2023

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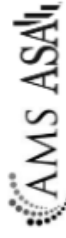**Zhanna Williams**

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2023 MCM Problem C: Predicting Wordle Results Solution

Team 2322194
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Summary

The purpose of this paper is to convey our solution for 2023 MCM Problem C. In this paper we wanted to show how we developed a model, the accuracy of the model, the uncertainties of the model, attributes that make words harder to guess in Wordle, and finally how we used our model and statistics to determine how difficult the word EERIE, regarding the game Wordle.

After playing Hard Mode we have found it allows players to find patterns that match the Wordle clue given and it is easier to program.

We have found using our model on March 1st, 2023 the score distribution for any Wordle word will look like the following:

1 try	2 tries	3 tries	4 tries	5 tries	6 tries	7+ tries
0.5%	6%	23%	33%	23.5%	11.5%	2.5%

These are the average numbers of tries needed to guess a word, therefore it will be similar to the data of March 1st, 2023.

We have developed a summarized model that classifies solution words by difficulty. We did that by adding percentages for attempts 1 through 3, 4 through 5, and 6+. The greatest percentage in each group classified the word in the categories easy, medium, and hard.

Using our model we identified how difficult the word "eerie" is to be solved in a Wordle game. We figured that out by running a test that showed that our model solves the puzzle within the allowed 6 tries in a Wordle game. But some of the words the model guessed are not likely words that would be Wordle solutions based on how uncommon they are, the model was also unlucky since "eerie" was picked because it was the only possible solution left. The word "eerie" was classified as medium difficulty according to our model, but that may change if the human playing the Wordle doesn't have a lot of uncommon words in their vocabulary.

The accuracy of our model is not consistent because with some words it is much more efficient for humans to guess it than the program. For example the word baker, the model guessed it in 10 tries. It found the ending "aker" quickly but it tried all of the possible combinations there are. A human would have more likely found baker as a solution in under 10 moves because some of the words the model guessed tend to be uncommon words. There is the possibility that the results on Twitter are inaccurate causing the accuracy of our model to be different.

This paper presented our model by showing how we developed it, the accuracy of our model, uncertainties, and attributes that make words harder to guess. We determined how difficult the word "eerie" is when playing Wordle and predicted the score distribution of March 1st, 2023 with our model. We have shown our model and its capabilities, for instance by predicting the score distribution for March 1st, 2023 using our model.

Development of the Model

To gain some insight about the model, we decided to make a computer program that would play a game of Wordle by itself, using the clues given to make guesses until the correct word was found progressively. **[1,6,10]**

We wanted the computer to play as optimally as possible so that each guess would cut down the number of possible guesses until the correct word was found. **[2, 3, 11]** Our theory was that if the computer played at an acceptable level, the results would match the typical level of the results of the Twitter data set.

We predicted that humans may play differently, as some players may play poorly, and others play very well, giving our program a middle-of-the-road performance.
Our algorithm for our computer player used the following information:

1)   We found the official Wordle allowed list in the published source code. We used that list to compute allowed words.

2)   We did find a list of common words that would be official recognized solutions but ignored it as human players are unlikely to refer to it when making their word choices.

3)   The computer checked the character frequency of the initial (or remaining words). It ranked allowed words in the number of words that would be eliminated if characters in the word were incorrect. **[3]**

4)   We played in "hard mode", which allowed us to find patterns that matched the Wordle clues given. "Hard mode" was easier to write a computer program for.

We then set the computer to play every game of Wordle on the Problem_C_Data_Wordle.xls spreadsheet.

5)   We also used multiple strategies. Using the model without human interaction, using the model with human interaction, and most importantly, changing the starting word that the computer was given according to the entropy of a word.

Results, strategy, and accuracy

While the computer program was able to solve all puzzles, it did not beat the best players, but did not consistently do worse than human players. **[4]** Our program took an average of 4.5 tries with a standard deviation of 1.23 tries to find the correct solution. This model was based on many different strategies, however, the model prioritizes guessing the word before reaching the 7th step using game theory to minimize losses.

Our program never solved the puzzle on the first try, since it used the opening word "soare", which was not on the spreadsheet provided. "soare" was ranked the highest by our program. **[5]** If none of the letters in "soare" was in the solution, the word list would be cut down to 576 words out of an initial list of 12,797 words (a 96% reduction). Attributes of the word make it either harder or easier to guess. Words like "stale" were easy to guess based on both the model and Twitter results. This is because the word "stale" isn't very similar to other words, yet it contains common letters like a, s, e, and t. Double letters like in the word "eerie", and words that are not unique such as "baker" that are similar to many other words are much more difficult to guess. **[6,7]**

In addition to the previous attributes, it is important to consider the "bin size", where this strategy tries to eliminate as many words as possible, to reach an answer efficiently, which is what our model represents. Words that give the most clues as to what the word is are words like "soare, arose, and tares". These starting words give the most information about what the actual word is because the positioning and letters are ubiquitous, and if the word contains no letters/positioning of the starting word, then the bin size is narrowed significantly. This strategy reaches a 99.7% success rate. **[1,4,8]**

Entropy means randomness or level of uncertainty. The lower the entropy, the higher the certainty. To find the entropy of a word, the following formula is used: **[13, 14, 15]**

$$Entropy = -\sum_{i=1}^{5} p(w_i) log_2(p(w_i))$$

The formula is used when the position of the letters is unknown where $p(w_i)$ is the probability of a letter appearing in a word.

After running the model many times, we realized entropy is the key factor in determining the correct solution.

