# The Validity of Some Popular Readability Formulas

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*Abstract: This study aimed at exploring the correlation between readers' evaluation of text-readability on one hand and some popular readability formula's (Flesch Reading Ease Readability Formula, Gunning's Fog-Index of Readability, The SMOG Index of Readability, Flesch-Kincaid) evaluation of text-readability on the other. This study was conducted with an overall number of 118 participants. The participants were selected from among male and female undergraduate students studying different EFL-related majors at the Department of Foreign Languages and Linguistics of IAU, Shiraz Branch. The participants were chosen using convenient sampling procedure. To achieve the objectives of the study, 5 passages of different readability index were used. Moreover, a questionnaire aimed at tapping responses from the participants was devised on each passage. Finally, a number of SPSS analyses were run and the results of the study did not reveal any significant correlations between readers' and the formulas' evaluation of text-readability level. As a conclusion, it seems that those teachers who have used the readability formulas as valuable measures for evaluating materials to use with their students should use them cautiously. Of course, further research seems necessary to check the validity of the readability formulas.*

*Key Words: text readability; readability formula; Flesch Reading Ease Readability Formula; Gunning's Fog-Index of Readability; The SMOG Index of Readability; Flesch-Kincaid Formula; validity of readability formulas.*

## 1. Introduction

Broadly speaking, factors affecting reading comprehension can be classified into two general categories: reader variables and text variables. The first category of variables which includes factors such as readers' background knowledge, skills, abilities, motivation, and attitude are internal to readers. The second category of variables which includes factors such as text-content, type, genre, organization, typographical features, and readability are internal to texts rather than to readers (Alderson, 2000 cited in Mehrpour & Riazi, 2004).

How easy or difficult is it to read a text? How clearly does a text express ideas and emotions? These questions are inextricably bound up with the concept of readability (Bailin & Grafstein, 2001). According to Richards, *et al.* (1992, p. 306), readability means: "how easily written materials can be read and understood. This depends on several factors including the average length of sentences, the number of new words contained, and the grammatical complexity of the language used in a passage."

Generally, Dale and Chall's (1949) definition may be the most comprehensive: "The sum total (including all the interactions) of all those elements within a given piece of printed material that affect the success a group of reader have with it. The success is the extent to which they understand it, read it at an optimal speed, and find it interesting."Other definitions have been proposed for readability (see, e.g., McLaghlin, 1969).

Procedures used to measure readability are known as readability formulas. Today, there are more than 40 different readability formulas used to measure readability, but some of them are better known and more popular than the others. Perhaps, the most common and the most publicized readability formula was the one credited to Rudolph Flesch (1948). The popularity of his formula made Flesch a leading authority on readability.

Flesch Reading Ease Readability Formula (1948) has also been incorporated and installed in Microsoft Office Word. A text in word can be checked for its spelling and grammar, as well as its readability level.

Readability index is based on the average number of syllables per word and words per sentence. Flesch Reading Ease Readability Formula rates texts on a 100-point scale—the higher the score, the easier it is to understand the text. The Flesch Reading Ease Readability Formula is usually defined by the following formula (Flesch, 1948):

206.835 – (1.015 × ASL) – (84.6 × ASW)

Where, ASL is the Average Sentence Length (the number of words divided by the number of sentences), and ASW is the Average of Syllables per Word (the number of syllables divided by the number of words). DuBay (2004) provides interpretation of the Flesch Reading Ease Score as indicated in Table 1.

**Table 1:** Description and predicted reading grade for Flesch Reading Ease Score (DuBay, 2004)

| Reading Ease Score | Description | Predicted Reading Grade | Estimated Percentage of U.S. Adults |
|---|---|---|---|
| 0-30 | very difficult | college graduate | 4.5% |
| 30-40 | difficult | college grade | 33% |
| 50-60 | fairly difficult | 10th-12th grade | 54% |
| 60-70 | standard | 8th-9th grade | 83% |
| 70-80 | fairly easy | 7th grade | 88% |
| 80-90 | easy | 6th grade | 91% |
| 90-100 | very easy | 5th grade | 93% |

It is not clear why the 40-50 range is left out in DuBay's table (Heydari & Riazi, 2012).

