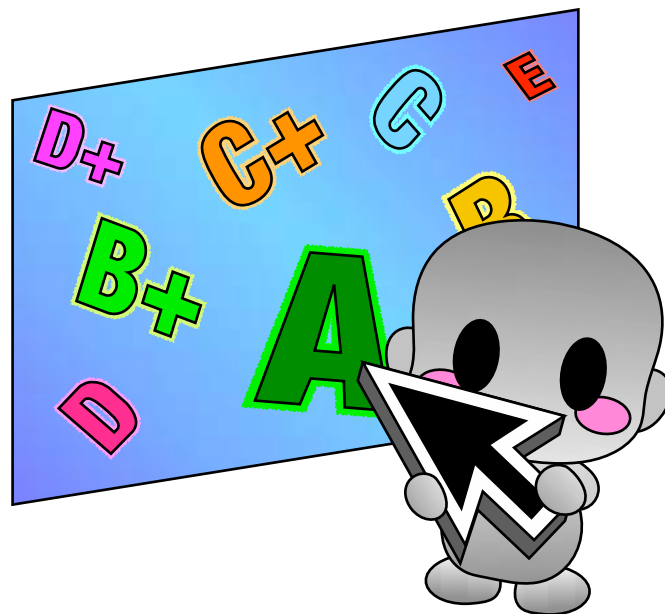


Description

Grade Calculation System

College of Social Communication Innovation

Srinakharinwirot University



Keywords

For this grade calculation system, there are various keywords related to grade calculation as follows...

* Score/Raw score

This means the total score of each student throughout that semester. which is used to calculate grades.

* Average score

This means the average (also known as mean score) of all scores or a group of students. It is calculated by adding all individual student scores and dividing by the number of total scores.

For example, the mean of 1, 2, 1, 4, and 6 is $(1 + 2 + 1 + 4 + 6) \div 5 = 2.8$.

* Standard Deviation (SD)

This means a statistic that measures the dispersion of a dataset relative to its mean. which this calculation system uses the following formula

$$sd = \sqrt{\frac{\sum x^2 - n(\bar{x})^2}{n - 1}}$$

sd = Standard deviation

\bar{x} = Average or Mean

x = Individual student score

n = Number of total scores

For example, if the scores are 1, 2, 1, 4, and 6 ==> the mean is 2.8, then

$$\begin{aligned} sd &= \sqrt{((1 + 4 + 1 + 16 + 36) - (5 \times (2.8)^2)) \div (5 - 1)} \\ &= \sqrt{(58 - (5 \times 7.84)) \div 4} \\ &= \sqrt{18.8 \div 4} \\ &= \sqrt{4.7} \\ &\approx 2.17 \end{aligned}$$

* Frequency

This means counting the number of scores that have the same value. For example, if the scores are 1, 2, 1, 4, and 6, then

Score	Frequency
1	2
2	1
4	1
6	1

* Cumulative Frequency

This means the sum of frequencies. Starting from the lowest score frequency and increasing to the higher score frequency up to the highest score.

For example, if the scores are 1, 2, 1, 4, and 6, then

Score	Frequency	Cumulative Frequency
1	2	5
2	1	3
4	1	2
6	1	1

$(3 + 2)$

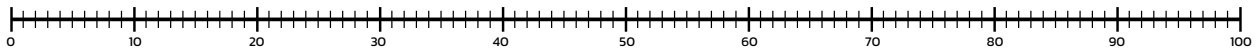
$(2 + 1)$

$(1 + 1)$

* Percentile

This means the position of the score compared to all scores in 100 parts, which will show that there are scores that are less or more than or equal to the scores in that position by what percentage.

It divides all data into 100 equal parts and then sorts the scores from least to greatest in this part.



The method for finding the percentile position starts by sorting the scores in ascending order and ranking them, then dividing the rank by the total number of scores, then multiplying by 100.

