

# Moderation of School-based Assessment Scores in the HKDSE

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香港考試及評核局  
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# 1. Introduction

School-based Assessment (SBA) is a salient feature of the Hong Kong Diploma of Secondary Education Examination (HKDSE). SBA refers to assessments administered in schools and marked by the students' own teachers. SBA scores awarded will count towards students' results in the HKDSE.

SBA has been adopted in Hong Kong Certificate of Education Examination (HKCEE) and Hong Kong Advanced Level Examination (HKALE) for many years and moderation of SBA scores is not a new practice in public examinations. Like other examination authorities in many countries and regions, the Hong Kong Examinations and Assessment Authority (HKEAA) makes use of well-established methods to moderate SBA marks submitted by schools. For example, statistical moderation methods were adopted in a number of HKCEE and HKALE subjects, including HKCEE Chinese Language and English Language from 2007 to 2010.

The purpose of this booklet is to explain the rationale and key features of moderation methods in the HKDSE, to describe the feedback to be provided to schools, and to give answers to some frequently-asked questions about the SBA moderation mechanism.

Further information about SBA can be obtained from the HKEAA website at [www.hkeaa.edu.hk/en/SBA/](http://www.hkeaa.edu.hk/en/SBA/)

## 2. The Purpose of Moderation

The main reason for carrying out moderation is to ensure the consistency of assessment standards across schools. Teachers know their students well and thus are best placed to judge their relative performance. In consultation with their colleagues, they can reliably judge the relative performance of all students within the school in a given subject. However, they are not necessarily aware of the standards of performance across all schools. Despite the fact that all teachers are trained in the implementation of SBA and will assess students using the same assessment criteria, teachers in some schools may be harsher or more lenient in their judgments than teachers in other schools. They may also vary in the range of scores that they award.

To address these potential problems, the HKEAA employs appropriate methods for moderating the raw SBA scores submitted by different schools, with the following aims:

- to maintain comparability of SBA results across schools, and thus ensure fairness for individual students and schools;
- to maintain the quality, reliability, and validity of SBA from year to year; and
- to enhance the implementation of SBA by providing useful feedback to schools.

### 3. The Basic Concept

The moderation process deals with the scores awarded by teachers and takes place after the assessment has been completed and scores submitted to the HKEAA.

There are essentially two ways in which differences in marking standards may affect raw SBA scores. Firstly, teachers in a given school may be either harsher or more lenient than teachers in another school when awarding scores (variations in average scores). Secondly, they may tend to either overly bunch students' scores together or spread them apart (variations in the spread of scores).

Moderation can be interpreted as a means of adjusting the average and the spread of raw SBA scores of students in a given group (usually a particular school) with an aim to maintain the comparability across groups. To compare performances of different groups, a moderating variable (for example, public examination scores or results obtained after reviewing samples of SBA work) can be used as a reference.

A moderation group is defined as a school, unless specified in some special cases (for example, a group of students from different schools who are taught and assessed by the same teacher(s) using the same assessment standards will be considered as a single moderation group). The SBA moderation process includes two basic components:

1. the determination of group performance level of individual moderation groups based on the moderating variable, that is, how the average performance of students in each group compares with that of all other groups;
2. the determination of individual students' moderated SBA scores, taking into consideration how a student in a moderation group performs in comparison to the average performance of all the students in the same group.

In general, the moderated SBA score of a student can be expressed as follows:

$$\begin{array}{r} \text{Group Performance Level} \\ + \text{ Difference Within Group} \\ \hline = \text{Moderated SBA Score} \end{array}$$

Different approaches can be used to determine the Group Performance Level and the Difference Within Group, for example, a statistical approach, an expert judgment approach or a consensus approach. Each approach has its merits and limitations. To accommodate the different characteristics of SBA components across all subjects, and to produce reliable moderation results, the HKEAA has adopted two moderation methods, the statistical approach and expert judgment approach.

	Statistical Moderation	Expert Judgment Moderation
<b>Approach</b>	Statistical moderation supplemented with sample review of students' work	Expert judgment moderation supplemented with statistical techniques
<b>Characteristics of SBA Component</b>	This method is adopted for subjects in which the SBA and the public examination share a substantial portion of common assessment objectives	This method is adopted for subjects with a small candidature or which involve assessment objectives that are very different from those of the public examination
<b>Key Features</b>	Determination of Group Performance Level with reference to the performance of the group in public examinations (statistical method), supplemented with review of samples of students' work	Determination of Group Performance Level with reference to review of samples of students' work (expert judgment), assisted with statistical techniques

*Table 1: SBA moderation methods for HKDSE Category A subjects*

## 4. Statistical Moderation

Statistical moderation is particularly appropriate in situations where there is another measure available that can be used to moderate schools' raw SBA scores. Typically, this other measure will be students' performance in the public examination in that subject. An advantage of the method is that it can be carried out easily, impartially and without a large commitment of time and resources, though it cannot be carried out until the marking of public examination scripts has been completed. This method is reliant on the assumption that the measure used to moderate the raw SBA scores is a valid measure of the overall level of performance of students in a moderation group. Generally speaking, this is a valid assumption in the context of many academic subjects in public examinations.