After that, in *The Technique of Clear Writing*, Gunning (1952) published a readability formula developed for adults, the Fog-Index, which became popular because of its ease of use. It uses two variables, average sentence length and the number of words with more than two syllables for each 100 words.

Grade Level= 0.4 ✕ (Average Sentence Length + Number of hard words)

Where:
A hard word is defined as a word that is more than two syllables long.
The Gunning's Fog-Index is shown in Table 2.

**Table 2:** Gunning's Fog-Index

| | Fog-Index | Estimated Reading Grades |
|---|---|---|
| | 17 | College graduate |
| | 16 | College senior |
| | 15 | College junior |
| | 14 | College sophomore |
| Danger line        13 | | College freshman |
| | 12 | High school senior |
| | 11 | High school junior |
| | 10 | High school sophomore |
| Easy | 9 | High school freshman |
| Reading        8 Range | | Eighth grade |
| | 7 | Seventh grade |
| | 6 | Sixth grade |

The publication of such formulas conveniently marks the end of the first 30 years of classic readability studies.

After that, G. Harry McLaughlin (1969) published his SMOG (Simple Measure Of Gobbledygook) formula in the belief that word length and sentence length should be multiplied rather than added. By counting the number of words of more than two syllables (polysyllable count) in 30 sentences, he provided this simple formula:

SMOG Grading = 3 + square root of polysyllable count

Another known readability formula, the Flesch-Kincaid Formula (1975 cited in Greenfield, 1999), is a recalibration of the original Flesch Formula. It rates text on a U.S. grade school level. For example, a score of eight means that an eight grader can understand the document. For most documents, the writers aim for a score of approximately 7.0 to 8.0.

The formula for the Flesch-Kincaid Grade Level Score is:

$(0.39 \times ASL) + (11.8 \times ASW) - 15.59$

Where:

ASL is the Average Sentence Length (the number of words divided by the number of sentences), and ASW is the Average of Syllables per Word (the number of syllables divided by the number of words).

The present study tries to deal with the validity of the popular aforementioned readability formulas. The next section presents a review of the background on the text readability.

## 2. Review of the Readability of the Texts

Reviewing the literature on readability formulas, one can easily understand that such studies are of three different types including:

1. History of readability
2. Applications of readability formulas
3. The pros and cons views toward the use of readability formulas

The first strand of studies on readability present different readability formulas devised to measure the readability of texts (Flesch, 1948; Dale-Chall, 1948 cited in DuBay, 2004; Gunning, 1952; Fry, 1968; McLaughlin, 1969; Flesch-Kincaid Formula, 1975 cited in Greenfield, 1999). In fact, the earliest investigations of readability were conducted by asking students, librarians, and teachers what seemed to make texts readable. Such studies led to the development of mathematical formulas. Today, readability evaluation of the texts is calculated by computer programs. As such, most grammar or editing software programs can determine the readability level of the written materials.

The second group of studies on readability deals with the application of the readability formulas. Readability formulas have had a wide range of applications. Indeed, they were originally created for testing the readability level of school textbooks (Serevin & Tankard, 1992 cited in Balachandran, 1997). Fry (1986, p.1) pointed out that "articles on the readability formulas are among the most frequently cited articles of all types of educational research." The applications give researchers an objective means for controlling the difficulty of passages in their experiments (DuBay, 2004). Today, readability formulas can be applied to anything from textbooks to government documents and they are more popular than ever. Some of such applications are as follows: (educational system: Kennedy, 1979; Reed, 1988; mass media including newspapers: Lostutter, 1949; Fusaro & Conover, 1983; newsletters: Balachandran, 1997; wire services: Catalano, 1990; brochures: Christ & Pharr, 1980; websites: Baker, Wilson, & Kars, 1997; Graber, Roller, & Kaeble, 1999; manuals: Stahl, Henk, & Eilers, 1995; TV programs: Vancura, 1955; and court actions and legislation: DuBay, 2004). Moreover, there are readability formulas for Spanish, French, Dutch, Swedish, Russian, Hebrew, Hindi, Chinese, Korean (see Rabin, 1988 cited in DuBay, 2004), and Farsi (Dayyani, 1993). The formulas have survived 80 years of intensive application, investigation, and controversy with both their credentials and limitations remaining intact.