For example, if the scores are 1, 2, 1, 4, and 6, then

Score	Rank	Percentile
1	1	20
1	1	20
2	3	60
4	4	80
6	5	100

$(1 \div 5) \times 100$

$(1 \div 5) \times 100$

$(3 \div 5) \times 100$

$(4 \div 5) \times 100$

$(5 \div 5) \times 100$

Grade Calculation

For this grade calculation system, the grade calculation format is divided into...

- 1) Criteria-based grading
- 2) Group-based grading
 - (1) Range
 - (2) Mean
 - (3) T-Score (Mean & SD)
 - (4) T-Score (Percentile)

And the grade level in descending order, including

A B+ B C+ C D+ D E

You can choose from the following options:

- | | |
|-----------|---------------------------|
| Option 1 | A, B+, B, C+, C, D+, D, E |
| Option 2 | A, B+, B, C+, C, D+, D |
| Option 3 | A, B+, B, C+, C, D+ |
| Option 4 | A, B+, B, C+, C |
| Option 5 | A, B+, B, C+ |
| Option 6 | A, B+, B |
| Option 7 | A, B+ |
| Option 8 | A, B, C, D, E |
| Option 9 | A, B, C, D |
| Option 10 | A, B, C |
| Option 11 | A, B |

Criteria-based grading

It is a grade calculation based on each student's score against the criteria you set.

The criteria that this includes

- Full score
- Score of the highest grade
- Score of the lowest grade, and
- Grade range width

Example

If the scores of all students that want to calculate the grade are

39	44	58	62	80	77	95	68	70	62	75
73	73	82	86	90	88.5	90.25	75	71.75	59	

Select the grade option as	Option 1 : A, B+, B, C+, C, D+, D, E (8 grades)
Set full score	110
Set grade range width	5.5
Set the score of the highest grade	90
Set the score of the lowest grade	52.5

Note :

If you configure It doesn't make sense, the system automatically changes that value based on the value of the full score, e.g.

If the full score is 150

but set the score of the highest grade greater than or equal to 150, the system will change the value to 149.99 immediately,

or

If the grade range width is too wide The system will change the value calculated from the full score and the grade option you choose etc.

From the entered score, you will get preliminary information as follows:

Number of students	21
Highest score	95
Lowest score	39
Average score	72.31
Standard Deviation	4.7

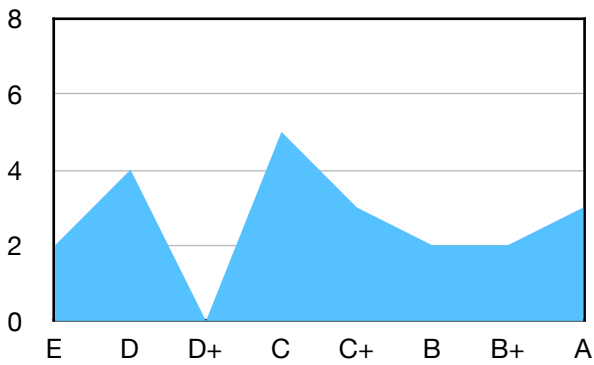
Criteria for grading are as follows:

Grade A	from 90 up	(90 (specified value))
Grade B+	from 84.5 to less than 90	(90 - 5.5 = 84.5)
Grade B	from 79 to less than 84.5	(84.5 - 5.5 = 79)
Grade C+	from 73.5 to less than 79	(79 - 5.5 = 73.5)
Grade C	from 68 to less than 73.5	(73.5 - 5.5 = 68)
Grade D+	from 62.5 to less than 68	(68 - 5.5 = 62.5)
Grade D	from 52.5 to less than 62.5	(52.5 (specified value))
Grade E	less than 52.5	