The moderation model adopted for the HKDSE is closely based on the one used for the HKCEE Chinese Language and English Language from 2007 to 2010. Using this method, the moderation involves adjusting the average and the spread of raw SBA scores of students in a given school with reference to the public examination scores of the same group of students. During the moderation process, students' raw SBA scores may be adjusted, but the rank order determined by the school will remain unchanged. Generally speaking, the results obtained will become the final SBA scores of individual students in that school.

However, as some of the assessment objectives of the SBA are not identical to those covered in the public examination, if only schools' public examination scores are used to adjust students' raw SBA scores, the result may not fully reflect the students' actual performance in the SBA. For example, there may be some outlier schools whose statistically moderated scores differ greatly from the level of performance demonstrated by students' SBA work.

Through reviewing samples of students' work, these outlier schools can be identified in the moderation process. In handling these outlier schools, the findings from the sample review will be compared with results obtained from the statistical method. Where appropriate, adjustments will be made to the statistically moderated scores of these outlier schools so that the final moderated scores can better reflect the actual performance of their students in the SBA. This process further improves the validity of the SBA results.

The details of the statistical method are as follows:

### A. Statistical Moderation with Reference to Public Examination Scores

Raw SBA scores are moderated with reference to the moderating variable (i.e. the public examination scores), taking into consideration the correlations between the raw SBA scores and the scores for each examination paper within each moderation group as well as across moderation groups. The detailed procedures are outlined in Figure 1 and the formula is given in **Appendix A**.

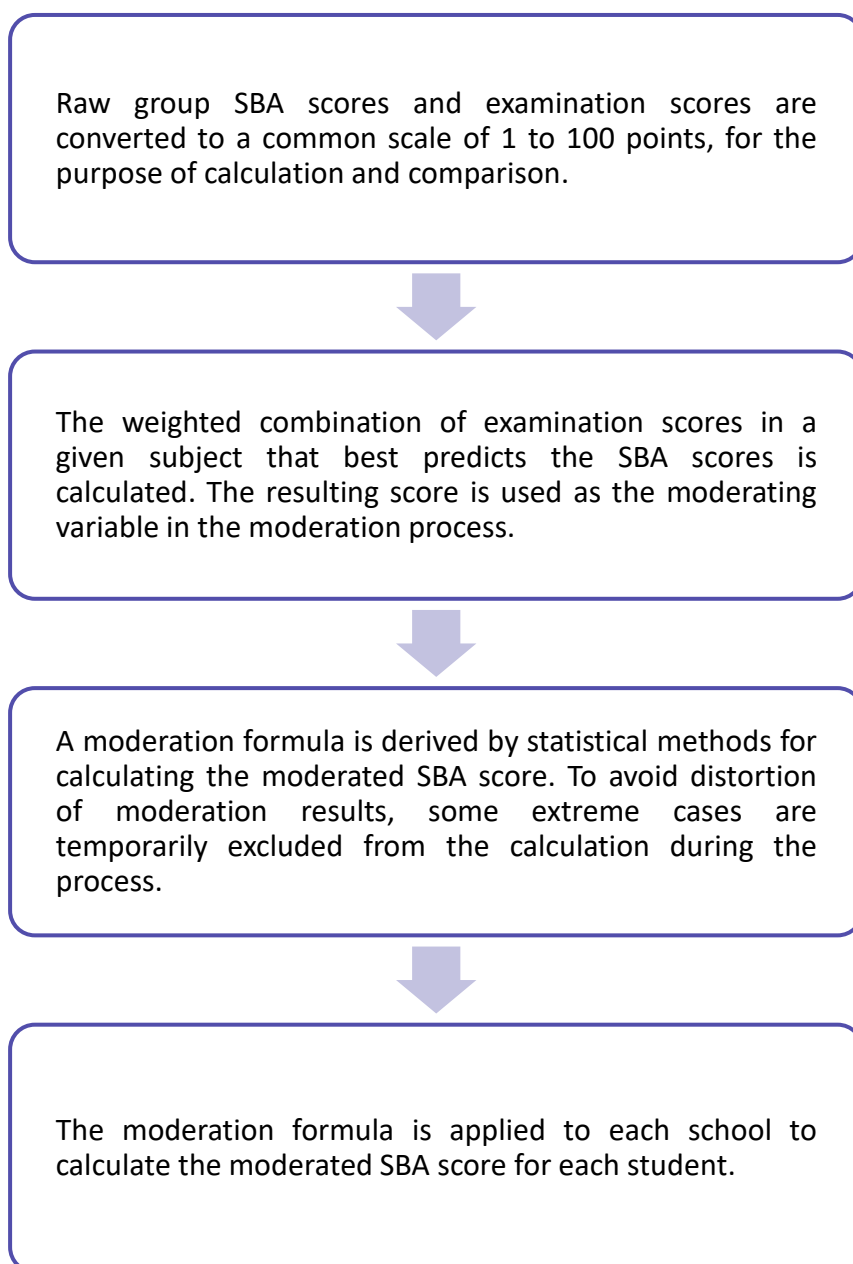


Figure 1: Procedures of statistical moderation with reference to public examination scores



## **B. Review of Samples of Students' Work**

After submission of SBA scores in S6, all schools will submit samples of students' work for review by SBA district coordinators (DCs) or assessors appointed by the HKEAA. The sampling method and the reviewing procedures are as follows:

### **Sampling Method:**

Each school submits a prescribed number of samples of students' work. Unless otherwise specified, the samples will be chosen by the HKEAA using a stratified random sampling technique. Students in each school are divided into a number of strata based on their raw SBA scores. In each stratum, the level of performance of students is similar to each other. A number of students are then randomly chosen from each stratum. This sampling method can ensure that a fairly small sample of students' work can adequately represent the full range of SBA performance standards for each school. For schools where only a few students are studying a particular subject, the work from all students has to be submitted.

