

Devilish Casino (solution)

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This is a black box puzzle where there are certain unknown rules that need to be determined with the help of the trial spins, with the goal to figure out what numbers the ball will land out after the spins resulting from the 13 given command words. Obviously, the given command words cannot be used in the trial spins, which only accept 5-letter words (based on the Wordle wordlist).

There are three main distinct and independent types of rules to be determined, which mimic an actual roulette spin to some degree. As such, the order/layout of the numbers on a standard US roulette wheel (as shown in the given image) is used in some of the rules. And there are two steps that need to be figured out for each type of rule – how the command word applies to that type of rule, and how the type of rule affects the landing number for that spin (command word).

1) Ball start position

In a game of roulette, the wheel is spun in one direction, and the ball is flicked along the rail in the opposite direction (in this case counterclockwise). The ball start position is the number from which the ball first starts its motion. In an actual roulette game, the ball is normally flicked roughly from the position where it last landed. However, to allow for each given command word to be solved independently, a rule is used to determine the ball start position in this puzzle. The rule determining **the ball start position is based on the sum of the alphabet positions of all the letters in the command word**. Starting from the 0 number position, count off the sum clockwise around the wheel (making more than 1 round if necessary, i.e. mod 38) to get the ball start position. **And the ball start position is logically the starting point for figuring out the landing number for each spin.**

2) Relative starting velocity of ball

In a game of roulette, as the wheel and the ball travel in opposite directions, the difference is the relative starting velocity of the ball, which can vary with each spin. As hinted by the word “starting”, the rule determining **the relative starting velocity of the ball is based on the first letter of the command word**. Thematically, the letter is viewed in relation to the familiar pangram “THE QUICK BROWN FOX / JUMPS OVER A LAZY DOG”. If the letter appears in both halves (i.e. EURO), the velocity is “Medium”. If the letter appears only in the first half (i.e. THQUICKBWNFX), the velocity is “High”. If the letter appears only in the second half (i.e. JMPSVALZYDG), the velocity is “Low”. **And the relative magnitude of the velocity gives an initial displacement of about a quarter wheel (9 positions) each, going counterclockwise from the ball start position.** i.e. Shift the ball start position on the wheel by 9 positions counterclockwise for low velocity, 18 for medium, and 27 for high, to get the initial landing number position before any further displacements from hitting diamonds.

3) Diamonds hit

In a game of roulette, the circular track of the wheel has metal deflectors called diamonds located at regular intervals, which the ball could hit and bounce off, resulting in a displacement in its final landing position. In this case, the given image of the wheel shows that it has 6 diamonds (less than an actual wheel, as the vertical diamonds had been omitted),

which is confirmed in the instructions. For simplicity (as it is difficult to model the physics of the effects), it is also given that the position of each diamond is not important. This then ignores increased likelihood of hitting certain other diamonds or landing in its vicinity due to loss of velocity. The rule determining **the diamond hit is based on the letters (after the first) in the command word in order.**

The following table summarizes the diamond that will be hit for each letter in the word. As an added difficulty to figuring this out, consecutive hits on the same diamond are not announced. **And the displacement shown corresponding to each diamond hit is made to the initial landing number position to get the final number landed on.**

Letters	Diamond Hit	Displacement
AEIOU	No hit	0
CHPQ	1	1 counterclockwise (1)
BKLY	2	Same as last diamond hit
VWX	3	2 counterclockwise (2)
FG	4	1 clockwise (-1)
DNRST	5	Double last diamond hit
JMZ	6	2 clockwise (-2)

Once enough rules have been solved, the same rules can be used for the given command words. These command words are all heterograms, to hint that there is no need to consider and test for word patterns in rules, such as doubled letters etc. The following table summarizes the 13 given command words, start position, counterclockwise shift from velocity, diamonds hit, displacements and landing number.

Command Word	Start position	CCW shift based on velocity	Diamonds hit (based on letters excluding first letter and vowels)	Displacements and total CCW displacement from diamonds	Landing number
HEMATOXYLINS	8	27	6,5,3,2,2,5,5	-2-4+2+2+2+4+8=12	12
BANKRUPTCIES	15	27	5,2,5,1,5,1,5	0+0+0+1+2+1+2=-6	1
CORNFLAKES	5	27	5,5,4,2,2,5	0+0-1-1-1-2=-5	19
DRAUGHTSWOMEN	25	9	5,4,1,5,5,3,6,5	0-1+1+2+4+2-2-4=2	22
DERMATOGYLPHICS	24	9	5,6,5,4,2,2,1,1,1,5	0-2-4-1-1-1+1+1+1+2=-4	5
SUBVOCALIZED	15	9	2,3,1,2,6,5	0+2+1+1-2-4=-2	7
EQUALITY	30	18	1,2,5,2	1+1+2+2=6	1
DUPLICATORS	3	9	1,2,1,5,5,5	1+1+1+2+4+8=17	19
CONJUGATE	1	27	5,6,4,5	0-2-1-2=-5	23
CUSTOMIZABLE	7	27	5,5,6,6,2,2	0+0-2-2-2-2=-8	8
EXCLUSIONARY	12	18	3,1,2,5,5,5,2	2+1+1+2+4+8+8=26	1
OVERADJUSTING	8	18	3,5,5,6,5,5,5,4	2+4+8-2-4-8-16-1=-17	12
FLOWCHARTING	36	27	2,3,1,1,5,5,5,4	0+2+1+1+2+4+8-1=17	5

Converting the numbers landed on in order into their corresponding letter in the alphabet gives the clue phrase **LAS VEGAS WHALE**, which solves to the thematic answer for this puzzle **HIGH ROLLER**.

Constructor's notes:

Like my other puzzles, the puzzle idea here was conceptualized and written specifically to the required answer, for the best thematic fit. So it was clear from the start that this was likely to be based on casino game, which also provides good logic puzzle possibilities. However, I wanted to have a mix of word puzzle elements as well, so eventually came up with this idea for a black box puzzle, which would fit the game of roulette best. The inspiration was from the book "The Eudaemonic Pie" by Thomas Bass, about how a group of physicists and computer scientists used early technology in the 70s-80s to successfully predict roulette outcomes at the casinos.

The trial spins intentionally use only 5-letter words, to provide a familiar reference to the popular game Wordle. Therefore, some solvers should have some practice with the approach of trying different 5-letter word combinations for this puzzle. And incidentally, a few months after this puzzle was written, someone came up with a Wordle variant called Obscurdle which also uses a black box concept. In terms of solving strategy for such a black box puzzle, a good approach is to do trials with words that are first identical — this helps confirm that outcomes are consistent with the same command word and are independent of each other. Then trial with words that differ by 1 letter in each of the positions and track the outcomes. This isolates any changes in the outcomes to the change from a particular letter to another in that specific position. It would be ideal to use multiple words that retain the same letters in the other 4 positions. This is relatively easy for the starting letter of a word, which will help determine how that affects the ball start and starting velocity. The same approach in the other positions can then help to figure out which diamond each letter maps to, and the displacement effect.

In line with the horror theme for this hunt, this puzzle presents a characteristic high-stakes gambling duel with the devil (the thematic Pit Fiend). For those familiar with roulette, an Easter egg you may notice is that the ball being flicked counterclockwise implies this is a US left-handed wheel. This is intentional to indicate that the Pit Fiend is left-handed, since "sinister" comes from Latin meaning "on the left side".