Example of grade calculation summary chart

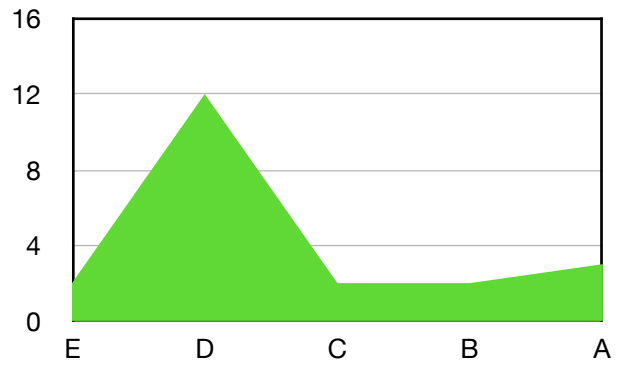
8 grades : A, B+, B, C+, C, D+, D, E

Criteria-based



5 grades : A, B, C, D, E

Criteria-based



Group-based grading : Range

It is a grade calculation based on the range or the difference between the highest score and the lowest score in the student's group or all scores. Then divide the score range according to the selected grade option.

The criteria you must set for this calculation are:

- Full score (used to calculate percentages)

Example

If the scores of all students that want to calculate the grade are

39	44	58	62	80	77	95	68	70	62	75
73	73	82	86	90	88.5	90.25	75	71.75	59	

Select the grade option as **Option 1 : A, B+, B, C+, C, D+, D, E (8 grades)**
 Set full score **110**

How to calculate

- 1) Find the range by finding the difference between the highest score, 95, and the lowest score, 39.

$$\text{Range} = 95 - 39 = 56$$

- 2) Find the grade range width by dividing the range by the number of grades.

$$\text{Grade range width} = 56 / 8 = 7$$

- 3) Finally, use the width of the grade range as a criterion for determining grades, starting with the lowest grades.

From the entered score, you will get preliminary information as follows:

Number of students	21
Highest score	95
Lowest score	39
Average score	72.31
Standard Deviation	4.7

Criteria for grading are as follows:

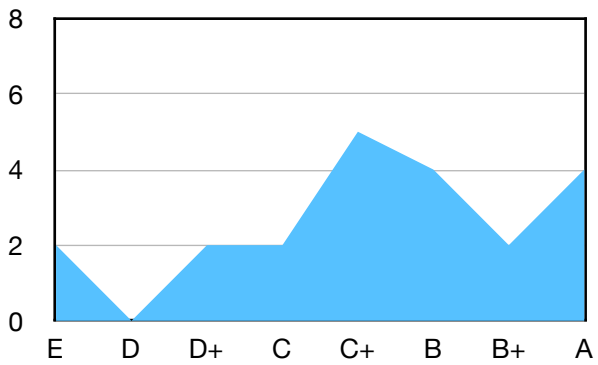
Grade A	from 88 up	
Grade B+	from 81 to less than 88	(81 + 7 = 88)
Grade B	from 74 to less than 81	(74 + 7 = 81)
Grade C+	from 67 to less than 74	(67 + 7 = 74)
Grade C	from 60 to less than 67	(60 + 7 = 67)
Grade D+	from 53 to less than 60	(53 + 7 = 60)

Grade D from 46 to less than 53 $(46 + 7 = 53)$
 Grade E less than 46 $(39 + 7 = 46)$

Example of grade calculation summary chart

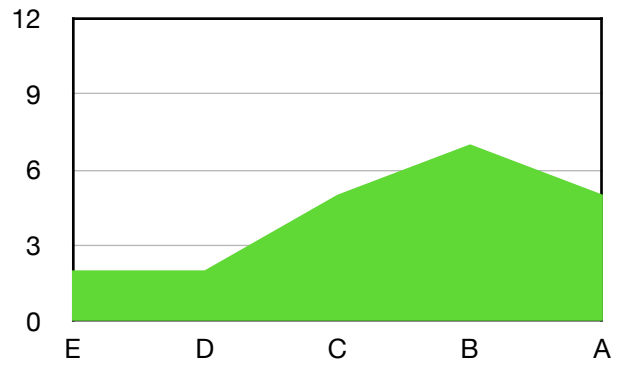
8 grades : A, B+, B, C+, C, D+, D, E

Range



5 grades : A, B, C, D, E

Range



Group-based grading : Mean

It is a grade calculation based on the average score (or mean) together with the determination of the range of the standard deviation of the student's group or all scores. Then divide the score range according to the selected grade option. The middle grade was given in the average range.