Below is a list of the words with the lowest entropy, which make them common starting words for many players.

5.291 soare   5.356 arise

5.294 roate   5.360 orate

5.299 raise   5.370 stare

5.311 raile   5.382 carte

5.311 reast   5.390 raine

5.321 slate   5.400 caret

5.342 crate   5.402 ariel

5.342 salet   5.406 taler

5.345 irate   5.406 carle

5.346 trace   5.407 slane

The probability of every letter is calculated by the following frequency table: **[12]**

Letter	Count		Letter	Frequency
E	21912		E	12.02
T	16587		T	9.10
A	14810		A	8.12
O	14003		O	7.68
I	13318		I	7.31
N	12666		N	6.95
S	11450		S	6.28
R	10977		R	6.02
H	10795		H	5.92
D	7874		D	4.32
L	7253		L	3.98
U	5246		U	2.88
C	4943		C	2.71

M	4761		M	2.61
F	4200		F	2.30
Y	3853		Y	2.11
W	3819		W	2.09
G	3693		G	2.03
P	3316		P	1.82
B	2715		B	1.49
V	2019		V	1.11
K	1257		K	0.69
X	315		X	0.17
Q	205		Q	0.11
J	188		J	0.10
Z	128		Z	0.07

Using the model, there is a strong chance that of March 1st, 2023, the score distribution for any word will look similar to the following: **[4,9]**

0.5%	6%	23%	33%	23.5%	11.5%	2.5%
1 try	2 tries	3 tries	4 tries	5 tries	6 tries	7+ tries

When synthesizing the data, these are the average number of tries needed to guess a word, therefore it will be similar to the data of March 1st, 2023.[4]

The model generally tracked human performance but had some notable drawbacks. Wordle solutions tended to be common words used in the English language, while the allowed words list had many esoteric or uncommon words. Our program did not make any distinction about the

likelihood of the computed word being a good solution. It merely took the word that would eliminate the most remaining words if all letters in the word were incorrect. **[3]**

One instance when the computer model was lucky was the word "stale":

Word	Words Remaining
soare	12972
stale	35

It opened with the word "soare", and with the clues given, computed 35 possible matches and ranked "stale" as the top word with the most common letters that would eliminate the list with incorrect letters. By luck, "stale" was correct.

Another instance when the computer model did poorly was the word "baker":

Word	Words Remaining
soare	12972
tread	257
pager	101
laker	42
waker	7
naker	6
maker	5
jaker	4
faker	3
baker	2

It took 10 tries for the model to find "baker" – we allowed the program to take as many tries as it needed, even though the limit was 6 tries. The code correctly determined that the last characters of the solution were "aker", but there were no statistics to rank the letters w,n,m,j,f over "b", so the model simply tried all of the possible combinations. A human would have likely picked out "baker" as a solution, as none of the other words would be a plausible Wordle solution, which tends to be familiar English words. [10]

We also needed to take into consideration that results are obtained from Twitter, which is self-reported by humans and would not be representative of every human that played the Wordle game, as not everyone reported their results. We believe that most of the players who got the solution correct on the first try simply found the day's solution and entered it, as it is statistically unlikely to get the correct answer on the first try (a 0.0008% chance - one word out of 12,972). [4] Data was not collected properly for this to be a fair analysis of the game. This is because of 1. voluntary response, and 2. Convenience sampling.

Because of voluntary responses, results may not accurately represent the true population. This is a big problem in determining the accuracy of the model because it is plausible people withhold

their true Wordle scores, and may also falsify them. As mentioned above, this may skew results, and it is extremely unlikely that someone guesses the word on the first try without external help (such as the source code in the game, computer help, or looking up the answer online). Another variable that changes fairness is convenience sampling, which is taking a sample because it is convenient, which does not portray a true population. All of the data was taken from Twitter, which does not show the results of a true population because not all Wordle users and players are on Twitter. Another problem with the data is the inconsistency in percentages. When adding all the percentages given in the data, some show 101%, 98%, etc, and the average percentage is 100.2514% which is impossible, as the limit should be 100%.

We felt the model was fairly consistent with the human results, accounting for outliers where the model was very lucky and when the model stumbled over words that are not distinctive and needed some human judgment to rank the best solution based on usage.

To classify words due to difficulty in hard mode in Wordle, we subdivided our data by the percentages for attempts 1 through 3, 4 through 5, and 6+. The greatest percentage in each group classified the word into categories easy, medium, and hard, respectively.

How does the model predict the word EERIE? We ran a test:

SOARE - 12972	AROSE -12972	ROATE- 12972	RAISE - 12972	TARES - 12972
CURIE - 127	INURE - 93	GRISE - 136	OURIE - 24	OURIE - 100
KYRIE - 4	VIRGE - 20	FIBRE - 13	KYRIE - 4	KYRIE - 4
FIRIE - 2	KYRIE - 3	KYRIE - 4	FIRIE - 2	FIRIE - 2
EERIE - 1	EERIE - 1	CURIE - 2	EERIE - 1	EERIE - 1
		EERIE - 1		

The model solves the puzzle within the allocated 6 tries. It decisively whittles down the possible number of words, until its typical failure with distinguishing likely words at the end. "kyrie" and "firie" are subjectively not likely words that would be Wordle solutions based on how uncommon they are, and the model is unlucky too, "eerie" is picked simply because it's the only solution left. The word eerie would be classified as medium according to our model. However, this ranking may change if a human were to play, as kyrie, curie, firie, and soare are not everyday vocabulary.

