25	0.59376
68	12	17.09	0.14623
69	12	10.49	0.57337
70	12	17.17	0.14317
71	12	12.77	0.38600
72	12	14.12	0.29296
73	12	9.02	0.70121
74	12	8.42	0.75172
75	12	13.49	0.33425
76	12	5.97	0.91734
77	12	6.29	0.90089
78	12	7.30	0.83749

Test No.	DOF	ChiSqr	P-Value
79	12	17.16	0.14380
80	12	6.16	0.90759
81	12	21.98	0.03778
82	12	9.70	0.64219
83	12	9.17	0.68823
84	12	18.38	0.10471
85	12	10.21	0.59728
86	12	9.84	0.63031
87	12	11.06	0.52419
88	12	13.14	0.35895
89	12	15.15	0.23309
90	12	13.54	0.33108
91	12	8.71	0.72737
92	12	8.19	0.76982
93	12	8.04	0.78218
94	12	17.06	0.14731
95	12	8.19	0.76982
96	12	12.46	0.40978
97	12	11.95	0.44975
98	12	10.91	0.53622
99	12	18.10	0.11268
100	12	11.87	0.45639
Combined P-Value for 100 tests (Using KS method)			0.91466

Notes:

- 1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

3. Summary of the analysis of blackjack tests

The Blackjack cards analysis is completed by combining the result of the KS Test performed in the two types of analysis (Hand Values and Ranks) for using Holm's method and producing a single Combined P-value. The combined p-value produced using Holm's method is used as an indication of statistical randomness.

Combination of p-values using Holm's Method		
Test	P-Value	P-Adjusted
Opening Score (Player)	0.63068	1.00000
Opening Score (Dealer)	0.98880	1.00000
Dealer's Final Score	0.36545	1.00000
Player Cards Rank	0.29204	1.00000
Dealer Cards Rank	0.91466	1.00000
Combined P-Value using Holm's Method		1.00000

Notes:

- 1) The combined p-value of all statistical tests using Holm's Method conducted for blackjack is greater than the minimum value of 0.05, which indicates that the randomness of the observed data falls within 95% confidence limits.

The final outcome of the analysis of blackjack indicates that the RNG is working correctly.

4. Conclusion

Analysis of actual data from game logs for 'player opening score', 'dealer opening score', 'dealer final score', 'player card rank' and 'dealer card rank' indicated statistical randomness. The results were satisfactory for 8 decks blackjack.

We conclude that the Random Number Generator (RNG) is working correctly.

iTech Labs has done limited sanity checks to verify the integrity of the game logs. iTech Labs also maintains a copy of the game logs for verification purposes. There were a large enough number of game records to give the calculations sufficient statistical power.

The scope of the review did not include reviews of financial controls or casino operations. We believe that the probabilities were calculated correctly from the game logs.

Signed:



James Boje
Managing Director EMEA
Executive.
Date: 04 March 2026