The criteria you must set for this calculation are:

- Full score (used to calculate percentages. Not about calculate the score range.)
- Range of standard deviation / SD range

Note :

SD range options include

3		-3SD	to	+3SD
2.25		-2.25SD	to	+2.25SD
1.5		-1.5SD	to	+1.5SD
0.75		-0.75SD	to	+0.75SD

Example

If the scores of all students that want to calculate the grade are

39	44	58	62	80	77	95	68	70	62	75
73	73	82	86	90	88.5	90.25	75	71.75	59	

Select the grade option as	Option 1 : A, B+, B, C+, C, D+, D, E (8 grades)
Set full score	110
Set SD range	3 (-3SD to +3SD)

From the entered score, you will get preliminary information as follows:

Number of students	21
Highest score	95
Lowest score	39
Average score	72.31
Standard Deviation	4.7

How to calculate

1) Find the grade in the middle (or closest to the middle point).

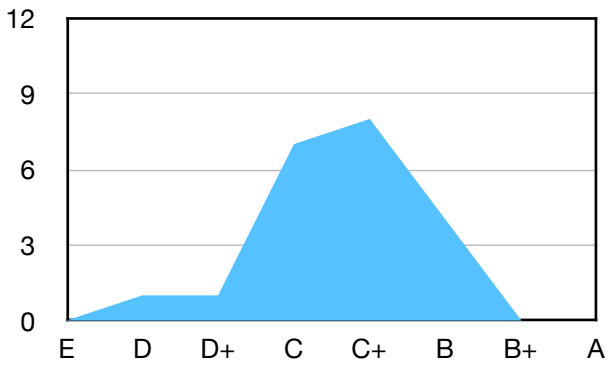
The selected grades are A, B+, B, C+, C, D+, D and E, so the middle grades are C+ and C.

- Grade C from 57.61 to less than 72.31
 $(72.31 + (-1 \times 14.7) = 57.61 \rightarrow 72.31 + (0 \times 14.7) = 72.31)$
- Grade D+ from 42.91 to less than 57.61
 $(72.31 + (-2 \times 14.7) = 42.91 \rightarrow 72.31 + (-1 \times 14.7) = 57.61)$
- Grade D from 28.21 to less than 42.91
 $(72.31 + (-3 \times 14.7) = 28.21 \rightarrow 72.31 + (-2 \times 14.7) = 42.91)$
- Grade E less than 28.21
 $(... \rightarrow 72.31 + (-3 \times 14.7) = 28.21)$

Example of grade calculation summary chart

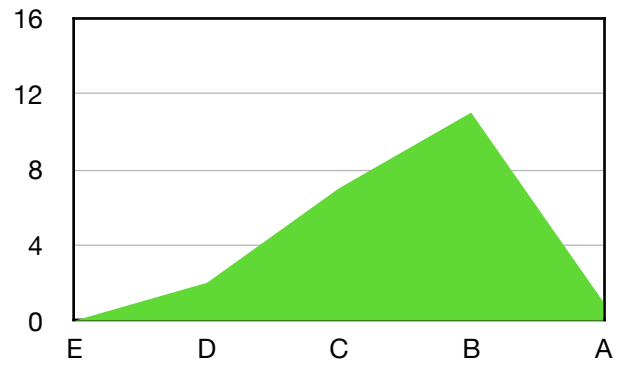
8 grades : A, B+, B, C+, C, D+, D, E

Mean



5 grades : A, B, C, D, E

Mean



Group-based grading : T-Score (Mean & SD)

It is a grade calculation by converting all scores into a T-Score form by setting a new score. Give a mean of 50 and a standard deviation (SD) of 10, then divide the score range according to the selected grade option.