Words like "eerie" are problematic because the model prefers to choose words that would eliminate as many words as possible if letters are incorrect. "eerie" would be ranked low because of the number of e's - it's simply a bad strategy to pick words with repeated letters unless there are enough clues to suggest the solution has repeated words. [4,9]

In conclusion, without an objective way of ranking how likely a word is to be a Wordle solution, our model suffers when the solution has words with similar letters, like "baker", but followed a strategy a human would make if playing Wordle with the intention of cutting down the list of possible solutions with the clues from each attempt.

Dear New York Times Puzzle Editor,

Our team has come up with a detailed analysis regarding the game Wordle. We developed a model based on many common strategies Wordle players use to guess the

word correctly. What we found is that many factors determine how difficult a word is. For example, easy words are unique, meaning they don't have a common ending like "aker" in the word "baker," which shares its ending with many other words. Another factor that plays a role

in how difficult a word is to guess is the common knowledge of the word. For example, the word "parer" is the most difficult word to guess in our data, and that is because the word is not used in everyday language. The last factor that we studied was the position and frequency of letters in the English language. For example, the word stale was easy to guess because the word isn't similar to other words, yet contains common letters like S, A, T, and E.

To prove this, we used the definition of entropy. Entropy is the uncertainty of a word, meaning that the lower the entropy, the less uncertainty the word contains. The most popular openings for many Wordle games are words like SOARE, AROSE, TARES, and ROATE because of their low entropy. These words will give the most clues on how to solve the puzzle because if none of the letters were correct, that would decrease the bin size or possibilities.

A problem we found in our data was the method of sampling. The data given may be inaccurate due to voluntary response and convenience sampling. Voluntary response decreases the integrity of the study as people choose what to post on Twitter. The data is not verifiable due to people lying and cheating when playing Wordle. Another problem with the data is convenience sampling off of Twitter. This is a problem because not all Wordle players have a Twitter account. This data does not represent a true population because the data was taken only from one source.

Overlooking the sampling method, we can see that the model shows results similar to the data given. Specifically, we looked at the word EERIE. A word like eerie is problematic to many players because of how many repeated letters are in the word. Three "e's" in a five-letter word make it very difficult to guess. Our model reflected this, even when using five different starting words Soare, Arose, Roate, Raise, and Tares, our model was only able to guess eerie correctly within 5 or 6 guesses.

This was our analysis of the data given, including the uncertainties the model has as well. It's clear that entropy is the key to winning the daily Wordle game.

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Appendix:
Results of Our Computer Program Playing Wordle
manly: soare 12972 layin 769 wanly 2 manly 1 4 tries

molar: soare 12972 romal 54 molar 1 3 tries
havoc: soare 12972 talon 195 yakow 18 caboc 7 havoc 1 5 tries
impel: soare 12972 tiled 608 incel 4 impel 1 4 tries
condo: soare 12972 yonic 369 gonch 6 convo 3 conto 2 condo 1 6 tries
judge: soare 12972 utile 302 nudge 28 pudge 5 mudge 4 judge 3 6 tries
extra: soare 12972 apert 15 extra 3 3 tries
poise: soare 12972 touse 30 poise 17 3 tries
aorta: soare 12972 romal 54 porta 8 torta 2 aorta 1 5 tries
excel: soare 12972 tiled 608 umbel 32 newel 9 expel 2 excel 1 6 tries
lunar: soare 12972 riyal 251 ulnar 9 lunar 1 4 tries
third: soare 12972 chiru 46 whirl 4 third 1 4 tries
slate: soare 12972 stale 35 slate 1 3 tries
taper: soare 12972 tread 257 terga 10 taxer 9 tawer 8 taver 7 taper 6 7 tries
chord: soare 12972 chiro 28 chord 1 3 tries
probe: soare 12972 trone 34 proke 17 prove 3 prole 2 probe 1 6 tries
rival: soare 12972 riyal 251 rival 1 3 tries
usual: soare 12972 tails 601 usual 2 3 tries
spoke: soare 12972 stope 21 spoke 2 3 tries
apply: soare 12972 layin 769 typal 14 amply 2 apply 1 5 tries
naive: soare 12972 anile 156 naive 3 3 tries
knock: soare 12972 nicol 254 junco 4 knock 1 4 tries
braid: soare 12972 train 107 grail 10 vraic 4 fraim 2 braid 1 6 tries
infer: soare 12972 tried 401 viner 56 inker 2 infer 1 5 tries
joust: soare 12972 molts 400 toshy 14 joist 6 joust 1 5 tries
amber: soare 12972 tread 257 pager 101 aimer 8 amber 1 5 tries
woken: soare 12972 yodel 177 token 27 woken 1 4 tries
adore: soare 12972 afore 3 adore 2 3 tries
torso: soare 12972 torsi 91 torsk 2 torso 1 4 tries
chafe: soare 12972 plate 72 knave 25 chafe 10 4 tries
eject: soare 12972 tiled 608 hefty 25 event 2 eject 1 5 tries
study: soare 12972 sluit 231 stunk 14 stump 7 study 4 5 tries
undue: soare 12972 utile 302 undue 3 3 tries
tepid: soare 12972 tiled 608 tepid 3 3 tries
happy: soare 12972 layin 769 cadgy 67 bawty 27 vampy 12 zappy 4 happy 3 7 tries
manly: soare 12972 layin 769 wanly 2 manly 1 4 tries