The third group of studies discusses the pros and cons views toward the use of readability formulas. Such studies mostly deal with a closer examination of the formulas' underlying principles (Kirkwood & Wolfe, 1980;

Bertram & Newman, 1981; Frase, Rubin, Starr, & Plung, 1981; Bailin & Grafstein, 2001), the concept of their validity and appropriateness for either native or second language learners (Froese, 1971; Hamsik, 1984; Brown, 1998; Greenfield, 1999; Rezaei, 2000; Ardoin, Suldo, Witt, Aldrich, & McDonald, 2005), the discrepancy between the scores of different formulas (Chen, 1986; DuBay, 2004) , and so forth. Such studies help readers to become familiar with the background of the formulas, the theory on which they stand, what they are good for and what they are not.

## Synopsis of the Literature Reviewed

Indeed, it can be declared openly that the formulas have both advantages and disadvantages.
   Advantages of using readability formulas:
   1.    By definition, readability formulas measure the grade-level readers must have to read a given text. The results from using readability formulas provide the writer of the text with much needed information to reach his target audience.
   2.    Readability formulas do not require the readers to first go through the text to decide if the text is too hard or too easy to read. By readability formulas, one can know ahead of time if his readers can understand the material. This can save time, money and energy.
   3.    Readability formulas are text-based formulas; many researchers and readers find them easy to use.
   4.    Today, readability formulas can be performed by computer. As such, most grammar or editing software today can determine the readability level of written materials.
   5.    Readability formulas help writers convert their written material into plain language.
   Disadvantages of using readability formulas:
   1.    Unfortunately, readability formulas are not of much help if one wants to know how well the target audience understands the text.
   2.    Due to many readability formulas, there is an increasing chance of getting wide variation in results of a same text.
   3.    Readability formulas cannot measure the context, prior knowledge, interest level, difficulty of concept, or coherence of text. (Heydari & Riazi, 2012; Zamanian & Heydari, 2012)
Indeed, it is important to re-examine the use of readability formulas as a measure of reading difficulty. This abundance of research by itself is the material proof for the significance of the topic under study. Of course, this fact necessitates further research in this area, and the present study intends to do that. It aims at exploring the validity of some better-known and more popular readability formulas.

## 3. Objectives of the Study

The purpose of this study is to empirically assess what readability formulas claim, how these formulas match or do not match the assumptions of specialists in the field, and how they can be used to create and evaluate texts for L2 learners. In doing so, it concentrates on the validity of some popular readability formulas. This study aimed at helping EFL educators and practitioners to make more objective decisions about how to go about selecting, revising, teaching, and evaluating EFL texts by evaluating the readability formulas and correlating standard indexes with the indices obtained by other means like assessing learners. Revisiting the concept of EFL text-readability formulas, the consequent related issues in the EFL reading skill such as reliability and validity, plus the scarcity of research in this area for EFL learners constitute the significance of the scope of this study. Moreover, they will provide further useful information that will be of value in the validation process of reading texts. Such knowledge is certainly crucial in the areas of teaching reading, material development, and testing.
The following questions are to be answered through this study:

1. Is there any correlation between readers' evaluation of text-readability and Flesch Reading Ease Readability Formula's evaluation of text-readability?
2. Is there any correlation between readers' evaluation of text-readability and Gunning's Fog-Index Formula's evaluation of text-readability?
3. Is there any correlation between readers' evaluation of text-readability and the SMOG Formula's evaluation of text-readability?
4. Is there any correlation between readers' evaluation of text-readability and Flesch-Kincaid Grade Level Formula's evaluation of text-readability?

## 4. Method

### 4.1. Participants

This study was conducted with an overall number of 118 participants. The participants were selected from among male and female undergraduate students studying different EFL-related majors at the Department of Foreign Languages and Linguistics of Shiraz Azad University. The participants were chosen using convenient sampling procedure.