### **Review Procedures:**

DCs/assessors review the samples of students' work collected, either by commenting on teachers' assessment standards or by remarking students' work, with reference to the stipulated assessment criteria.

## **C. Outliers Detection and Follow-up Actions**

The statistical moderation results will be compared to the results from the sample review. If the two are broadly comparable with each other, the statistical moderation results will be adopted. If the difference between the two is significant, SBA supervisors and HKEAA subject managers will follow up on these outlier cases and will modify the adjustment recommended by the statistical method, if necessary, so that the moderated results will better reflect students' SBA performance. Additional samples will be solicited from particular schools if necessary.

## Impact of Statistical Moderation

The impact of moderation on the SBA scores of the moderation groups and individual students is illustrated below with some hypothetical data.

### Impact on Moderation Groups

In this example, there are just two schools, School A and School B. Each school is a moderation group. The overall performance of the students from both schools in the public examination and in the SBA is illustrated in Figures 2(a) to 2(c).

Figure 2(a) shows that, overall, the students from School B performed better in the public examination than the students in School A.

Figure 2(a)

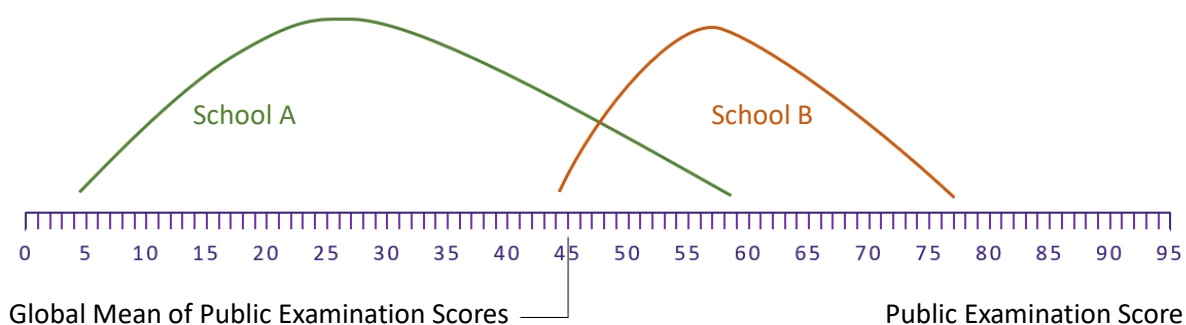


Figure 2(b) shows that the raw SBA scores of the students from both schools follow a similar distribution.

Figure 2(b)

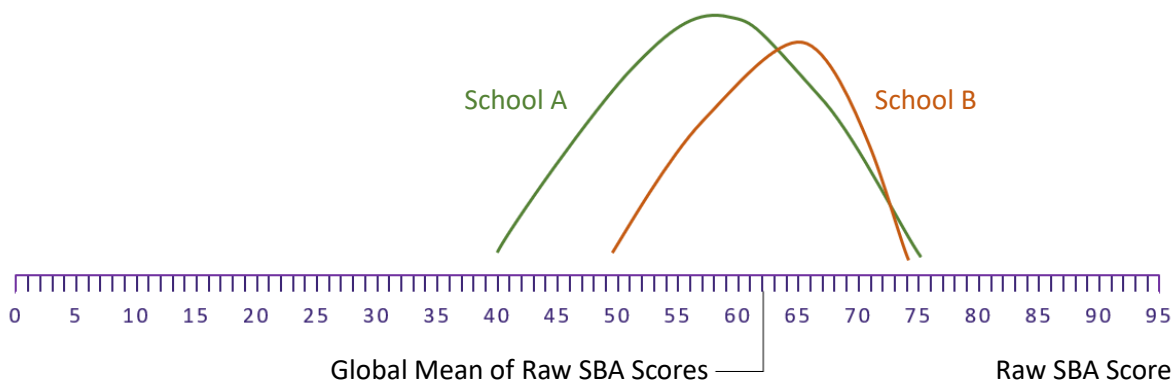
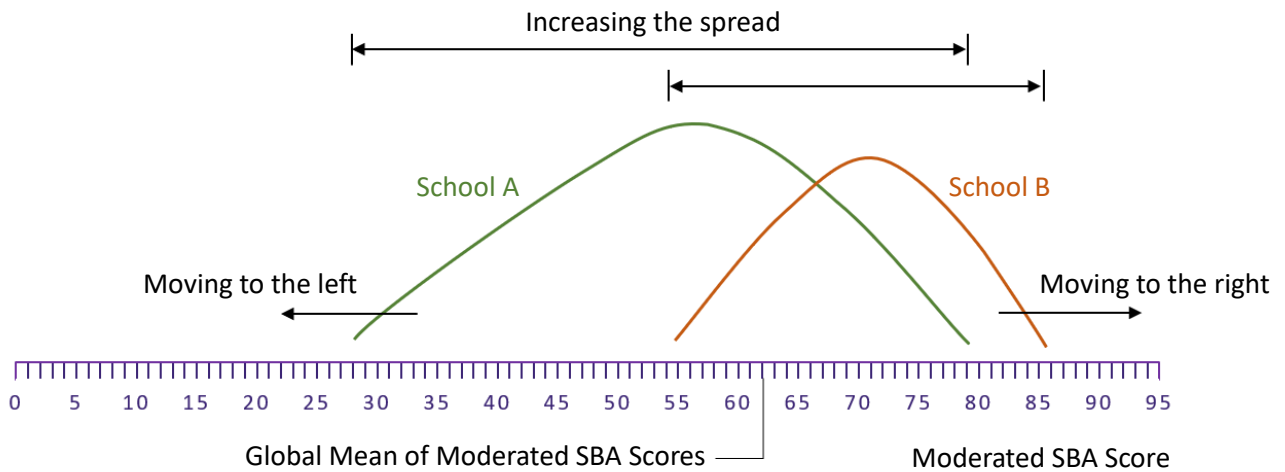