joust: soare 12972 molts 400 toshy 14 joist 6 joust 1 5 tries
amber: soare 12972 tread 257 pager 101 aimer 8 amber 1 5 tries
woken: soare 12972 yodel 177 token 27 woken 1 4 tries
adore: soare 12972 afore 3 adore 2 3 tries
torso: soare 12972 torsi 91 torsk 2 torso 1 4 tries
chafe: soare 12972 plate 72 knave 25 chafe 10 4 tries
eject: soare 12972 tiled 608 hefty 25 event 2 eject 1 5 tries
study: soare 12972 sluit 231 stunk 14 stump 7 study 4 5 tries
undue: soare 12972 utile 302 undue 3 3 tries
tepid: soare 12972 tiled 608 tepid 3 3 tries
happy: soare 12972 layin 769 cadgy 67 bawty 27 vampy 12 zappy 4 happy 3 7 tries
itchy: soare 12972 unity 577 tichy 11 itchy 1 4 tries
feast: soare 12972 teals 70 yeast 4 heast 3 feast 2 5 tries
drive: soare 12972 curie 127 tride 29 drive 1 4 tries
prime: soare 12972 curie 127 tride 29 grize 10 brine 3 prime 1 6 tries
axiom: soare 12972 talon 195 axiom 6 3 tries
brave: soare 12972 trace 39 grade 17 brame 8 braze 4 brave 3 6 tries
avert: soare 12972 apert 15 avert 2 3 tries
glyph: soare 12972 unity 577 glyph 4 3 tries
there: soare 12972 mitre 28 there 1 3 tries
baker: soare 12972 tread 257 pager 101 laker 42 waker 7 naker 6 maker 5 jaker 4 faker 3 baker 2 10 tries
snarl: soare 12972 starn 31 snary 5 snarl 4 4 tries
maple: soare 12972 anile 156 gable 16 padle 8 maple 2 5 tries
inane: soare 12972 plate 72 knave 25 inane 1 4 tries
valet: soare 12972 naled 349 palet 5 valet 1 4 tries
medal: soare 12972 naled 349 pedal 5 medal 2 4 tries
unite: soare 12972 utile 302 unite 1 3 tries
rainy: soare 12972 riyal 251 rainy 1 3 tries
spell: soare 12972 steil 211 swell 9 spell 5 4 tries
begin: soare 12972 tiled 608 neigh 28 genip 4 begin 1 5 tries
stale: soare 12972 stale 35 2 tries
dream: soare 12972 tread 257 dream 2 3 tries
photo: soare 12972 nicol 254 outby 22 thoft 2 photo 1 5 tries
aloud: soare 12972 talon 195 idola 14 aloud 1 4 tries
inept: soare 12972 tiled 608 nepit 16 inept 1 4 tries
piney: soare 12972 tiled 608 vixen 19 winey 3 piney 1 5 tries
aptly: soare 12972 layin 769 typal 14 aptly 1 4 tries
waltz: soare 12972 layin 769 hault 55 waltz 9 4 tries
libel: soare 12972 tiled 608 limen 11 libel 1 4 tries
sneak: soare 12972 stean 66 sneap 3 sneak 2 4 tries
carry: soare 12972 mauri 74 barry 14 tarry 4 parry 3 harry 2 carry 1 7 tries
flout: soare 12972 nicol 254 glout 16 flout 1 4 tries
foggy: soare 12972 yonic 369 goldy 111 boogy 4 moggy 2 foggy 1 6 tries
fault: soare 12972 layin 769 hault 55 vault 4 gault 3 fault 2 6 tries
mummy: soare 12972 unity 577 duply 74 jumby 25 gummy 3 yummy 2 mummy 1 7 tries
spiel: soare 12972 steil 211 spiel 3 3 tries
grove: soare 12972 trone 34 proke 17 drome 9 froze 3 grove 1 6 tries
denim: soare 12972 tiled 608 medic 9 denim 1 4 tries
quirk: soare 12972 chiru 46 quirt 2 quirk 1 4 tries
exist: soare 12972 tiles 640 besti 9 exist 1 4 tries
stein: soare 12972 steil 211 stein 1 3 tries
spade: soare 12972 stale 35 shape 17 spane 4 spake 3 spade 2 6 tries
catch: soare 12972 layin 769 match 73 watch 6 patch 5 gatch 4 batch 3 hatch 2 catch 1 9 tries
floor: soare 12972 curio 143 drown 51 rhomb 2 floor 1 5 tries
equal: soare 12972 naled 349 tepal 35 uveal 4 equal 1 5 tries
ionic: soare 12972 yonic 369 tonic 4 monic 3 ionic 2 5 tries