Indeed, there was a convincing reason for selecting undergraduate students in this study which goes as the following. At first, 5 reading passages were randomly taken from the book *Practice and Progress* by Alexander (1967), a reading textbook which is being taught to EFL undergraduate students at the advanced level of reading course (Reading Comprehension # 3) at Shiraz Azad University. Using Flesch Reading Ease Readability Formula, the readability scores of the 5 passages were determined. Then, their average readability score (79.87) was compared with that of the 5 passages from Ackert (1986) used in the current study (74.5). The result of the comparison revealed that the information of the 5 prepared passages taken from Ackert (1986) might be at the level of undergraduate students to read and understand. Accordingly, this study was conducted with a number of undergraduate students in the field.

### 4.2. Materials and Instruments

First, 5 reading passages were selected from the book of *Concepts and Comments: An ESL Reader* (Ackert, 1986), a reading text-book for EFL students studying at the advanced level of reading courses locally (see Appendix). This book contains 25 high-interest reading passages serve as springboards for reading skills development, vocabulary building, Language analysis, and thought-provoking discussions and writing. In *Concepts and Comments: An ESL Reader*, the readings address a wide range of fresh and engaging topics. The 5 passages were accompanied by 10 comprehension questions including 5 true/ false questions and 5 multiple choice questions which aimed at tapping responses from the participants on the difficulty-level of the passages as well.

Table 3 presents the texts along with different readability formulas used in the present study.

**Table 3:** Readability Scores of the Passages Using Different Readability Formulas

| Passage | Flesch Reading Ease Score | Gunning's Fog-Index | The SMOG Index | Flesch-Kincaid Grade Level |
|---|---|---|---|---|
| 1 (buy me!) | 82.8 | 7.4 | 5.6 | 4 |
| 2 (memory) | 77.6 | 7.2 | 5.4 | 4.2 |
| 3 (Braille) | 75.5 | 7.6 | 5.9 | 5.4 |
| 4 (Greenland) | 68.5 | 6.9 | 5.8 | 6.7 |
| 5 (the Olympic games) | 67.2 | 6.1 | 5.7 | 6.2 |

*4.3. Data Collection Procedures*

Firstly, the 5 prepared passages were given to participants. Participants were asked to provide feedback on text difficulty by filling out the 2 different prepared types of questions (true/false and multiple choice) on each reading. Their answers on each reading were collected for analysis. On the other hand, the readability levels of the 5 prepared passages were calculated using different readability formulas.

*4.4. Data Analysis Procedures*

The data were analyzed through appropriate statistical procedures including non-parametric Spearman's rho correlation coefficient.

For the four research questions of the study investigating if there were any correlations between readers' evaluation of text-readability level and different readability indices, a correlation was run for each.

## 5. Results and Discussion

Table 4 presents the descriptive statistics and rank order of the 5 prepared passages as evaluated by the participants and the different readability indices of the texts as presented in Table 3.

**Table 4:** Descriptive statistics of the texts based on the different used readability formulas' and participants' evaluation

| Texts | Participants Mean | Participants rank order | Flesch Mean | Flesch rank order | Fog Mean | Fog rank order | SMOG Mean | SMOG rank order | Flesch Kincaid Mean | Fk rank order |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.4 | 2 | 82.8 | 5 | 7.4 | 2 | 5.6 | 4 | 4.0 | 5 |
| 2 | 6.1 | 4 | 77.6 | 4 | 7.2 | 3 | 5.4 | 5 | 4.2 | 4 |
| 3 | 6.0 | 3 | 75.5 | 3 | 7.6 | 1 | 5.9 | 1 | 5.3 | 3 |
| 4 | 4.4 | 1 | 68.5 | 2 | 6.9 | 4 | 5.8 | 2 | 6.7 | 1 |
| 5 | 7.1 | 5 | 67.2 | 1 | 6.1 | 5 | 5.7 | 3 | 6.2 | 2 |

Comparing the means and the rank orders, one can conclude that they are not close to each other. However, they turned out to be quite far from each other. To see if such differences were significant or not, a non-parametric Spearman's rho correlation coefficient was run on each case (participants' mean and each readability formula' index). Table 5 shows the results of the comparison between different evaluations.

