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A Study of the Validity of Some Methods of Measuring Straight-Copy Typing Skill

Patricia A. Wheeler
Eastern Illinois University

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A STUDY OF THE VALIDITY OF SOME METHODS OF MEASURING STRAIGHT-COPY TYPING SKILL

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Patricia A. Wheeler

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PREFACE

Traditionally, gwpm, nwpm, and cwpm have been used as methods of measuring straight-copy typing skill. When teaching techniques and grading practices based on these methods have yielded unsatisfactory results, their validity as measuring instruments has been questioned. If typing scores do not provide a good estimate of students' abilities, the conclusions drawn from them may be incorrect and evolve into poor methods of instruction. It follows that students may not develop the highest skill possible.

This research study is designed to test the validity of some of the most commonly used methods and if they are proved unsatisfactory, to experiment with a method that could be used successfully.

Statistical data throughout the study was obtained from working with the Typing I classes of Litchfield High School, Litchfield, Illinois. The study was initiated during the last six weeks period. To justify its use, grades in accordance with the results of the study were given to the 94 students who participated.

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I. SETTING UP A VALID METHOD OF MEASURING BASIC TYPING SKILL

Valid measurement of typing skill is important for grading purposes and for developing sound methods of instruction. To be valid, a method must measure what it is supposed to measure. Typing skill is concerned with two major areas: speed and accuracy. Several questions need to be answered in regard to these areas.

Does speed alone (gwpm) indicate basic typing skill? Are the fastest typists also the most accurate typists? On the basis of average gwpm for several five-minute timed writings, the typing classes were divided into a "fast" group (Group I) and a "slow" group (Group II). These groupings were used to compare average gwpm with average per cent of error on a total of 1,410 five-minute straight-copy timed writings. The results were as follows:

	Average gwpm	Average per cent of error
Group I	44	1.51
Group II	31	2.26

This information shows that the average per cent of error is higher for the slow group. It appears that the

fastest typists are also the most accurate typists. If, however, a test is made of the relationship between average gwpm and average per cent of error, a correlation coefficient of -.34 is yielded. A Pearsonian correlation coefficient of -.34 can be interpreted as meaning that there is no significant relationship between average gwpm and average per cent of error made by students in typing. Since there is little relationship between gross speed and accuracy, it cannot be said that the fastest typists are also the most accurate typists. Consequently, speed alone (gwpm) is not what is supposed to be measured in determining basic typing skill. The conclusion is that a method must include a measure of accuracy.

What effect does an error have on basic typing skill? In advanced typing, the effect of an error can be shown by figuring production rates. For example, if a student types a 250-word letter and makes four errors, how much time would it take him to correct the errors and make the letter mailable? Assuming each correction required 19 seconds, the total time for making corrections would be 1¼ minutes. This time would then be added to the total time for putting the letter into mailable form. If he typed the letter in 8 minutes (at approximately 30 wpm) and then when proofreading found the four errors and corrected them, the entire typing time would

be 9¼ minutes (8 minutes + 1¼ minutes). His production rate would be 27 wpm (250 ÷ 9.25).

This method can be easily used in advanced typing. But in beginning typing, students might not know the procedure for correcting errors, especially when they are just learning the touch system. What method could be a satisfactory substitute for the production rate method when errors are not actually corrected?

When correcting errors, two factors affect the production rate: the kind of error and the student's skill in making the correction. Some errors are easy to correct while others are more difficult. Crowding or spreading letters of a word is much more difficult than making a one-letter correction at the beginning of a word. Making a correction when one or more carbon copies are involved is more difficult than when there is only the original copy. In order to penalize students for errors, it must be discovered what kinds of errors are made and the frequency with which they occur.