valid: soare 12972 layin 769 cavil 11 valid 1 4 tries
enjoy: soare 12972 olent 123 devon 15 enjoy 2 4 tries
howdy: soare 12972 yonic 369 goldy 111 howdy 12 4 tries
vigor: soare 12972 curio 143 rigol 15 vigor 1 4 tries
dandy: soare 12972 layin 769 canty 36 kandy 14 pandy 5 handy 4 gandy 3 bandy 2 dandy 1 9 tries
sloth: soare 12972 stoln 141 sloth 3 3 tries
march: soare 12972 riyal 251 garum 26 marka 4 march 1 5 tries
bough: soare 12972 yonic 369 moult 51 dough 5 bough 2 5 tries
sting: soare 12972 sluit 231 smith 21 stink 5 sting 1 5 tries
twine: soare 12972 utile 302 white 6 twine 2 4 tries
leave: soare 12972 plate 72 whale 8 liane 3 leaze 2 leave 1 6 tries
scorn: soare 12972 snort 15 sworn 3 shorn 2 scorn 1 5 tries
scald: soare 12972 spalt 155 scaly 12 scald 3 4 tries
usurp: soare 12972 muirs 20 usury 2 usurp 1 4 tries
soggy: soare 12972 sonly 57 soupy 8 softy 5 sooky 3 soggy 2 6 tries
brisk: soare 12972 ursid 178 trigs 35 prism 4 frisk 2 brisk 1 6 tries
admit: soare 12972 layin 769 admit 13 3 tries
grate: soare 12972 trace 39 wrate 6 urate 5 prate 4 irate 3 grate 2 7 tries
glory: soare 12972 chiro 28 flory 5 glory 1 4 tries
saint: soare 12972 satin 119 saint 1 3 tries
recap: soare 12972 tread 257 belar 29 rewan 10 repay 3 remap 2 recap 1 7 tries
alike: soare 12972 anile 156 alive 2 alike 1 4 tries
trice: soare 12972 curie 127 trice 4 3 tries
stick: soare 12972 sluit 231 smith 21 stink 5 stick 1 5 tries
chute: soare 12972 utile 302 quyte 7 chute 1 4 tries
parer: soare 12972 tread 257 pager 101 payer 7 pawer 6 paver 5 paler 4 pacer 3 parer 2 9 tries
doubt: soare 12972 yonic 369 moult 51 doubt 2 4 tries
thyme: soare 12972 utile 302 thyme 18 3 tries
alpha: soare 12972 layin 769 mulga 30 alpha 1 4 tries
booze: soare 12972 logie 128 conte 46 pombe 13 booze 1 5 tries
tibia: soare 12972 layin 769 admit 13 hutia 2 tibia 1 5 tries
lofty: soare 12972 yonic 369 goldy 111 jowly 12 loppy 6 looby 4 lofty 1 7 tries
theme: soare 12972 utile 302 thyme 18 theme 1 4 tries
class: soare 12972 clash 149 clast 3 clasp 2 class 1 5 tries
leery: soare 12972 entry 44 fiery 18 query 5 veery 4 peery 3 leery 2 7 tries
taunt: soare 12972 layin 769 gaunt 46 vaunt 6 jaunt 5 haunt 4 daunt 3 taunt 2 8 tries
whoop: soare 12972 nicol 254 butoh 9 whoop 2 4 tries
inter: soare 12972 tried 401 niter 9 inter 1 4 tries
gully: soare 12972 unity 577 duply 74 fugly 7 gully 1 5 tries
charm: soare 12972 liart 43 chard 17 chary 5 charm 4 5 tries
fungi: soare 12972 unity 577 lupin 11 fungi 2 4 tries
prize: soare 12972 curie 127 tride 29 grize 10 prize 3 5 tries
onset: soare 12972 lenos 60 owsen 2 onset 1 4 tries
chief: soare 12972 tiled 608 cunei 3 chief 1 4 tries
gauze: soare 12972 anile 156 madge 41 vague 4 gauze 2 5 tries
ruder: soare 12972 tried 401 under 12 ruder 1 4 tries
irony: soare 12972 curio 143 rigol 15 irony 2 4 tries
clown: soare 12972 nicol 254 clown 2 3 tries
needy: soare 12972 tiled 608 bendy 16 needy 2 4 tries
woven: soare 12972 yodel 177 token 27 coven 11 woven 2 5 tries
merit: soare 12972 tried 401 remit 7 merit 1 4 tries
waste: soare 12972 paste 36 waste 5 3 tries
treat: soare 12972 tread 257 treat 1 3 tries
shrug: soare 12972 sirup 27 strum 6 shrub 3 shrug 1 5 tries
twang: soare 12972 liang 168 whang 8 twang 2 4 tries
twice: soare 12972 utile 302 white 6 twine 2 twice 1 5 tries