**Table 5:** Results of the comparison between different evaluations

| | Correlation | Sig. (2-tailed) |
|---|---|---|
| Correlation between participants' mean & Flesch | -.300 | .624 |
| Correlation between participants' mean & Fog | -.300 | .624 |
| Correlation between participants' mean & SMOG | -.300 | .624 |
| Correlation between participants' mean & FK | -.100 | .873 |

As this table shows, in all cases the correlations between the two evaluations are not significant. In other words, participants' scores on text-readability level and the evaluation of text-readability through the use of these popular readability formulas were significantly different for five passages.

The result of the present study is consistent with those of Froese (1971), Carrell (1987), Brown (1998), Rezaei (2000), Ardoin, Suldo, Witt, Aldrich, and McDonald (2005), who attempted to re-evaluate the validity of different readability formulas. These researchers studied the validity of readability formulas in comparison

to various independent criteria of reading difficulty such as cloze units, multiple-choice items, and equivalent forms. All of them asserted that the formulas are not valid measures of the difficulty of the written materials. Findings of the present study are in sharp contrast to Hamsik (1984), Fry (1989), and Greenfields' (1999) who asserted that not only readability formulas can prove to be valuable tools for measuring the difficulty of texts for native English speakers, but also they do measure the readability level of texts for EFL learners.

## 6. Conclusions

This study was carried out to investigate the validity of some better-known and more popular readability formulas (Flesch Reading Ease Readability Formula, Gunning's Fog-Index of Readability, the SMOG Index of Readability, and Flesch-Kincaid Formula). The study investigated if there are any correlations between students' scores and the four aforementioned readability indexes on text difficulty. Results of correlation suggested that there were not any correlations between the two sets of evaluations (human evaluation versus readability formulas). The following table summarizes results of the study.

**Table 6:** Summary of the findings of the study

|  | text1 | text2 | text3 | text4 | text5 |
|---|---|---|---|---|---|
| Participants' means on text difficulty | 5.4 | 6.1 | 6.0 | 4.4 | 7.1 |
| Level of difficulty | difficult | easy | average | very difficult | very easy |
| Readability index based on Flesch formula | 82.8 | 77.6 | 75.5 | 68.5 | 67.2 |
| Level of readability | very easy | easy | average | difficult | very difficult |
| Readability index based on Fog-Index | 7.4 | 7.2 | 7.6 | 6.9 | 6.1 |
| Level of readability | difficult | average | very difficult | easy | very easy |
| Readability index based on SMOG Index | 5.6 | 5.4 | 5.9 | 5.8 | 5.7 |
| Level of readability | easy | very easy | very difficult | difficult | average |
| Readability index based on Flesch-Kincaid | 4.0 | 4.2 | 5.3 | 6.7 | 6.2 |
| Level of readability | very easy | easy | average | very difficult | difficult |

As can be seen in Table 6, the five texts were evaluated differently by participants and by the readability formulas.

The findings of the study have implications for materials and test developers. While further research is needed to validate the findings of the present study, it can be suggested that decisions for text selection in terms of text difficulty and readability are not based on readability formula per se. Human judgments are needed to be considered as well.

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## Appendix

### Passage 1
### Buy me!

People in cities all over the world shop in supermarkets. Who decides what you buy in the supermarkets? Do you decide? Does the supermarket decide?

When you enter the supermarket, you see shelves full of food. You walk in the aisles between the shelves. You push a shopping cart and put your food in it. You probably hear soft, slow music as you walk

along the aisles. If you hear fast music, you walk quickly. The supermarket plays slow music. You walk slowly and have more time to buy things.

Maybe you go to the meat department first. There is some meat on sale, and you want to find it. The manager of the supermarket knows where customers enter the meat department. The cheaper meat is at the other end of the meet department, away from where the costumers enter. You have to walk by all expensive meat before you find the cheaper meat. Maybe you will buy some of the expensive meat instead of the meat on sale.