An analysis was made of the types and number of errors found on 471 five-minute straight-copy timed writings. A special sheet (See Appendix A) was filled out for each timing. Categories set up to accommodate the various types of errors are shown in the following list:

Error at beginning of word
Error in middle of word
Error at ending of word
Whole word scrambled
Omitted letter or letters in word
Extra letter or letters in word
Omitted word, line, or lines
Extra or repeated words, line, or lines
Spaces omitted between words
Extra space or spaces between words
Extra space or spaces within words
Squeezed letters
Blank space where letter did not print
Failure to paragraph
Insufficient vertical spaces
Extra vertical spaces

An analysis of the frequency of each type of error resulted in the following percentages:

Error at beginning of word	36%
Error in middle of word	23%
Error at ending of word	31%
Other errors	10%

Ninety per cent of the errors fell into the first three categories: error at beginning of word, error in middle of word, and error at ending of word. The average time needed to correct these three types of errors could therefore be used as the basis for a penalty.

A test was constructed (See Appendix B) to find the average time needed to make these three types of corrections. The test had six items--two of each type of correction. The test was given to the four typing classes. Students used the same materials that they normally used in class. No attempt was made to control the kind of erasers, quality of paper, or the manner of erasing. Neither was an attempt made to grade

the quality of erasure. The results of the test showed that the 94 students took on the average of 14 seconds to erase without a carbon copy and 21 seconds with an original and one carbon copy. This reveals that it takes about 7 seconds longer to correct an error on both an original and a carbon copy than on just an original copy.

It was discovered earlier that there is no significant relationship between gwpm and per cent of error. Therefore, the fastest typists were not necessarily the most accurate typists. It follows that it could be asked whether the fastest typists make corrections in less time than the slower typists. In other words, is there a relationship between gwpm and speed in making corrections?

To answer this question, the correlation coefficient between gwpm and time needed to make corrections was computed for the 94 students. The correlation coefficient found was -.35. This leads to the conclusion that it is incorrect to assume that the fastest typists make corrections in less time than the slower typists. Therefore, the same penalty could be used for all speed levels in any one course.

It has been determined that the average time needed to make a correction without a carbon copy on the 2nd semester high school level is 14 seconds regardless of the gross speed of the typist. If a student were typing 60 gwpm, he would be typing 1 word per second. He could have typed 14 words, then,

in the time he needed to make a correction. With an original and one carbon copy, he could have typed 21 words. Actually, the effect of an error depends on the gross typing rate of the student and the level of typing experience. Dr. Irol Balsley's study of high school and college level typing points out that less time was needed to make corrections as students progressed through the various stages of learning. For instance, 2nd semester college students correct errors in less time than 2nd semester high school students.[1]

In summary, the following statements can be made:

1. Gross speed alone is not an indication of basic typing skill because the fastest typists aren't necessarily the most accurate typists.

2. The fastest typists do not necessarily make corrections in less time than slower typists; therefore, the same penalty can be applied to all speed levels in any one course.

3. Speed in making corrections is greater with typing experience; therefore, the penalty should decrease with advanced stages of learning.

4. Speed in making corrections is greater without a carbon copy than with an original and one carbon copy.

5. The cost of an error depends on the level of typing experience and the gross speed of the typist.

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[1]Irol Whitmore Balsley, A Study of the Validity of Methods of Measuring Straight-Copy Typing Skill (Ruston: Department of Business and Economic Research, School of Business Administration, Louisiana Polytechnic Institute, 1956), p. 9.

The conclusion reached is that in order to be valid, a method of measuring basic typing skill must be set up to include both speed and accuracy and adjust the penalty for errors according to level of typing experience, gross typing speed, and whether or not a carbon copy is being made.

II. ANALYZING SOME METHODS OF MEASURING BASIC TYPING SKILL

Gross-Words-Per-Minute Method.--This method treats errors as unimportant. The gwpm score is figured by dividing total words typed by the length of the timing period. For example, if a student typed 300 words on a five-minute timing, his score would be 60 gwpm (300 ÷ 5).

The gwpm method assumes that the fastest typists are also the most nearly accurate typists. Evidence was presented in Section I, however, which discounted this assumption. It was shown that there is a definite lack of relationship between gwpm and per cent of error. Any method based on this assumption therefore would present a distorted picture of basic typing skill. This, in turn, would lead to the use of poor teaching techniques and unfair grading practices. The fast typist who makes many errors might be overrated; the slow typist who makes few errors might be underrated. Ignoring errors will not result in a valid measure of basic typing skill. Gwpm should be used as an instrument of learning, not of measuring.