Figure 2(c) shows the impact of the statistical moderation process. The mean of the SBA scores of School B has increased after moderation while the mean of SBA scores of School A has decreased after moderation to reflect the performance of their students in the public examinations. In addition, the scores for both schools become more widely spread, reflecting the greater spread of the same students in the public examination.

Figure 2(c)



### Impact on Individual Students

In this example, there are 26 students (A to Z) in a moderation group and their performance is as shown in Figures 3(a) to 3(d).

The relationship between the public examination scores and the raw SBA scores [Figures 3(a) and 3(b)] shows that there is a significant difference between the two sets of scores for this group. Let's take two students, B and H, from the group as example. Figure 3(a) and Figure 3(b) show that Student B got the top score in his group in the public examination, and Student H got the lowest score. However, in the SBA, Student B was not the highest-scoring student and Student H not the lowest-scoring student. In comparison, Student B did less well in the SBA than in the public examination while Student H did much better in the SBA than in the public examination.

Figure 3(a)

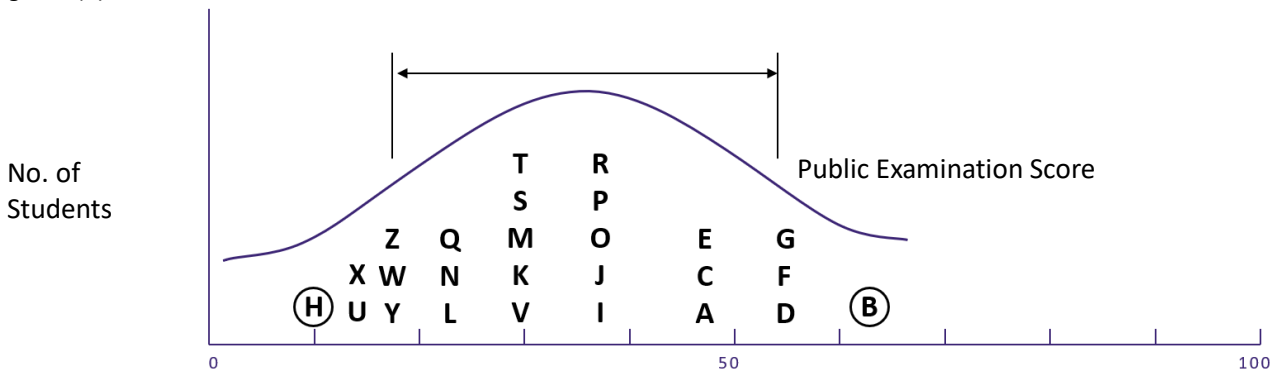
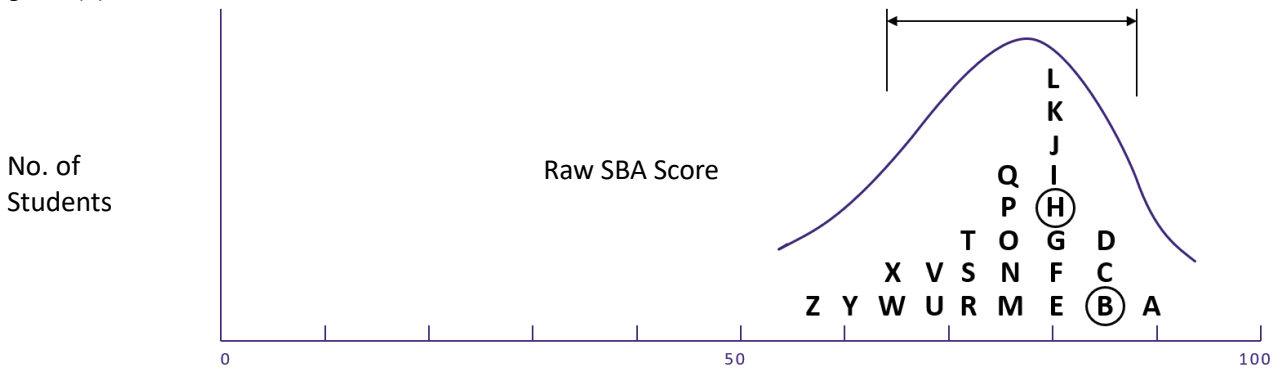


Figure 3(b)



Supposing that the group mean of the raw SBA scores is much higher than that expected for groups with a similar performance in the public examination, the raw SBA scores of the group need to be adjusted downwards. After statistical moderation, the results would be similar to those shown in Figure 3(c).