The criteria you must set for this calculation are:

- Middle value/T-Score in the middle of the grade (standard value is 50)

Example

If the scores of all students that want to calculate the grade are

39	44	58	62	80	77	95	68	70	62	75
73	73	82	86	90	88.5	90.25	75	71.75	59	

Select the grade option as **Option 1 : A, B+, B, C+, C, D+, D, E (8 grades)**
 Set the middle of grade **50**

From the entered score, you will get preliminary information as follows:

Number of students	21
Highest score	95
Lowest score	39
Average score	72.31
Standard Deviation	4.7

How to calculate

1) Convert all scores to Z-Scores, starting with finding the z-value using the formula

$$z = (x - \text{mean}) / \text{sd}$$

- x = Individual student score
- mean = Mean or Average score
- sd = Standard deviation

such as

If the score is 95 ==> $z = (95 - 72.31) / 14.7 \approx 1.54$

If the score is 39 ==> $z = (39 - 72.31) / 14.7 \approx -2.26$

etc.

2) Find a T-Score with a mean of 50 and a standard deviation of 10 using the formula

$$t = 50 + 10z$$

- t = T-Score of each student
- z = Z-Score or z-value of each student

such as

$$\text{If } z \text{ is } 1.54 \implies t = 50 + (10 \times 1.54) = 65.4$$

$$\text{If } z \text{ is } -2.26 \implies t = 50 + (10 \times -2.26) = 27.4$$

etc.

- 3) Find the difference between the highest T-Score and the lowest T-Score.
 $= 65.4 - 27.4 = 38$
- 4) Divide the result by the number of grades according to the selected grade option.
 $= 38 \div 8 = 4.75 \approx 5$
- 5) Find the grade in the middle (or closest to the middle point).
 The selected grades are A, B+, B, C+, C, D+, D and E, so the middle grades are C+ and C. (If the number of grades is an even number, use the first grade (here, C+) as the midpoint.)
- 6) Find the range of the T-Score using result 4) and start with the specified middle of grade, 50, at the middle grade, C+, and then add it up for higher grades and gradually delete for lower grades.

such as

C+	is in the range	50	----->	50 + 5 = 55
C	is in the range	50 - 5 = 45	----->	50
B	is in the range	50 + 5 = 55	----->	55 + 5 = 60

etc.

- 7) Finally, the calculated results are used as a grading criterion against the T-Score.

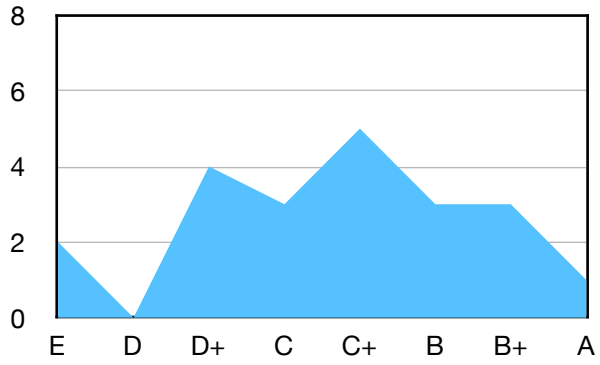
Criteria for grading are as follows:

Grade A	T-Score from 65 up	(60 + 5 = 65 --> ...)
Grade B+	T-Score from 60 to less than 65	(55 + 5 = 60 --> 60 + 5 = 65)
Grade B	T-Score from 55 to less than 60	(50 + 5 = 55 --> 55 + 5 = 60)
Grade C+	T-Score from 50 to less than 55	(50 --> 50 + 5 = 55)
Grade C	T-Score from 45 to less than 50	(50 - 5 = 45 --> 45 + 5 = 50)
Grade D+	T-Score from 40 to less than 45	(45 - 5 = 40 --> 40 + 5 = 45)
Grade D	T-Score from 35 to less than 40	(40 - 5 = 35 --> 35 + 5 = 40)
Grade E	T-Score less than 35	(... --> 35)