Net-Words-Per-Minute Method.--This method is widely used although its validity has been doubted for many years.

An advantage of nwpm is that it is easy to understand. It assumes that the faster a student types, the less time he needs to make corrections, and that the same amount of time is needed to make corrections at any level of typing experience. Ten words are deducted for each error, regardless of speed, to compensate for the words that would have been lost if the error had been corrected. It is arrived at by assuming that a typist can type approximately 10 words in the time that it takes to correct an error. Since the penalty remains the same at all speed levels, the assumption is made that the faster a student types, the more quickly he makes corrections. For example, if a student were typing 40gwpm, he would be typing 10 words in 15 seconds. With a 10-word penalty, it is assumed that he could make the correction in 15 seconds. If a student is typing 60 gwpm, he would type 10 words in 10 seconds, and it is assumed that he could make the correction in 10 seconds. At these two speed levels, there is supposed to be a difference of 5 seconds in the length of time needed to make a correction. Thus the 40 gwpm student is penalized 1½ times as much as the 60 gwpm student. At an even lower speed level, such as 20 gwpm, the penalty is three times as much as for the 60 gwpm student.

Section I revealed that there was no significant relationship between gwpm and speed in making corrections. As a result, the net-words-per-minute scoring method penalizes

too much at lower levels and not enough at higher levels. Also, the 10-word deduction is made for all students whether they are beginning or advanced typists. It was demonstrated in Section I that an allowance should be made for the amount of training a typist has had.

A nwpm score is computed as follows: If a student typed 300 words in 5 minutes with 5 errors, his nwpm score would be 50 (300 - 50 ÷ 5). In other words, it assumes that the student would have typed 250 words if he had corrected errors.

In connection with the nwpm method, a limit is often placed on the number of errors allowed per timing. Perhaps only one error is allowed per minute. This limit, especially for grading purposes, is unfair when papers are accepted and rejected. On a five-minute timed writing, a paper typed at 60 gwpm with 6 errors would be rejected while a paper typed at 40 gwpm with 5 errors would be accepted. Actually, the strokes typed per error on the first paper (.40 per cent of error) are more than the strokes typed per error on the second paper (.50 per cent of error). If errors are to be limited, it should be set up on the basis of per cent of error rather than on number of errors. It is obvious that the nwpm scoring method is not an adequate method of measuring basic typing skill.

Correct-Words-Per-Minute Method.--This method applies a token penalty of one word for each error made. If a student typed 300 words in 5 minutes with 5 errors, his cwpm score would be 59 (300 - 5 * 5). The cwpm method, like the gwpm method, assumes that the fastest typists are also the most nearly accurate typists. It presents an even more distorted picture of basic typing skill, because the token penalty gives the impression that just compensation has been made for errors. The inadequacy of deducting one word for an error can be shown by the following illustration: As reported in Section I, the 2nd semester high school student typing at 60 gwpm needs, on the average, 14 seconds to correct an error without a carbon copy. In other words, he could type not 1 but 14 words in the time needed to make the correction. The cwpm method penalizes only 1/14 as much as should be penalized. The student penalized under the cwpm method appears to have a higher typing skill than he really does possess.

III. MAILABLE-WORDS-PER-MINUTE METHOD

Striving for "mailability" has been, in my opinion, successful in problem work for both beginning and advanced typing. It is also promising for use in connection with straight-copy typing. This method is based on the length of time that is needed to make copy mailable, which means adding on rather than deducting from the base typing time.