The daily department sells milk and milk products such as butter and meat. Many customers like milk that has only a little butterfat in it. One store has three different containers of low fat milk. One says 1 percent (1%) fat on the container. The second says 99 percent (99%) fat free. The third says low fat in big letters and 1% in small letters. As you can see, all the milk has the same amount of fat. The milk is all the same. The amount of milk in each container is also the same. However, in this store the three containers of milk cost three different amounts of money. Maybe the costumer will buy the milk that cost the most.

Most of the food in the supermarkets is very attractive. It all says "buy me!" to the customers. The expensive meat says "buy me!" as you walk by. The expensive milk container says "buy me! I have less fat." The supermarket tells you what to buy.

*True or False?*

1. The supermarket tries to tell you what to buy.
2. Butter is in the meat department.
3. Most food in the supermarket is attractive.
4. You put your food in a big basket in the supermarket.
5. If you hear slow music, you walk quickly.

*Multiple-Choice Questions*

1. People walk in the ……in the supermarket.
a. shelves          b. dairy                    c. aisles              d. amount
2.  The manager knows …….
a. which customers like low fat milk            b. which customers like slow music
c. where customers enter the meat department      d. where customers come from
3. When you walk by the expensive meat…..
a. maybe you will buy some            b. maybe you will buy low fat milk
c. you will look for fresh fruit            d. you will walk on the shelves
4. There are three different containers of low fat milk.
a. one is 90% fat free                    b. they all cost the same amount of money
c. one has less fat than the others          d. they all have the same amount of fat
5. Supermarket managers make the food attractive because………
a. the customers will buy more          b. it is very expensive
c. it is in the dairy department          d. it is cheap

## Passage 2
## Memory

"Memorize these words." "Learn this spelling rule." "Don't forget the quiz tomorrow." You remember things every day, but how do you do it?

You find a telephone number in the phonebook, dial it and then forget it. This is your short term memory. It lasts less than 30 seconds. (There are 60 seconds in a minute). However you don't look in the phonebook for a friend's number. You know it. This is long term memory. Your long term memory has everything that you remember.

Why do you forget something? What is the reason? You did not learn it in the beginning. This is the major reason for forgetting. For example, you meet some new people, and you forget your names. You hear the names, but you do not learn them. Then you forget them.

You can remember better. Here are some ideas.

1. Move information from your long term memory to your long term memory. Practice the information. Say the information to yourself. Think about it. Spend time on it.

2. Overlearn. After you learn something, study it some more. Learn it more than you need to. For example, when you know a list of new words, don't stop. Practice the words a few more times.

3. be sure that you understand the information. It is difficult to memorize something you don't understand.

4. Do only one thing at a time. Study in a quiet place. You cannot listen to music or people and memorize at the same time.

5. Try to connect the information with something you already know. For example, when you learn the name of a new kind of food, think of a similar kind of food.

6. Divide the information into parts. Do not have more than seven parts at the same time.

7. Make a picture in your mind. For example, maybe you see a new word. It is a kind of furniture in a room. Remember what it looks like.

8. Try to relax when you study. Enjoy it. You cannot remember things when you are tired or unhappy.

Some people have a photographic memory. They see everything like a picture. Later they can see the picture in their mind again and describe everything in it. They can remember long lists of numbers and thousands of other things. Would you like to have a photographic memory?

*True or False?*

1. Your short term memory lasts a minute.
2. Your address is in your long term memory.
3. Overlearning helps you remember.
4. It is easy to memorize things that you don't understand.
5. Connect a new word to a similar word in your mind.

*Multiple-Choice Questions*

1. When you learn something and continue studying it, you are…….

a. remembering          b. looking at          c. overlearning          d. learning

2. In order to learn, divide the information into…….. parts.

a. 20                    b. 7                    c. 10                    d. 12

3. You cannot remember things when you are……….

a. tired                 b. happy               c. glad                 d. not tired

4. Why do you remember your friend's number?

a. because you listed it                    b. because you overlearn it

c. because it is in your long term memory    d. because it is in your short term memory

5. What is the major reason for forgetting?

a. you did not remember it in the beginning   b. you don't have long lists of everything

c. you did not learn it in the beginning      d. you don't have a photographic memory

## Passage 3
### Braille

Louis Braille was born in France in 1809. His father had a small business. He made shoes and other things from leather. Louis liked to help his father in the store even when he was very small. One day when Louis was three years old, he was cutting some leather. Suddenly the knife slipped and hit him in the eye. Louis soon became completely blind.

