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LET'S PLAY A GAME...

Using binary number system to "magically" guess a secret number

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HOW THIS GAME WORKS...

- How to Play this Game
  - Print & Cut out the 6 cards below. You are now ready to do the trick.
  - Give the 6 cards to a friend, and ask them to pick a secret number between 1 and 63, and tell you if their number is on each card. When ever they say yes, add the first top left number. When you have added up the first number of each card they have said yes to, that is the number they picked. Or you could have them give you back all the cards that have their number on it.
  - You can figure out their secret number by adding together all of the first numbers on the cards they gave back to you. For example, if they gave you back the cards with the top, left, first numbers on these cards are 16 and 4, then their number would be 20, because the these numbers add up to 20.

- Why does it work?
  - Remember how to write the numbers from 1 to 63 in binary? See the last page if you forgot. The sequence of 1's and 0's in a binary number tell us which powers of 2 add up to make the number. For example, 19 = 16+2+1, so in binary we write 10011.
  - Now notice that the number 19 appears only on the first, fourth, and fifth cards. That is, 19 appears on the cards with first numbers 16, 2, and 1, and it does not appear on the cards 32, 8 or 4.
  - The 6 cards correspond to the powers of 2. The numbers that are on the first card (with "16" as the first number) are the ones that have a "1" in the 16's position when we write it in binary. The numbers on the "8" card are those with a "1" in the 8 position in binary. And so on for the other cards. So, when you add up first numbers on the cards that a "secret" number is on, you are adding up the powers of two that add up to the secret number!

- Online Magic -http://avimagic.com/tricks/number_cards.php

ALL SIX CARDS

1	3	5	7	9	11	13	15
17	19	21	23	25	27	29	31
33	35	37	39	41	43	45	47
49	51	53	55	57	59	61	63

2	3	6	7	10	11	14	15
18	19	22	23	26	27	30	31
34	35	38	39	42	43	46	47
50	51	54	55	58	59	62	63

4	5	6	7	12	13	14	15
20	21	22	23	28	29	30	31
36	37	38	39	44	45	46	47
52	53	54	55	60	61	62	63

8	9	10	11	12	13	14	15
24	25	26	27	28	29	30	31
40	41	42	43	44	45	46	47
56	57	58	59	60	61	62	63

16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31
48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63

32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63

Cut Out These Cards

IS YOUR NUMBER ON THIS CARD?

1	3	5	7	9	11	13	15
17	19	21	23	25	27	29	31
33	35	37	39	41	43	45	47
49	51	53	55	57	59	61	63

IS YOUR NUMBER ON THIS CARD?

2	3	6	7	10	11	14	15
18	19	22	23	26	27	30	31
34	35	38	39	42	43	46	47
50	51	54	55	58	59	62	63

IS YOUR NUMBER ON THIS CARD?

4	5	6	7	12	13	14	15
20	21	22	23	28	29	30	31
36	37	38	39	44	45	46	47
52	53	54	55	60	61	62	63

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IS YOUR NUMBER ON THIS CARD?

8	9	10	11	12	13	14	15
24	25	26	27	28	29	30	31
40	41	42	43	44	45	46	47
56	57	58	59	60	61	62	63

IS YOUR NUMBER ON THIS CARD?

16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31
48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63

IS YOUR NUMBER ON THIS CARD?

32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63

Decimal (Base 10)	Binary (Base 2)	Decimal (Base 10)	Binary (Base 2)	Decimal (Base 10)	Binary (Base 2)	Decimal (Base 10)	Binary (Base 2)
0	0000 0000	16	0001 0000	32	0010 0000	48	0011 0000
1	0000 0001	17	0001 0001	33	0010 0001	49	0011 0001
2	0000 0010	18	0001 0010	34	0010 0010	50	0011 0010
3	0000 0011	19	0001 0011	35	0010 0011	51	0011 0011
4	0000 0100	20	0001 0100	36	0010 0100	52	0011 0100
5	0000 0101	21	0001 0101	37	0010 0101	53	0011 0101
6	0000 0110	22	0001 0110	38	0010 0110	54	0011 0110
7	0000 0111	23	0001 0111	39	0010 0111	55	0011 0111
8	0000 1000	24	0001 1000	40	0010 1000	56	0011 1000
9	0000 1001	25	0001 1001	41	0010 1001	57	0011 1001
10	0000 1010	26	0001 1010	42	0010 1010	58	0011 1010
11	0000 1011	27	0001 1011	43	0010 1011	59	0011 1011
12	0000 1100	28	0001 1100	44	0010 1100	60	0011 1100
13	0000 1101	29	0001 1101	45	0010 1101	61	0011 1101
14	0000 1110	30	0001 1110	46	0010 1110	62	0011 1110
15	0000 1111	31	0001 1111	47	0010 1111	63	0011 1111
						64	0010 0000