An illustration will show how a mwpm score is computed for a 2nd semester high school student who types 30 gwpm for 5 minutes with 5 errors. The time needed, on the average, for the correction of an error without a carbon copy on the 2nd semester high school level was found to be 14 seconds. The number of seconds in 5 minutes is 300. By adding 14 seconds to the 300 for each error, the total time of 360 seconds is reached. The total gross words typed was 150. By dividing the total gross words typed by the total seconds of time used (150 ÷ 360), the number of words typed per second is obtained (.4167). This number multiplied by 60 (the number of seconds in 1 minute) gives the mwpm score of 25.00. When a carbon copy has been prepared, instead of adding 14 seconds for each error, 21 seconds would be added.

Following through with the same procedure, a score of 22.74 is obtained.

This method meets the requirements set up in Section I for a valid measuring instrument. Mwpm includes both speed and accuracy and adjusts the penalty for errors according to gross typing speed, level of typing experience, and whether or not a carbon copy is made.

To use this method, charts must be developed for the various levels of typing experience, preferably for each semester or quarter. The charts for the 2nd semester typing classes at Litchfield High School are found in the Appendices. Scores are conveniently determined if each student keeps a chart in his typing book. To find his mwpm score, the student computes gwpm, counts his errors, and then checks the chart for his score.

In order to present a more complete picture of the gwpm, nwpm, and cwpm methods analyzed in Section II and the mwpm method suggested in Section III, the average rates for the typing classes on 2,016 five-minute straight-copy timed writings are presented as follows:

Average gwpm	Average cwpm	Average nwpm	Average mwpm Without a carbon copy	Average mwpm With a carbon copy
38	37	31	33.86	31.57

It can be seen from these figures that there is little difference between gwpm and cwpm averages for the semester because of the small penalty for an error in the cwpm method. The lower nwpm average reflects the heavy penalty at lower speed levels with the nwpm method.

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary.--Some of the commonly-used methods of measuring basic typing skill have been disected in this study and the following observations made:

1. The fastest typists aren't necessarily the most accurate typists.
2. The fastest typists do not necessarily make corrections in less time than slower typists.
3. The more training a typist has had, the faster he can make corrections.
4. A typist can correct errors faster without a carbon copy than with an original and one carbon copy.
5. A typist's gross speed is a determining factor in computing the cost of an error.

From these observations, the following criteria for a valid measuring instrument have been developed: In order to be valid, a method of measuring basic typing skill must be set up to include both speed and accuracy and adjust the penalty for errors according to the level of typing experience, gross typing speed, and whether or not a carbon copy is being made at the time.

Conclusions.--The gross-words-per-minute method and the correct-words-per-minute method incorrectly assume that

the fastest typists are the most accurate typists. The net-words-per-minute method incorrectly assumes that the faster a student types, the less time he needs to make corrections and that the same amount of time is needed to make a correction regardless of training. In other words, the gwpm, cwpm, and nwpm methods are invalid because they do not meet the requirements for a valid method of measuring basic typing skill.

The mailable-words-per-minute method, however, is a valid measuring instrument for basic typing skill and does meet the requirements. It includes both speed and accuracy and adjusts the penalty for errors according to gross typing speed, level of typing experience, and whether or not a carbon copy is made.

Recommendations.--An overview of this study leads to the following suggestions. The need for better scoring methods should be recognized and answered by business education teachers and students. Teachers should be encouraged to experiment further with mailable-words-per-minute scoring in their own classes. Students should have a thorough understanding of the limitations of the methods described in this paper.

APPENDIX A

Date _____ Name _____

	Tally	Frequency
Error at beginning of word		
Error in middle of word		
Error at ending of word		
Whole word scrambled		
Omitted letter or letters in word		
Extra letter or letters in word		
Omitted word, line, or lines		
Extra or repeated words, line, or lines		
Spaces omitted between words		
Extra space or spaces between words		
Squeezed letters		
Blank space where letter did not print		
Failure to paragraph		
Insufficient vertical spaces		
Extra vertical spaces		
Total		

APPENDIX B

Administering Timed Erasing Test.--Below is the test which was given to help determine the cost of an error. (Written on board)

Without carbon copy

her walk was

he forced the

was stepping a

the train stopped

more than any

while leaping through

With carbon copy

not told to

the man was

but farming does

the gun was

it determined what

since reaping is

Students inserted paper into the machine and typed the six phrases--three in the upper left part of the paper and three in the upper right. It was explained that each phrase contained an error, and that they were going to be timed on the total time needed to make all six corrections. After the correct letter was written above the incorrect letter, the test was started. Time intervals of 1 second were called out. When students had finished making all six corrections, they listened for the next number called and wrote it down on their paper. A practice run was given before each actual test.