gruel: soare 12972 tried 401 cruel 20 gruel 1 4 tries
poker: soare 12972 rowed 88 poler 46 poker 2 4 tries
khaki: soare 12972 liang 168 thaim 11 khazi 4 khadi 2 khaki 1 6 tries
hunky: soare 12972 unity 577 gundy 22 punky 9 junky 3 hunky 2 6 tries
label: soare 12972 naled 349 cavel 13 bagel 5 label 1 5 tries
glean: soare 12972 naled 349 venal 8 glean 2 4 tries
cling: soare 12972 unity 577 cling 14 3 tries
patty: soare 12972 layin 769 cadgy 67 bawty 27 patty 3 5 tries
unfit: soare 12972 unity 577 until 5 unwit 2 unfit 1 5 tries
smear: soare 12972 swear 21 stear 5 spear 4 smear 3 5 tries
alien: soare 12972 naled 349 angel 2 alien 1 4 tries
buggy: soare 12972 unity 577 duply 74 jumby 25 buzzy 3 buggy 2 6 tries
rhyme: soare 12972 curie 127 gryde 22 rhyne 2 rhyme 1 5 tries
youth: soare 12972 yonic 369 yokul 5 youth 1 4 tries
coyly: soare 12972 yonic 369 pocky 17 comby 9 coyly 3 5 tries
quart: soare 12972 liart 43 quart 4 3 tries
cramp: soare 12972 train 107 brack 32 crapy 5 cramp 1 5 tries
bluff: soare 12972 unity 577 mulch 24 pluff 3 bluff 2 5 tries
upset: soare 12972 tiles 640 upset 4 3 tries
stomp: soare 12972 stoln 141 stowp 18 stoup 3 stomp 2 5 tries
motto: soare 12972 yonic 369 moult 51 motto 1 4 tries
cinch: soare 12972 unity 577 linch 18 winch 5 pinch 4 ginch 3 finch 2 cinch 1 8 tries
elope: soare 12972 olive 62 cloze 14 globe 7 ploye 3 elope 1 6 tries
power: soare 12972 rowed 88 vower 7 tower 6 power 5 5 tries
midge: soare 12972 utile 302 dinge 46 midge 3 4 tries
tryst: soare 12972 ursid 178 tryps 3 tryst 1 4 tries
aphid: soare 12972 layin 769 admit 13 aphid 1 4 tries
trite: soare 12972 curie 127 tride 29 tripe 5 trine 4 trike 3 tribe 2 trite 1 8 tries
angry: soare 12972 mauri 74 angry 5 3 tries
flock: soare 12972 nicol 254 flock 10 3 tries
wacky: soare 12972 layin 769 cadgy 67 wacky 4 4 tries
roomy: soare 12972 dorty 80 roupy 8 rocky 5 roily 3 roomy 2 6 tries
wedge: soare 12972 utile 302 hynde 43 wedge 3 4 tries
liver: soare 12972 tried 401 viner 56 wiver 7 liver 6 5 tries
bland: soare 12972 liang 168 plank 8 bland 3 4 tries
night: soare 12972 unity 577 nicht 6 night 1 4 tries
madam: soare 12972 layin 769 match 73 mapau 5 madam 1 5 tries
berth: soare 12972 tried 401 retch 9 berth 1 4 tries
stead: soare 12972 stean 66 steam 4 steal 3 steak 2 stead 1 6 tries
voice: soare 12972 logie 128 voice 3 3 tries
agape: soare 12972 plate 72 chape 4 agape 1 4 tries
fluff: soare 12972 unity 577 mulch 24 pluff 3 bluff 2 fluff 1 6 tries
field: soare 12972 tiled 608 yield 4 wield 3 field 2 5 tries
sever: soare 12972 spier 56 syker 19 suber 13 sweer 11 sexer 5 sever 4 7 tries
lilac: soare 12972 layin 769 limpa 6 litai 2 lilac 1 5 tries
egret: soare 12972 tried 401 muter 19 rewet 5 egret 1 5 tries
pinto: soare 12972 nicol 254 pingo 9 pinto 2 4 tries
hutch: soare 12972 unity 577 mutch 11 kutch 5 dutch 4 butch 3 hutch 2 7 tries
gawky: soare 12972 layin 769 cadgy 67 gaumy 7 gawky 3 5 tries
droll: soare 12972 curio 143 drown 51 dropt 7 drool 5 droll 1 6 tries
retro: soare 12972 negro 13 pedro 5 metro 2 retro 1 5 tries
rusty: soare 12972 ursid 178 rusty 4 3 tries
beady: soare 12972 leady 51 heady 2 beady 1 4 tries
smite: soare 12972 stile 74 suite 5 spite 4 smite 3 5 tries
brink: soare 12972 rutin 175 bring 9 briny 2 brink 1 5 tries
awful: soare 12972 layin 769 mulga 30 awful 3 4 tries
gloat: soare 12972 talon 195 flota 9 ploat 3 gloat 2 5 tries
input: soare 12972 unity 577 input 2 3 tries