After moderation, although the raw SBA scores have been adjusted, the rank order of the students remains the same. Figure 3(c) shows that the rank order of Students B and H has not been affected at all. In other words, individual students' moderated SBA scores are not directly affected by how well they performed as individuals in the public examination. For example, Students D, C and B have the same raw SBA scores before moderation, despite their differences in examination performance. After moderation, they will have the same moderated SBA scores.

Figure 3(c)

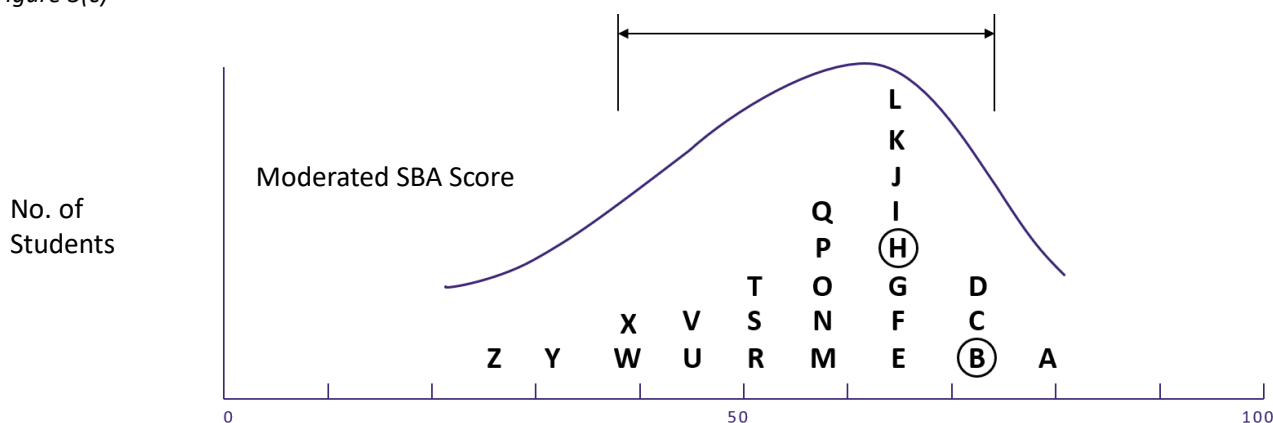
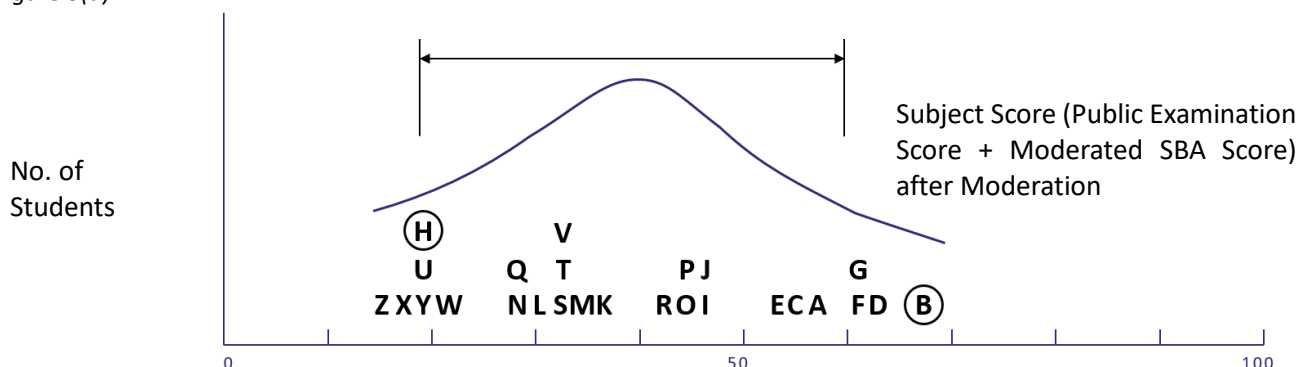


Figure 3(d) shows the total subject score for each student after the moderated SBA score is added to the examination score. Students with high raw SBA scores benefit even after moderation e.g. the overall subject result of Student H now ranks higher than his public examination result.

Figure 3(d)



# 5. Expert Judgment Moderation

Expert judgment based on review of students' work by district coordinators (DCs)/assessors is another approach for adjusting the raw SBA scores across different schools. This moderation method involves selection of samples of students' work covering the full range of attainment. The scores obtained from the sample review will be used to determine the Group Performance Level. Within a group, individual students' raw SBA scores may be adjusted, but the rank order within a moderation group will remain unchanged. The details of this moderation method are as follows.

## A. Review of Samples of Students' Work

After submission of SBA scores in S6, all schools will submit samples of students' work for review by DCs/assessors appointed by the HKEAA. The sampling method and the reviewing procedures are as follows:

### Sampling Method:

The sampling method is identical to that for the statistical moderation method.