Example of grade calculation summary chart

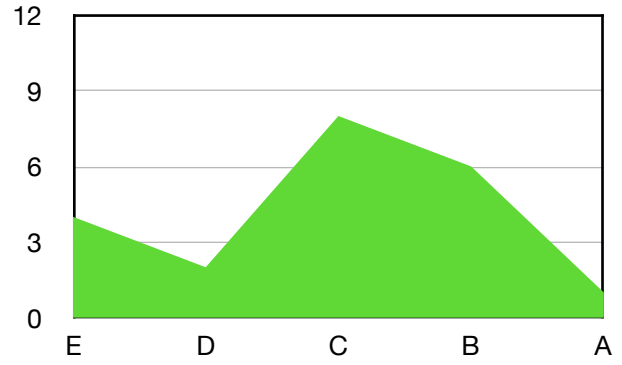
8 grades : A, B+, B, C+, C, D+, D, E

T-Score (Mean & SD)



5 grades : A, B, C, D, E

T-Score (Mean & SD)



Group-based grading : T-Score (Percentile)

It is a grade calculation by converting all scores into a T-Score form by comparing the percentile with the normal T-Score table and then dividing the score range according to the selected grade option.

The criteria you must set for this calculation are:

- Middle value/T-Score in the middle of the grade (standard value is 50)

Example

If the scores of all students that want to calculate the grade are

39	44	58	62	80	77	95	68	70	62	75
73	73	82	86	90	88.5	90.25	75	71.75	59	

Select the grade option as **Option 1 : A, B+, B, C+, C, D+, D, E (8 grades)**
 Set the middle of grade **50**

From the entered score, you will get preliminary information as follows:

Number of students	21
Highest score	95
Lowest score	39
Average score	72.31
Standard Deviation	4.7

How to calculate

- 1) Sort the scores from the lowest to the highest score.
- 2) Rank each score, if the score value is the same, they will rank in the same place. Start ranking from the lowest score to the highest score, for example:

Score	Rank
1	1
1	1
2	3
4	4
6	5

or

Score 39 will be ranked 1st and score 95 will be ranked 21st out of the total score.

- 3) Use the obtained rank to calculate the percentile value. by dividing the rank value by the total number of scores and then multiplying by 100, for example:

Score	Rank	Percentile
1	1	20
1	1	20
2	3	60
4	4	80
6	5	100

$(1 \div 5) \times 100$

$(1 \div 5) \times 100$

$(3 \div 5) \times 100$

$(4 \div 5) \times 100$

$(5 \div 5) \times 100$

or

Score 39, ranked in the 1st, percentile = $(1 \div 21) \times 100 \approx 4.76$

Score 95, ranked in the 21st, percentile = $(21 \div 21) \times 100 = 100$

4) Compare the calculated percentile with the normal T-Score table to find the T-Score, which use this table...

T	0	1	2	3	4	5	6	7	8	9
1	0.003	0.004	0.007	0.011	0.016	0.023	0.034	0.048	0.069	0.097
2	0.13	0.19	0.26	0.35	0.47	0.62	0.82	1.07	1.39	1.79
3	2.28	2.87	3.59	4.46	5.48	6.68	8.08	9.68	11.51	13.57
4	15.87	18.41	21.19	24.20	27.43	30.85	34.46	38.21	42.07	46.02
5	50.0	53.98	57.93	61.79	65.54	69.15	72.57	75.80	78.81	81.59
6	84.13	86.43	88.49	90.32	91.92	93.32	94.52	95.54	96.41	97.13
7	97.72	98.21	98.61	98.93	99.18	99.38	99.53	99.65	99.74	99.81
8	99.865	99.903	99.931	99.952	99.966	99.977	99.984	99.989	99.993	99.995

Here's how to compare percentile to find T-Score:

(1) Compare the percentile values with the decimal numbers in the table, using the closest value.

such as

Percentile 80.0 is closest to 81.59.