loser: soare 12972 rosed 31 poser 4 noser 3 loser 2 5 tries
cacao: soare 12972 talon 195 macho 14 wacko 3 bacco 2 cacao 1 6 tries
blown: soare 12972 nicol 254 plong 7 flown 2 blown 1 5 tries
apron: soare 12972 trona 79 racon 10 apron 1 4 tries
primo: soare 12972 curio 143 trigo 4 primo 1 4 tries
atone: soare 12972 anole 23 axone 3 atone 2 4 tries
donor: soare 12972 dorty 80 donor 2 3 tries
float: soare 12972 talon 195 flota 9 float 1 4 tries
goose: soare 12972 touse 30 poise 17 lowse 11 gosse 6 goose 1 6 tries
piety: soare 12972 tiled 608 piety 3 3 tries
girth: soare 12972 rutin 175 frith 22 yirth 4 mirth 3 girth 2 6 tries
trait: soare 12972 train 107 trail 3 traik 2 trait 1 5 tries
flood: soare 12972 nicol 254 bloop 11 kloof 3 flood 1 5 tries
gloom: soare 12972 nicol 254 bloop 11 kloof 3 gloom 1 5 tries
depth: soare 12972 tiled 608 educt 5 depth 1 4 tries
froth: soare 12972 curio 143 drown 51 tromp 18 froth 2 5 tries
peach: soare 12972 leady 51 beath 11 peach 1 4 tries
showy: soare 12972 stoln 141 shock 38 showy 10 4 tries
creak: soare 12972 tread 257 creak 9 3 tries
manor: soare 12972 trona 79 racon 10 nagor 2 manor 1 5 tries
atoll: soare 12972 talon 195 flota 9 atoll 1 4 tries
bayou: soare 12972 talon 195 yakow 18 bayou 1 4 tries
crept: soare 12972 tried 401 urent 8 crept 2 4 tries
tiara: soare 12972 liart 43 tiara 1 3 tries
asset: soare 12972 tesla 219 easts 2 asset 1 4 tries
vouch: soare 12972 yonic 369 touch 31 vouch 5 4 tries
album: soare 12972 layin 769 mulga 30 ampul 3 almud 2 album 1 6 tries
hinge: soare 12972 utile 302 dinge 46 winge 5 minge 4 hinge 3 6 tries
money: soare 12972 yodel 177 money 22 3 tries
scrap: soare 12972 scrat 39 scray 7 scraw 6 scrap 5 5 tries
gamer: soare 12972 tread 257 pager 101 gazer 3 gayer 2 gamer 1 6 tries
glass: soare 12972 clash 149 plast 5 flask 2 glass 1 5 tries
scour: soare 12972 sutor 18 scour 1 3 tries
being: soare 12972 tiled 608 neigh 28 being 1 4 tries
delve: soare 12972 utile 302 clype 22 ledge 11 delve 1 5 tries
yield: soare 12972 tiled 608 yield 4 3 tries
metal: soare 12972 naled 349 tepal 35 metal 2 4 tries
tipsy: soare 12972 tulsi 505 tipsy 2 3 tries
slung: soare 12972 sluit 231 slung 9 3 tries
farce: soare 12972 large 56 carve 11 farce 1 4 tries
gecko: soare 12972 olent 123 demob 28 gecko 2 4 tries
shine: soare 12972 stile 74 spine 15 swine 3 shine 2 5 tries
canny: soare 12972 layin 769 canty 36 candy 2 canny 1 5 tries
midst: soare 12972 tulsi 505 ditsy 5 midst 1 4 tries
badge: soare 12972 anile 156 madge 41 wadge 5 fadge 4 cadge 3 badge 2 7 tries
homer: soare 12972 rowed 88 poler 46 toner 30 comer 19 vomer 3 homer 2 7 tries
train: soare 12972 train 107 2 tries
hairy: soare 12972 mauri 74 yaird 13 vairy 4 lairy 3 hairy 2 6 tries
story: soare 12972 snort 15 story 3 3 tries
forgo: soare 12972 dorty 80 corni 19 forum 5 forgo 1 5 tries
larva: soare 12972 riyal 251 larum 4 larnt 3 larch 2 larva 1 6 tries
stash: soare 12972 spalt 155 stang 22 staid 8 stack 7 stays 6 stash 2 7 tries
zesty: soare 12972 tiles 640 guest 12 zesty 4 4 tries
shown: soare 12972 stoln 141 shown 5 3 tries
heist: soare 12972 tiles 640 besti 9 neist 5 heist 4 5 tries
askew: soare 12972 tesla 219 names 104 asked 3 askew 1 5 tries
inert: soare 12972 entry 44 inert 1 3 tries
olive: soare 12972 olive 62 2 tries

plant: soare 12972 liang 168 plank 8 plant 1 4 tries
oxide: soare 12972 olive 62 oxime 4 oxide 1 4 tries
cargo: soare 12972 trona 79 parol 28 carbo 5 cargo 1 5 tries
foyer: soare 12972 rowed 88 poler 46 toner 30 comer 19 yoker 10 foyer 1 7 tries
flair: soare 12972 train 107 glair 4 flair 1 4 tries
ample: soare 12972 anile 156 ample 5 3 tries
cheek: soare 12972 tiled 608 unmew 25 zebec 4 cheep 2 cheek 1 6 tries
shame: soare 12972 stale 35 shape 17 shave 4 shame 3 5 tries
mince: soare 12972 utile 302 dinge 46 wince 7 yince 2 mince 1 6 tries
chunk: soare 12972 unity 577 lunch 16 chunk 1 4 tries
royal: soare 12972 romal 54 royal 3 3 tries
squad: soare 12972 satin 119 subha 17 squaw 3 squad 1 5 tries
black: soare 12972 liang 168 flack 34 plack 4 black 3 5 tries
stair: soare 12972 stair 2 2 tries
scare: soare 12972 sware 7 stare 6 spare 5 snare 4 share 3 scare 2 7 tries
foray: soare 12972 romal 54 borak 14 torah 5 foray 2 5 tries
comma: soare 12972 nodal 132 mocha 24 comma 1 4 tries
natal: soare 12972 layin 769 nabla 9 naval 3 natal 2 5 tries
shawl: soare 12972 spalt 155 swail 18 shawl 1 4 tries
fewer: soare 12972 tried 401 puler 71 cyber 21 fewer 13 5 tries
trope: soare 12972 trone 34 trove 4 trope 3 4 tries
snout: soare 12972 stoln 141 snout 3 3 tries
lowly: soare 12972 yonic 369 goldy 111 jowly 12 lowly 1 5 tries
stove: soare 12972 stope 21 stove 4 3 tries
shall: soare 12972 spalt 155 scaly 12 shalm 6 shall 1 5 tries
found: soare 12972 yonic 369 mound 22 wound 6 pound 5 lound 4 hound 3 found 2 8 tries
nymph: soare 12972 unity 577 lynch 3 nymph 1 4 tries
epoxy: soare 12972 olent 123 demob 28 epoxy 2 4 tries
depot: soare 12972 olent 123 depot 5 3 tries
chest: soare 12972 tiles 640 guest 12 weest 3 chest 1 5 tries
purge: soare 12972 curie 127 purge 7 3 tries
slosh: soare 12972 stoln 141 spoil 17 sloyd 8 sloom 6 slows 4 slosh 1 7 tries
their: soare 12972 tried 401 their 1 3 tries
renew: soare 12972 tried 401 puler 71 remen 7 reney 2 renew 1 6 tries
allow: soare 12972 talon 195 aglow 7 ablow 2 allow 1 5 tries
saute: soare 12972 salue 13 saute 2 3 tries
movie: soare 12972 logie 128 mobie 18 moxie 3 movie 2 5 tries
cater: soare 12972 tread 257 recta 19 cater 2 4 tries
tease: soare 12972 lyase 15 phase 9 ukase 6 tease 5 5 tries
smelt: soare 12972 steil 211 spelt 5 swelt 2 smelt 1 5 tries
focus: soare 12972 molts 400 gonks 162 fouds 56 focus 1 5 tries
today: soare 12972 nodal 132 today 2 3 tries
watch: soare 12972 layin 769 match 73 watch 6 4 tries
lapse: soare 12972 paste 36 lapse 1 3 tries
month: soare 12972 yonic 369 donut 14 month 1 4 tries
sweet: soare 12972 steil 211 spent 14 sweet 3 4 tries
hoard: soare 12972 hoary 7 hoard 1 3 tries
cloth: soare 12972 nicol 254 flock 10 clout 5 cloth 1 5 tries
brine: soare 12972 curie 127 tride 29 grize 10 brine 3 5 tries
ahead: soare 12972 naled 349 jehad 8 ahead 1 4 tries
mourn: soare 12972 bourd 29 yourt 6 mourn 2 4 tries
nasty: soare 12972 tails 601 patsy 12 vasty 4 nasty 3 5 tries
rupee: soare 12972 curie 127 ruble 3 rupee 2 4 tries
choke: soare 12972 olive 62 phone 13 choke 2 4 tries
chant: soare 12972 liang 168 thank 13 chant 1 4 tries
spill: soare 12972 sluit 231 silky 11 swill 3 spill 2 5 tries
vivid: soare 12972 unity 577 milch 25 bifid 3 vivid 1 5 tries