### Review Procedures:

DCs/assessors remark the samples of students' work collected with reference to the stipulated assessment criteria.

## B. Determination of Group Performance Level and Individual Students' Moderated Scores

The scores obtained in the sample review exercise are used to determine the Group Performance Level of individual moderation groups. Within each group, students' moderated scores are derived in accordance with the Group Performance Level and their relative performance within the group. Details are provided in Figure 4 and the formula is given in **Appendix B**.

### Determination of Group Performance Level

Average scores obtained in the sample review exercise are used to determine the Group Performance Level. Statistical techniques will be employed to improve the reliability of the results obtained from the sampling and reviewing process, including adjustments to the sample statistics with reference to individual schools' raw SBA scores as well as the overall SBA performance of all schools (if deemed necessary).



### Determination of Individual Students' Moderated Score

Moderated score of each student is calculated in accordance with the Group Performance Level and the student's relative performance within the group.

Figure 4: Procedures to determine the moderated score for an individual student using expert judgment moderation

### **C. Detection of Cases with Extreme Adjustments and Follow-up Actions**

For each moderation group, the moderated scores will be compared to the school's raw SBA scores. If the difference between the two is significant, SBA supervisors and HKEAA subject managers will follow up on these extreme cases and may modify the adjustments recommended by the expert judgment method to ensure that the moderated scores properly reflect students' performance. Additional samples will be solicited from particular schools if necessary.

#### **Impact of Expert Judgment Moderation**

As with statistical moderation, this method also aims at moderating SBA scores by adjusting the mean and spread of the scores of each moderation group. The difference is that instead of using public examination scores as in the statistical moderation method, this method achieves this by expert judgment. Hence, with the same underlying principle, the impact of this method will be the same as that of statistical moderation: the mean and spread of the moderated SBA scores of each group may increase or decrease but the rank order of the students within the group remains unchanged.

## 6. Feedback to Schools

After the examination each year, SBA moderation reports will be sent to schools for their reference. The report will specify the extent of the adjustment made to the scores submitted by schools. A sample of the SBA moderation report for the subject of English Language is shown in Figure 5.

<b>香港考試及評核局</b> <b>2023 年香港中學文憑考試</b> <b>Hong Kong Examinations and Assessment Authority</b> <b>Hong Kong Diploma of Secondary Education Examination 2023</b>	
<b>校本評核分數調整報告</b> <b>SBA Moderation Report</b>	
學校名稱： School Name:	甲乙丙學校 ABC School
科目： Subject:	英國語文 English Language
調整組別代號： Moderation Group ID:	1234 5678

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**調整組別的統計數據\***  
**Statistics of the moderation group\***

學校所提交的考生人數： No. of candidates submitted by school:	100
調整組別的人數**： No. of candidates in the moderation group**:	100
校本評核原始分數的平均分： Mean of raw SBA scores:	65.25
校本評核原始分數的標準差： Standard deviation of raw SBA scores:	9.06
調整後校本評核的平均分： Mean of moderated SBA scores:	62.25
調整後校本評核分數的標準差： Standard deviation of moderated SBA scores:	9.06

**評語：**  
**Comments:**

校本評核原始分數的平均分**合乎預期範圍**。  
The mean of the raw SBA scores is **within the expected range**.

校本評核原始分數的分布**合乎預期範圍**。  
The spread of the raw SBA scores is **within the expected range**.

\* 這些數值是根據考評局獲得的最終數據計算所得，與校本評核系統所顯示者或有些微出入。  
\* The figures are based on the final data received by the HKEAA and may be slightly different from those shown in the SBA System.

\*\* 調整組別不包括下列考生：  
缺席於公開考試、校本評核被評為 0 分、獲豁免或未能完成任何評核課業的考生。  
\*\* The following candidates have been excluded from the Moderation Group:  
candidates who were absent from the public exam / awarded zero SBA marks / exempted from SBA / failed to complete any SBA work.

Figure 5: A sample of an SBA report for the subject of English Language



# 7. Frequently-asked Questions

## General questions

### 1. Why is it necessary to use different methods to moderate SBA scores?

The design of SBA components may be different across subjects. Statistical moderation based on the use of public examination scores as a moderating variable is applicable to subjects in which public examination performance is a valid measure of the overall level of performance of students in the moderation group. On the other hand, the SBA of Design and Applied Technology, for example, focuses on assessing students' skills in deriving practical solutions to a real world design problem which is a dimension different from the requirement of the public examination. Hence, it is not appropriate to use examination results to moderate SBA scores (statistical moderation) in Design and Applied Technology. Expert judgment moderation is therefore adopted by certain subjects.

### 2. Will the raw scores of all the students participating in SBA be moderated?

Yes. All students participating in SBA will have their raw SBA scores moderated. Those who are excluded from the moderation group, for example cases with extreme scores, will still have their raw SBA scores moderated based on the information from the rest of the group.

### 3. Will the rank order of a student's SBA score change after moderation?

No. Within each moderation group, the rank order of a student's SBA score remains unchanged after moderation.

### 4. Why is standardisation among teachers within a school necessary if the HKEAA is going to moderate the raw SBA scores anyway?