APPENDIX C

Using Scoring Charts to Determine Mailable-Words-Per-Minute Scores.--The scoring charts in this appendix are set up for use on five-minute timed writings. To determine mwpm scores, follow these steps: (1) Compute gwpm, (2) count errors, and (3) consult chart. These charts may also be used for timed writings of other lengths by following Step 1 and Step 2 and adding the steps indicated below.

For one-minute timings, multiply the number of errors by 5, and then consult chart.

For three-minute timings, divide the number of errors by 3 and multiply that figure by 5. Then consult the chart for the gross typing rate and that number of errors. For instance, if a student typed 40 gwpm with 5 errors, divide 5 by 3 (1.67) and multiply by 5, which gives 8.35 or 8. Consult chart for 40 gwpm, 8 errors.

For ten-minute timings, divide number of errors by 2, and then consult chart.

ILLUSTRATIVE CHART
2nd Semester Typing
Without Carbon Copy

Gwpm	Errors 1	2	3	4	5	6	7	8	9	10
60	57.32	54.88	52.63	50.56	48.65	46.87	45.22	43.69	42.25	40.91
59	56.36	53.95	51.75	49.72	47.83	46.09	44.47	42.96	41.54	40.22
58	55.41	53.05	50.87	48.88	47.02	45.31	43.72	42.23	40.84	39.54
57	54.47	52.13	50.00	48.03	46.21	44.53	42.97	41.50	40.14	38.86
56	53.50	51.22	49.12	47.19	45.40	43.75	42.22	40.77	39.43	38.18
55	52.54	50.30	48.24	46.34	44.59	42.97	41.47	40.04	38.73	37.50
54	51.59	49.39	47.36	45.50	44.38	42.19	40.72	39.31	38.03	36.82
53	50.63	48.47	46.49	44.66	42.97	41.41	39.97	38.58	37.33	36.14
52	49.68	47.56	45.61	43.82	42.16	40.63	39.22	37.85	36.63	35.46
51	48.73	46.64	44.74	42.97	41.35	39.85	38.47	37.12	35.93	34.78
50	47.77	45.73	43.85	42.13	40.54	39.07	37.72	36.39	35.23	34.10
49	46.81	44.81	42.98	41.29	39.73	38.29	36.97	35.66	34.53	33.42
48	45.86	43.90	42.10	40.45	38.92	37.51	36.22	34.93	33.83	32.74
47	44.90	42.98	41.23	39.61	38.11	36.73	35.47	34.20	33.13	32.06
46	43.94	42.07	40.35	38.76	37.30	35.95	34.72	33.47	32.43	31.38
45	42.99	41.15	39.47	37.92	36.49	35.17	33.97	32.74	31.73	30.70
44	42.04	40.24	38.59	37.07	35.67	34.39	33.22	32.01	31.03	30.02