When he was ten years old, he entered the National Institute for the Blind in Paris. One day his class went to visit a special exhibit by a captain in the army.  One thing in the exhibit was very interesting for Louis. It showed messages in code. Armies send messages in secret codes so no one else can read them. The captain wrote his code in raised letters on very thick paper.

Louis thought a lot about this code. Then he decided to write in the same way so blind people could read with their fingers. It is very difficult to feel the differences between raised letters. Instead of letters, Louis used a cell of six dots. He arranged the dots with two dots across and three down.

There are 63 possible arrangements of the dots in the Braille system. Each arrangement stands for one letter, punctuation mark, or number. He also used this system to write music. Louis Braille invented this system when he was only fifteen years old.

Blind people can also write Braille. They use a special kind of pen to make the dots. Today there are Braille books in all written languages in the world. However, these books are large and expensive to make. They must be on special paper. Someone who can see must learn the Braille alphabet and make the raised dots in the paper by hand or with a special typewriter.

Now there is an easier way for blind people to read. Talking books are complete books or magazines on cassette tapes or phonograph records. Blind people listen to the book. Blind people can also write using a typewriter or a computer.

Louis Braille invented a way for blind people to communicate. He invented it before the time of phonographs, tape recorders, type writers, and computers. When he died in 1852, he was buried in the Pantheon in Paris. This is where the national heroes of France are buried, and Louis Braille was a national hero.

*True or False?*

1. Braille invented a system of reading for blind people.
2. Braille was buried in the Pantheon because he was a national hero.
3. Braille showed messages in letter.
4. He was 10 years old when he invented this system.
5. Blind people also use talking books and type writers today.

*Multiple-Choice Questions*

1. Louis Braille's father made things from …….
a. leather          b. wool          c. exhibit          d. codes

2. When Louis was ten years old, he began to study ……….
a. at his neighborhood school          c. at a special school for the blind
b. at a university          d. in the army

3. He saw a special exhibit. It showed……….. in code.
a. messages          b. system          c. arrangements          d. computers

4. It is difficult to feel the differences between………
a. coded messages          c. a system of raised dots
b. arrangements of dots          d. raised letters

5. Talking books………
a. are on cassette tapes          c. have raised dots
b. have raised letters          d. are on computers

## Passage 4
## Greenland

Greenland is the largest island in the world. It covers over 2000000 (two million) square kilometers. Most of it lies inside the Arctic Circle. And a huge sheet of ice covers 85% of it. Imagine that a map of Greenland is on top of the map of Europe. Greenland stretches from London to the middle of Sahara desert.

The ice sheet is more than 1.6 kilometers thick, and it never melts. They are probably only rock under the ice, but no one knows for sure.

Along the sea coast, mountains rise from the sea. There are a few low trees in the southwest, but no forests. Snow covers everything in winter, but in summer very low plants cover the ground between the sea and the ice sheet.

Norwegian Vikings were the first Europeans to see the island in A.D. 875, but no one visited it until 982. Three years later a few Vikings went to live there.  In 1261 the people in Greenland decided to join Norway. Norway and Denmark united in 1380. This union ended in 1814, and Greenland stay with Denmark. Greenland is fifty times larger than Denmark, but it is still a part of this small country.

About 62000 people live in Greenland.  Most of them are part Eskimo and part Danish. Almost all of them live in towns and villages on the southwestern coast because that is the warmest part of the island. A few pure Eskimos live in the far north and some Danes live in the towns. Life in Greenland is difficult because the weather is very cold. In January it is -29.5° C (minus 29 point 5 degrees Celsius) and in July it is 4° C (4 degrees Celsius). It is dark twenty four hours a day during winter. In summer it is always daylight.

The island has very few natural resources. The people raise a few vegetables and sheep. They used to fish and hunt, but now they usually buy food at stores.

