Readability

For this problem, you'll implement a program that calculates the approximate grade level needed to comprehend some text, per the below.

```
$ ./readability
Text: Congratulations! Today is your day. You're off to Great Places! You're off and away!
Grade 3
```

Background

According to Scholastic, E.B. White's *Charlotte's Web* is between a second- and fourth-grade reading level, and Lois Lowry's *The Giver* is between an eighth- and twelfth-grade reading level. What does it mean, though, for a book to be at a particular reading level?

Well, in many cases, a human expert might read a book and make a decision on the grade (i.e., year in school) for which they think the book is most appropriate. But an algorithm could likely figure that out too!

So what sorts of traits are characteristic of higher reading levels? Well, longer words probably correlate with higher reading levels. Likewise, longer sentences probably correlate with higher reading levels, too.

A number of "readability tests" have been developed over the years that define formulas for computing the reading level of a text. One such readability test is the *Coleman-Liau index*. The Coleman-Liau index of a text is designed to output that (U.S.) grade level that is needed to understand some text. The formula is

```
index = 0.0588 * L - 0.296 * S - 15.8
```

where `L` is the average number of letters per 100 words in the text, and `S` is the average number of sentences per 100 words in the text.

Let's write a program called `readability` that takes a text and determines its reading level. For example, if user types in a line of text from Dr. Seuss, the program should behave as follows:

```
$ ./readability
Text: Congratulations! Today is your day. You're off to Great Places! You're off and away!
Grade 3
```

The text the user inputted has 65 letters, 4 sentences, and 14 words. 65 letters per 14 words is an average of about 464.29 letters per 100 words (because 65 / 14 * 100 = 464.29). And 4 sentences per 14 words is an average of about 28.57 sentences per 100 words (because 4 / 14 * 100 = 28.57). Plugged into the Coleman-Liau formula, and rounded to the nearest integer, we get an answer of 3 (because 0.0588 * 464.29 - 0.296 * 28.57 - 15.8 = 3): so this passage is at a third-grade reading level.

Let's try another one:

```
$ ./readability
Text: Harry Potter was a highly unusual boy in many ways. For one thing, he hated the summer holidays more than any other time of year. For a
Grade 5
```

This text has 214 letters, 4 sentences, and 56 words. That comes out to about 382.14 letters per 100 words, and 7.14 sentences per 100 words. Plugged into the Coleman-Liau formula, we get a fifth-grade reading level.

As the average number of letters and words per sentence increases, the Coleman-Liau index gives the text a higher reading level. If you were to take this paragraph, for instance, which has longer words and sentences than either of the prior two examples, the formula would give the text an twelfth-grade reading level.

```
$ ./readability
Text: As the average number of letters and words per sentence increases, the Coleman-Liau index gives the text a higher reading level. If you
Grade 12
```

Specification

Design and implement a program, `readability`, that computes the Coleman-Liau index of text.

- Implement your program in a file called `readability.c` in a directory called `readability`.
- Your program must prompt the user for a `string` of text using `get_string`.

- Your program should count the number of letters, words, and sentences in the text. You may assume that a letter is any lowercase character from `a` to `z` or any uppercase character from `A` to `Z`, any sequence of characters separated by spaces should count as a word, and that any occurrence of a period, exclamation point, or question mark indicates the end of a sentence.
- Your program should print as output `"Grade X"` where `X` is the grade level computed by the Coleman-Liau formula, rounded to the nearest integer.
- If the resulting index number is 16 or higher (equivalent to or greater than a senior undergraduate reading level), your program should output `"Grade 16+"` instead of giving the exact index number. If the index number is less than 1, your program should output `"Before Grade 1"`.

How to Test Your Code

Try running your program on the following texts, to ensure you see the specified grade level. Be sure to copy only the text, no extra spaces.

- `One fish. Two fish. Red fish. Blue fish.` (Before Grade 1)
- `Would you like them here or there? I would not like them here or there. I would not like them anywhere.` (Grade 2)
- `Congratulations! Today is your day. You're off to Great Places! You're off and away!` (Grade 3)
- `Harry Potter was a highly unusual boy in many ways. For one thing, he hated the summer holidays more than any other time of yea` (Grade 5)
- `In my younger and more vulnerable years my father gave me some advice that I've been turning over in my mind ever since.` (Grade 7)
- `Alice was beginning to get very tired of sitting by her sister on the bank, and of having nothing to do: once or twice she had` (Grade 8)
- `When he was nearly thirteen, my brother Jem got his arm badly broken at the elbow. When it healed, and Jem's fears of never bei` (Grade 8)
- `There are more things in Heaven and Earth, Horatio, than are dreamt of in your philosophy.` (Grade 9)
- `It was a bright cold day in April, and the clocks were striking thirteen. Winston Smith, his chin nuzzled into his breast in an` (Grade 10)
- `A large class of computational problems involve the determination of properties of graphs, digraphs, integers, arrays of intege` (Grade 16+)