43	41.08	39.32	37.72	36.23	34.86	33.61	32.47	31.28	33.03	29.34
42	40.12	38.41	36.84	35.39	34.05	32.83	31.72	30.55	29.63	28.95
41	39.17	37.50	35.96	34.55	33.24	32.05	30.97	29.82	28.93	28.27
40	38.21	36.58	35.08	33.70	32.43	31.27	30.22	29.09	28.23	27.59
39	37.26	35.67	34.21	32.86	31.62	30.49	29.47	28.36	27.53	26.91
38	36.30	34.75	33.33	32.02	30.81	29.71	28.72	27.63	26.83	26.15
37	35.35	33.65	32.45	31.18	30.00	28.93	27.97	26.90	26.13	25.47
36	34.39	32.92	31.58	30.34	29.19	28.15	27.22	26.17	25.43	24.79
35	33.44	32.01	30.70	29.49	28.38	27.37	26.47	25.44	24.73	24.11
34	32.48	31.09	29.82	28.65	27.57	26.59	25.72	24.71	24.03	23.43
33	31.52	30.18	28.94	27.80	26.76	25.81	24.97	23.98	23.33	22.75
32	30.57	29.27	28.07	26.96	25.95	25.03	24.22	23.25	22.63	22.07
31	29.62	28.35	27.19	26.12	25.14	24.25	23.47	22.52	21.93	21.39
30	28.66	27.44	26.31	25.28	25.00	23.47	22.72	21.79	21.23	20.71
29	27.70	26.52	25.43	24.44	23.53	22.69	21.97	21.06	20.53	20.03
28	26.75	25.61	24.56	23.59	22.72	21.91	21.22	20.33	19.83	19.35
27	25.79	24.69	23.68	22.75	21.91	21.13	20.47	19.60	19.13	18.67
26	24.84	23.78	22.81	21.91	21.10	20.35	19.72	18.87	18.43	17.99
25	23.88	22.86	21.92	21.07	20.29	19.57	18.97	18.14	17.73	17.31
24	22.93	21.95	21.05	20.22	19.48	18.79	18.22	17.41	17.03	16.63
23	21.97	21.04	20.17	19.39	18.67	18.01	17.47	16.68	16.63	15.95
22	21.02	20.12	19.30	18.53	17.86	17.23	16.72	15.95	15.63	15.27
21	20.06	19.21	18.42	17.69	17.05	16.45	15.97	15.22	14.93	14.59
20	19.10	18.29	17.54	16.85	16.24	15.67	15.22	14.49	14.23	13.91
19	18.15	17.38	16.66	16.01	15.43	14.89	14.47	13.76	13.53	13.23
18	17.20	16.46	15.79	15.07	14.62	14.11	13.72	13.03	12.83	12.55
17	16.24	15.55	14.91	14.32	13.81	13.33	12.97	12.30	12.13	11.87
16	15.28	14.63	14.03	13.48	13.00	12.55	12.22	11.57	11.43	11.19
15	14.33	13.72	13.15	12.64	12.19	11.77	11.47	10.84	10.73	10.51
14	13.37	12.80	12.28	11.80	11.38	10.99	10.72	10.11	10.03	9.83
13	12.42	11.89	11.40	10.95	10.57	10.21	9.97	9.38	9.33	9.15
12	11.46	10.97	10.52	10.11	9.76	9.43	9.22	8.65	8.63	8.47