Percentile 98.5 is closest to 98.61.

Percentile 4.76 is closest to 4.46.

Percentile 100 is closest to 99.995.

etc.

(2) When you get the position or box of the decimal. Look at the first column (numbers 1-8), which is in the same row as this box. Use that number as the tens digit.

Likewise, look at the top row (numbers 0 - 9), which is in the same column as this box. Use that number as the unit digit.

such as

Percentile 80.0 matches 81.59 T-Score is 59

Percentile 98.5 matches 98.61 T-Score is 72

Percentile 4.76 matches 4.46 T-Score is 33

Percentile 100 matches 99.995 T-Score is 89

etc.

- 5) Find the difference between the highest T-Score and the lowest T-Score.
 $= 89 - 33 = 56$
 Add the resulting value by 1.
 $= 56 + 1 = 57$
- 6) Divide the result by the number of grades according to the selected grade option.
 $= 57 \div 8 = 7.125 \quad \text{====> } 8$
 (If there are decimal fractions, round up) so the result is 8.
- 7) Find the grade in the middle (or closest to the middle point).
 The selected grades are A, B+, B, C+, C, D+, D and E, so the middle grades are C+ and C.
 (If the number of grades is an even number, use the first grade (here, C+) as the midpoint.)
- 8) Find the range of the T-Score using result 6) and start with the specified middle of grade, 50, at the middle grade, C+, and then add it up for higher grades and gradually delete for lower grades.
 such as

C+	is in the range	50	----->	50 + 8 = 58
C	is in the range	50 - 8 = 42	----->	50
B	is in the range	50 + 8 = 58	----->	58 + 8 = 66

 etc.
- 9) Finally, the calculated results are used as a grading criterion against the T-Score.

Criteria for grading are as follows:

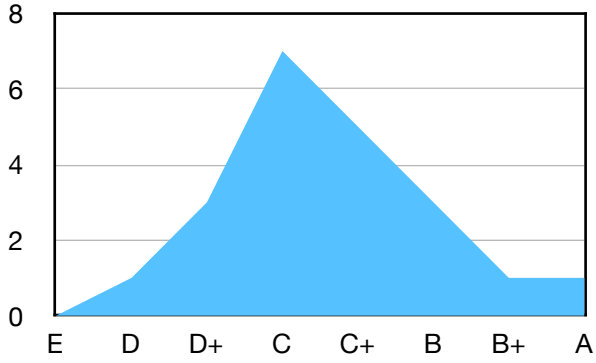
Grade A	T-Score from 74 up	(66 + 8 = 74 --> ...)
Grade B+	T-Score from 66 to less than 74	(58 + 8 = 66 --> 66 + 8 = 74)
Grade B	T-Score from 58 to less than 66	(50 + 8 = 58 --> 58 + 8 = 66)
Grade C+	T-Score from 50 to less than 58	(50 --> 50 + 8 = 58)
Grade C	T-Score from 42 to less than 50	(50 - 8 = 42 --> 42 + 8 = 50)
Grade D+	T-Score from 34 to less than 42	(42 - 8 = 34 --> 34 + 8 = 42)
Grade D	T-Score from 26 to less than 34	(34 - 8 = 26 --> 26 + 8 = 34)
Grade E	T-Score less than 26	(... --> 26)

Example of grade calculation summary chart

8 grades : A, B+, B, C+, C, D+, D, E

5 grades : A, B, C, D, E

T-Score (Percentile)



T-Score (Percentile)