Moderation by the HKEAA is conducted on a school basis, i.e. taking each individual school as a moderation group. Hence it is necessary to standardise the marking among teachers within the school so as to produce a fair overall rank order of students for the school as a whole.

### 5. Why is moderation conducted on a school basis but not on a teacher basis?

Students following the same curriculum in a school should be judged against the same standards in the assessment process, irrespective of which class they are attending or which teachers are teaching them. This internal comparability is vital to the learning and teaching process and can be achieved through professional collaboration and sharing among teachers within a school. In addition, treating schools as a single group can increase the size of the moderation group, which enhances the reliability of the results of the moderation.

**6. Is it possible to ensure that the samples selected represent the full spectrum of students' performance in a moderation group?**

Yes. Each moderation group will be divided into a number of strata, within which students' raw scores are similar. From each stratum, students' work will be sampled. This sampling method can ensure that a fairly small sample of students' work can adequately represent the full range of performance in a moderation group.

**7. How can the parity of sample review be ensured?**

The district coordinators (DCs)/assessors are all experienced subject teachers/experts. In reviewing students' work, they use the same set of assessment criteria provided to teachers as specified in the *SBA Teachers' Handbooks*. Moreover, training sessions will be conducted to standardise the assessment standards. The training sessions will include evaluating and discussing annotated samples of students' work. Double-marking will be conducted if necessary to further enhance the effectiveness of the review.

## Questions about Statistical Moderation

**8. Will it be advantageous/disadvantageous to students if teachers' judgments are more lenient or harsher than those in other schools?**

No. All students assessed by different teachers will receive comparable scores after statistical moderation. The raw SBA scores are moderated against the public examination scores. Groups with lower raw SBA scores than other groups with similar public examination results will have their raw scores adjusted upwards whereas groups with higher raw SBA scores than other groups with similar public examination results will have their raw scores adjusted downwards.

**9. Will a student get the highest/lowest moderated SBA score after statistical moderation if he/she gets the highest/lowest public examination score?**

A student with the highest/lowest public examination score will not necessarily get the highest/lowest moderated SBA score. Individual public examination scores will have little direct effect on individual moderated SBA scores. Moderation makes adjustments based on the overall performance of the group in public examinations, rather than on the performance of individual students in public examinations.

**10. Will a student get the highest/lowest moderated SBA score after statistical moderation if he/she gets the highest/lowest raw SBA score?**

Yes. A student with the highest/lowest raw SBA score will receive the highest/lowest moderated SBA score within the same moderation group, irrespective of his/her public examination score.

**11. If raw SBA scores are moderated using public examination scores, does it mean that scores awarded by teachers are less reliable than examination scores?**

No. Teachers within a given school are known to be reliable in assessing their own students. However, they are less familiar with the standards set across different schools. Statistical moderation adjusts for any such difference in standard to ensure comparability of SBA scores across schools.

**12. If a high-performing student studied in a low-banding school and his/her classmates did very poorly in the public examination, would his/her moderated SBA scores be adversely affected?**

In this scenario, the score of the high-performing student in the public examination is expected to be much higher than those of his/her classmates. This will lead to a greater spread in the public examination scores of the group. In addition, the high-performing student is also likely to have a higher raw SBA score than his/her classmates. There will thus be a gap between this student and his/her classmates that will remain after statistical moderation. The individual moderated SBA score of the student will not necessarily be adversely affected, even though the moderated mean SBA score of the group may be lower than the raw mean SBA score of the group.

**13. If a student did badly in the public examination, would his/ her raw SBA score be reduced after statistical moderation?**

No. An individual's examination score will not directly affect that individual's moderated SBA score. Whether a student will have his/her raw SBA score reduced or not depends on the individual's raw SBA score as well as the group's performance in the public examination. If the group mean of the raw SBA scores is high but the performance of that group in the public examination is poor, all students in that group will be likely to have their raw SBA scores reduced after statistical moderation.

**14. What are outlier schools in the moderation process? How will these schools be identified and handled?**

Outliers are those schools identified for further follow-up actions after the statistical moderation process has been applied. These actions are intended to ascertain whether the moderation results fairly reflect their student's performance in the SBA. One type of outlier schools is those where a great discrepancy is found between the statistically moderated scores and the level of performance as demonstrated in their students' SBA work. These schools will be identified through analysis of the statistically moderated scores as well as review of samples of students' SBA work. In handling these outlier schools, the findings from the sample review will be compared with scores obtained from the statistical method. If necessary, adjustments will be made to the scores obtained after statistical moderation so that the final moderated scores of these schools can better reflect the performance of their students in the SBA.

**15. What is the purpose of reviewing samples of students' work in the moderation process?**

Reviewing samples of students' work allows identification of outlier schools in the moderation process and helps to establish the need to take appropriate follow-up actions with an aim to further improving the validity of the moderated SBA results. Through reviewing the samples, feedback to schools, both on students' performance as well as teachers' assessment standards, can be provided.

**Questions about Expert Judgment Moderation**

**16. Will it be advantageous/disadvantageous to students if teachers' judgments are more lenient or harsher than those in other schools?**

No. The raw SBA scores are moderated by expert judgment which is based on the same assessment criteria. This ensures that all students assessed by different teachers will receive comparable scores after moderation.