ILLUSTRATIVE CHART
2nd Semester Typing
With One Carbon Copy

Gwpm	Errors 1	2	3	4	5	6	7	8	9	10
60	56.07	52.63	49.58	46.87	44.44	42.25	40.27	38.46	36.80	35.27
59	55.14	55.75	48.76	46.09	43.70	41.54	39.59	37.82	36.19	34.70
58	54.20	50.87	47.93	45.31	42.96	40.84	38.92	37.18	35.58	34.12
57	53.27	49.89	47.11	44.53	42.22	40.14	38.24	36.55	34.97	33.54
56	52.34	48.91	46.28	43.75	41.48	39.44	37.56	35.92	34.36	32.96
55	51.41	48.03	45.45	42.97	40.74	38.74	36.88	35.29	33.75	32.38
54	50.48	47.15	44.63	42.19	40.00	38.04	36.20	35.66	33.14	31.80
53	49.55	46.17	43.81	41.41	39.26	37.34	35.52	34.03	32.53	31.22
52	48.62	45.29	42.99	40.63	38.52	36.64	34.84	34.40	31.92	30.64
51	47.69	44.41	42.17	39.85	37.78	35.94	34.16	32.77	31.51	30.06
50	46.76	43.53	41.35	39.07	37.04	35.24	33.48	32.04	31.00	29.48
49	45.83	42.65	40.53	38.29	36.30	34.54	32.80	31.51	30.69	28.90
48	44.90	41.77	39.71	37.51	35.56	33.84	32.12	30.88	30.38	28.32
47	43.97	40.89	38.89	36.73	34.82	33.14	31.44	30.25	29.77	27.74
46	43.04	40.01	38.07	35.95	34.08	32.44	30.76	29.62	28.21	27.05
45	42.11	39.13	37.25	35.17	33.34	31.74	30.08	28.99	28.55	25.47
44	41.18	38.25	36.43	34.39	32.60	31.04	29.40	28.36	27.94	24.89
43	40.25	37.37	35.61	33.61	31.86	30.34	28.72	27.73	27.34	24.31
42	39.32	36.49	34.79	32.83	31.12	29.64	28.04	27.10	26.72	23.73
41	38.39	35.61	33.97	32.05	30.38	28.94	27.36	25.47	26.11	23.15
40	37.46	34.73	33.15	31.27	29.64	28.24	26.68	25.84	25.50	22.57
39	36.59	33.85	32.33	30.49	28.90	27.54	26.00	25.21	24.89	21.99
38	35.60	32.97	31.51	29.71	28.16	26.84	25.32	24.58	24.28	21.41
37	34.67	32.09	30.69	28.93	27.43	26.14	24.64	23.95	22.70	20.83
36	33.74	31.21	29.87	28.15	26.68	25.44	23.96	23.32	22.09	20.25
35	32.81	30.33	29.05	27.37	26.44	24.74	23.28	22.69	21.48	19.67
34	31.88	29.45	28.23	26.59	25.70	24.04	22.60	22.06	22.87	19.09
33	30.95	28.57	27.41	25.81	24.96	23.34	21.92	21.43	20.62	18.51
32	30.02	27.69	26.59	25.03	24.22	22.64	21.24	20.80	19.65	17.93
31	29.09	26.81	25.77	24.25	23.48	21.94	20.56	20.17	19.04	17.35
30	28.16	25.93	24.95	23.17	23.74	21.24	19.88	19.54	18.43	16.77
29	27.23	25.05	24.13	22.49	22.00	20.54	19.20	18.91	17.82	16.19
28	26.30	24.17	23.14	21.91	21.26	19.84	18.52	17.94	17.21	15.61
27	25.37	23.29	22.32	21.13	20.52	19.14	17.84	17.30	16.60	15.03
26	24.44	22.41	21.50	20.35	19.78	18.44	17.16	16.66	15.99	14.45
25	23.51	25.13	20.68	19.57	19.04	17.74	16.48	16.02	15.38	13.87
24	22.58	22.05	19.86	18.79	18.30	17.05	15.80	15.38	14.77	13.29
23	21.65	19.67	19.04	18.01	17.56	16.34	15.12	14.74	14.36	12.71
22	20.72	18.79	18.22	17.23	16.82	15.64	14.44	14.10	13.65	12.13
21	19.79	17.91	17.40	16.45	16.08	14.94	13.76	13.46	12.26	11.55
20	18.86	87.03	16.58	15.67	15.34	14.24	13.08	12.82	11.65	10.97
19	17.93	16.15	15.76	14.89	14.60	13.54	12.40	12.18	11.04	10.39
18	17.00	15.17	14.94	14.11	13.86	12.84	11.72	11.54	10.43	9.81
17	16.07	14.29	14.12	13.33	11.85	11.26	11.04	10.90	9.82	9.23
16	15.14	13.41	13.30	11.72	11.11	10.56	10.36	10.26	9.21	8.65
15	14.21	12.53	11.57	10.94	10.37	9.86	9.68	8.97	8.60	8.07
14	13.28	11.65	10.75	10.16	9.63	9.16	9.00	8.33	7.99	7.49
13	12.35	10.77	9.33	9.01	8.89	8.46	8.32	7.69	7.38	6.91
12	11.42	9.89	9.11	8.60	8.15	7.76	7.64	7.05	6.77	6.33

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