bloke: soare 12972 olive 62 cloze 14 globe 7 bloke 1 5 tries
trove: soare 12972 trone 34 trove 4 3 tries
thorn: soare 12972 chiro 28 whort 5 thorp 2 thorn 1 5 tries
other: soare 12972 tenor 64 oxter 6 other 1 4 tries
tacit: soare 12972 layin 769 mafic 23 capiz 2 tacit 1 5 tries
swill: soare 12972 sluit 231 silky 11 swill 3 4 tries
dodge: soare 12972 logie 128 bodge 9 wodge 4 podge 3 modge 2 dodge 1 7 tries
shake: soare 12972 stale 35 shape 17 shave 4 shame 3 shake 2 6 tries
caulk: soare 12972 layin 769 hault 55 caulk 5 4 tries
aroma: soare 12972 trona 79 groma 4 aroma 1 4 tries
cynic: soare 12972 unity 577 vinyl 3 cynic 1 4 tries
robin: soare 12972 dorty 80 rough 6 robin 2 4 tries
ultra: soare 12972 mauri 74 ultra 5 3 tries
ulcer: soare 12972 tried 401 puler 71 ulcer 3 4 tries
pause: soare 12972 paste 36 pause 2 3 tries
humor: soare 12972 curio 143 tumor 5 humor 2 4 tries
frame: soare 12972 trace 39 grade 17 brame 8 frame 2 5 tries
elder: soare 12972 tried 401 under 12 cyder 4 heder 2 elder 1 6 tries
skill: soare 12972 sluit 231 silky 11 skill 1 4 tries
aloft: soare 12972 talon 195 flota 9 aloft 1 4 tries
pleat: soare 12972 naled 349 tepal 35 pleat 1 4 tries
shard: soare 12972 starn 31 scarp 14 swarm 6 shark 2 shard 1 6 tries
moist: soare 12972 molts 400 moust 2 moist 1 4 tries
those: soare 12972 chose 5 whose 2 those 1 4 tries
light: soare 12972 unity 577 gitch 32 wight 10 pight 9 might 8 light 7 7 tries
wrung: soare 12972 rutin 175 grund 6 wrung 2 4 tries
could: soare 12972 yonic 369 touch 31 could 1 4 tries
perky: soare 12972 tried 401 rebuy 28 perky 9 4 tries
mount: soare 12972 yonic 369 mound 22 mount 1 4 tries
whack: soare 12972 liang 168 thack 36 whack 2 4 tries
sugar: soare 12972 scrat 39 simar 4 sugar 1 4 tries
knoll: soare 12972 nicol 254 knoll 1 3 tries
crimp: soare 12972 rutin 175 primy 29 crimp 1 4 tries
wince: soare 12972 utile 302 dinge 46 wince 7 4 tries
prick: soare 12972 rutin 175 primy 29 prick 2 4 tries
robot: soare 12972 dorty 80 rozit 6 robot 1 4 tries
point: soare 12972 yonic 369 toing 11 point 3 4 tries
proxy: soare 12972 curio 143 drown 51 tromp 18 proxy 3 5 tries
shire: soare 12972 stire 12 swire 3 spire 2 shire 1 5 tries
solar: soare 12972 soral 8 solar 1 3 tries
panic: soare 12972 layin 769 manic 6 panic 1 4 tries
tangy: soare 12972 layin 769 canty 36 tanky 2 tangy 1 5 tries
abbey: soare 12972 naled 349 hevea 3 apeek 2 abbey 1 5 tries
favor: soare 12972 trona 79 parol 28 mayor 5 favor 2 5 tries
drink: soare 12972 rutin 175 bring 9 prink 2 drink 1 5 tries
query: soare 12972 entry 44 fiery 18 query 5 4 tries
gorge: soare 12972 ronte 31 forge 13 porge 2 gorge 1 5 tries
crank: soare 12972 train 107 krang 14 prank 5 frank 4 drank 3 crank 2 7 tries
slump: soare 12972 sluit 231 slung 9 slump 6 4 tries