Tianyi Mu
Clever Hangman
Part 1c

For 10 guesses:

The original order of letters has the results:

```
word length: 5
4170 words 1191 wins
word length: 6
6166 words 1948 wins
word length: 7
7359 words 2254 wins
word length: 8
7070 words 2186 wins
word length: 9
6078 words 1899 wins
word length: 10
4591 words 1503 wins
```

The order based on the probabilities (count of the number of words that letter is present in) has the results:

```
word length: 5
4170 words 1268 wins
word length: 6
6166 words 2153 wins
word length: 7
7359 words 2944 wins
word length: 8
7070 words 3169 wins
word length: 9
6078 words 3009 wins
word length: 10
4591 words 2482 wins
```

The order based on popularity of letters in dictionary words grouped by the length of those words has the results:

```
word length: 5
4170 words 1149 wins
word length: 6
6166 words 2148 wins
word length: 7
7359 words 2972 wins
word length: 8
7070 words 3160 wins
word length: 9
6078 words 3001 wins
word length: 10
4591 words 2477 wins
```

The order based on popularity of letters in dictionary words grouped by the length of those words and conditional probability when the lengths of words are known has the results:

```
word length: 5
4170 words 1087 wins
word length: 6
6166 words 1937 wins
word length: 7
7359 words 2972 wins
word length: 8
7070 words 3160 wins
word length: 9
6078 words 3001 wins
word length: 10
4591 words 2477 wins
```

For 12 guesses:

The original order of letters has the results:

```
word length: 5
4170 words 1625 wins
word length: 6
6166 words 2574 wins
word length: 7
7359 words 3108 wins
word length: 8
7070 words 3176 wins
word length: 9
6078 words 2868 wins
word length: 10
4591 words 2405 wins
```

The order based on the probabilities (count of the number of words that letter is present in) has the results:

```
word length: 5
4170 words 1864 wins
word length: 6
6166 words 3231 wins
word length: 7
7359 words 4315 wins
word length: 8
7070 words 4459 wins
word length: 9
6078 words 4019 wins
word length: 10
4591 words 3275 wins
```

The order based on popularity of letters in dictionary words grouped by the length of those words has the results:

```
word length: 5
```

```
4170 words 1843 wins
word length: 6
6166 words 3231 wins
word length: 7
7359 words 4315 wins
word length: 8
7070 words 4459 wins
word length: 9
6078 words 4019 wins
word length: 10
4591 words 3275 wins
```

The order based on popularity of letters in dictionary words grouped by the length of those words and conditional probability when the lengths of words are known has the results:

```
word length: 5
4170 words 1833 wins
word length: 6
6166 words 3080 wins
word length: 7
7359 words 4315 wins
word length: 8
7070 words 4459 wins
word length: 9
6078 words 4019 wins
word length: 10
4591 words 3275 wins
```

Based on the table generated for 10 and 12 guesses, it is clear that the letter order based on probability works the best for the word list we have in this hangman program. Although the letter orders based on word length and conditional probability should perform better, it is not the case for this particular hangman game. If we include all words from the dictionary, then the letter orders based on word length and conditional probability may perform better. Nevertheless, we can see that with more guesses, and longer words, then the letter orders based on word length and conditional probability have a much bigger increase in performance than the general letter orders that apply to all words.

In conclusion, the “better” ordering of letter is the letter order based on probability.

"esiarntolcdupmghbyfvkwzxqj"