**17. If raw SBA scores are moderated using expert judgment, does it mean that scores awarded by teachers are less reliable than those awarded by the experts?**

No. Teachers within a given school are known to be reliable in assessing their students. However, they are less familiar with the standards set across different schools. Expert judgment moderation adjusts for any such difference in standards to ensure comparability of SBA scores across schools.

**18. Will students whose works are selected for review receive moderated scores that are exactly the same as the ones awarded by the experts?**

Not necessarily. The scores awarded to the samples in the review exercise will only be used to determine the degree of adjustment to be made to the mean and spread of the raw SBA scores of a moderation group. All students in the group, whether they are sampled or not, will be subject to moderation.

# Appendices: The Moderation Formulas

## Appendix A - Formula for Statistical Moderation

The formula used to statistically moderate SBA scores in statistical moderation may be expressed in words as follows:

$$\text{Moderated SBA Score of a Student} = \text{Moderated Group Mean of SBA Scores} + \text{Difference Within Group}$$

$$\text{Moderated Group Mean of SBA Scores} = \text{Global mean of raw SBA scores} + \text{Difference Between Groups}$$

$$\text{Difference Between Groups} = (\text{Group mean of public examination scores} - \text{Global mean of public examination scores}) \times \text{inter-group change rate}$$

where:

The **inter-group change rate** is the pooled within-group slope calculated from regressing raw SBA scores on the moderating variable (public examination scores), which ranges from 0 to 1. Once determined, the rate will be applied to all groups.

$$\text{Difference Within Group} = (\text{raw SBA score of a student} - \text{group mean of raw SBA scores}) \times \text{intra-group change rate}$$

where:

The **intra-group change rate** is for adjusting the spread of the raw SBA scores of a group with reference to the group standard deviation of the public examination scores and the group standard deviation of the raw SBA scores. As a result, the group standard deviation of the moderated SBA scores is equal to the pooled standard deviation of the public examination scores and the standard deviation of the raw SBA scores of the group. If the group standard deviation of the public examination scores is equal to (smaller/larger than) the group standard deviation of the raw SBA scores, the intra-group change rate will then be equal to (smaller/ larger than) 1.

More precisely, the formula used to moderate students' SBA scores in statistical moderation is as follows:

### Moderated SBA Score of a student

$$= x_{mean} + \beta(\bar{z} - z_{mean}) + (x - \bar{x}) \frac{s_p}{s_x}$$

where:

$x$  is the raw SBA score of a student

$x_{mean}$  is the global mean of the raw SBA scores

$z_{mean}$  is the global mean of the public examination scores

$\bar{x}$  is the group mean of the raw SBA scores

$\bar{z}$  is the group mean of the public examination scores

$s_x$  is the group standard deviation of the raw SBA scores

$s_z$  is the group standard deviation of the public examination scores

$s_p$  is the group standard deviation of the moderated SBA scores which is defined as  $\sqrt{w_x s_x^2 + w_z s_z^2}$  where  $w_x$  and  $w_z$  are the weightings such that  $w_x + w_z = 1$

$\beta$  the inter-group change rate, i.e. the slope calculated from regressing raw SBA scores on public examination scores, taking into account the nesting of students within groups

## Appendix B - Formula for Expert Judgment Moderation

The formula used to moderate SBA scores using expert judgment moderation is as follows:

$$\text{Moderated SBA Score of a Student} = \text{Group Performance Level on SBA}^{\#} + \text{Difference Within Group}$$

$$\text{Difference Within Group} = (\text{raw SBA score of a student} - \text{group mean of raw SBA scores}) \times \text{intra-group change rate}$$

where:

The **intra-group change rate** is for adjusting the spread of the raw SBA scores of a group with reference to the group standard deviation of the raw SBA scores, the group standard deviation of the public examination scores and the group standard deviation of the scores obtained in the sample review exercise. As a result, the group standard deviation of the moderated SBA scores is equal to the pooled average of the above three standard deviations of the group.

<sup>#</sup>Due to possible variations incurred in the sampling and remarking processes, an appropriate tolerance limit will be set in determining the group performance level. If the difference between the raw school mean and the result obtained in the sample review of a certain moderation group is within the tolerance limit, the raw school mean will be adopted as the group performance level. If the difference exceeds the tolerance limit, appropriate adjustments will be made to the raw school mean with reference to the sample review result to determine the group performance level.

Therefore, the formula to calculate individual students' moderated scores is as follows:

### Moderated SBA Score of a student

$$= \theta + (x - \bar{x}) \frac{s_p}{s_x}$$

where:

$\theta$  is the group SBA performance level based on the sample review exercise

$x$  is the raw SBA score of a student

$\bar{x}$  is the group mean of the raw SBA scores

$s_x$  is the group standard deviation of the raw SBA scores

$s_z$  is the group standard deviation of public examination scores, which has been converted to the same scale as the SBA scores

$s_a$  is the group standard deviation based on scores obtained in the sample review exercise

$s_p$  is the group standard deviation of the moderated SBA scores which is defined as  $\sqrt{w_x s_x^2 + w_z s_z^2 + w_a s_a^2}$  where  $w_x$ ,  $w_z$  and  $w_a$  are the weightings such that  $w_x + w_z + w_a = 1$

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