Greenland is important to the world because scientists study the weather there. They can tell when storms are developing over the North Atlantic Ocean. It is important to know when storms are developing there because it is an important shipping area.

Life in Greenland is changing very fast. People lived a traditional life for centuries, but now they are moving into the modern world very quickly. They are losing their old traditions, but there is nothing to take their place. There are a lot of problems among the people. It is difficult for any country to move from a traditional life to a modern life. It is especially hard for Greenland because the people spent centuries with very little communication with the rest of the world. These problems will probably continue into the future.

*True or False?*

1. Greenland is a part of Denmark.
2. The union between Norway and Denmark ended in 1261.
3. People live in south-eastern areas of Greenland because of the warm weather there.
4. Greenland doesn't have any natural resources.
5. In 982 A.D. Europeans first go there to live.

*Multiple-Choice Questions*

1. Most of Greenland lies…….
a. above the Arctic Circle                              c. in the Sahara Desert
b. below the Arctic Circle                             d. in Europe
2. The ice sheet ……
a. melts in summer                                      c. is three kilometers thick
b. is always three                                        d. has a few green plants under it
3. Greenland …….
a. is flat                                                     c. is rich in natural resources
b. has warm winters                                    d. has mountains along the seacoast
4. The first Europeans to live in Greenland were……..
a. Danes            b. Eskimo              c. Norwegian Viking            d. English
5. Greenland is important to the world because…….
a. scientists the weather there          c. it has communications with the rest of the world
b. it has rich natural resources          d. a huge ice sheet covers it

Passage 5
The Olympic Games

Every four years people all over the world watch the Olympic Games. It is a time for all kinds of people to unite in peace. Some of them join together to compete for gold medals. Millions of other people watch them on television.

Why do we have the Olympics? How did they begin? The first Olympic Games were in Greece in 776 B.C. There was only one event. People ran a race the length of the stadium. The games lasted one day. Slowly people added more events. The games were only for men, and women could not even watch them. Only Greeks competed. They came from all parts of the Greek world. The time of the games was a time of peace, and the government let everyone travel safely. Kings competed against common people. The winners became natural heroes.

The first modern Games were in 1896 in Athens. The Greeks built a new stadium for the competition. Athletes from several countries competed. Then there were Olympics every four years in different cities in Europe and the United States until 1952. After that they were in Melbourne, Tokyo, Mexico City and Montreal besides in European cities. Each year there were athletes from more nations. The first Winter Olympics were in 1924. The athletes compete in skiing and other winter sports.

Today there must be Olympic Games every four years. The games must have at least fifteen events, and they cannot last more than sixteen days. There is no age limit—people of any age can compete.
The competitors must not be professionals. They must be amateurs. The athletes compete for gold medals. The winners are still natural heroes, as they were in early Olympic Games in Greece.

In 1956, Egypt, Iraq, and Lebanon boycotted the Games. They did not compete in the Games because several countries took the Suez Canal from Egypt that year. Other countries boycotted the Games in 1964 and 1976. In 1980 the United States and other countries boycotted the games in Moscow. In 1984 the Soviet Union and other countries boycotted the games in Los Angles. How can the nations of the world solve this problem? Maybe the games should be in Greece every year, where they began. The athletes from all over the world could compete without any boycotts.

*True or False?*

1. The first Olympic competitors ran the length of the stadium.
2. Only men competed in the first Olympics, but women could watch them.
3. Only Greeks could compete in the first Games.
4. After 1956 there were on Games in Europe.
5. Professional athletes usually win the most medals in the Olympics.

*Multiple-Choice Questions*

1. What was the only event in the first Olympic Games?
a. skiing          b. boxing          c. running          d. football
2. Where were the first modern Games?
a. Athens          b. Tokyo          c. Melbourne          d. Montreal
3. When where the first winter games?
a. 1952          b. 1924          c. 776 B.C.          d. 1984
4. How many events are in the games? At least ……. events.
a. 4          b. 2          c. 20          d. 15
5. How many countries boycotted the games in 1956?
a. 3          b. 2          c. 1          d. 5