Comparing the awarded grades in June 2020 with other calculations

Overview

The normal process used by Ofqual exam boards to calculate national grade distributions in each subject each year (maintaining comparable outcomes) is similar to, but subtly different from the perspective of schools when considering the grades in terms of the progress made by individual pupils and the school as a whole. This arises from their different roles and responsibilities. This document explains how the usual national approach has been adapted to create the standardisation model, and how it is fundamentally similar to the familiar subject transition matrices approach, but also where there will be inevitable differences.

Information about the Ofqual and exam board standardisation model

The broad outline was described in slide 18 of the Ofqual Summer Symposium (Tues 21 July) and the follow-up blog.

The approach adopted is the Direct Centre-level Performance (DCP) approach.
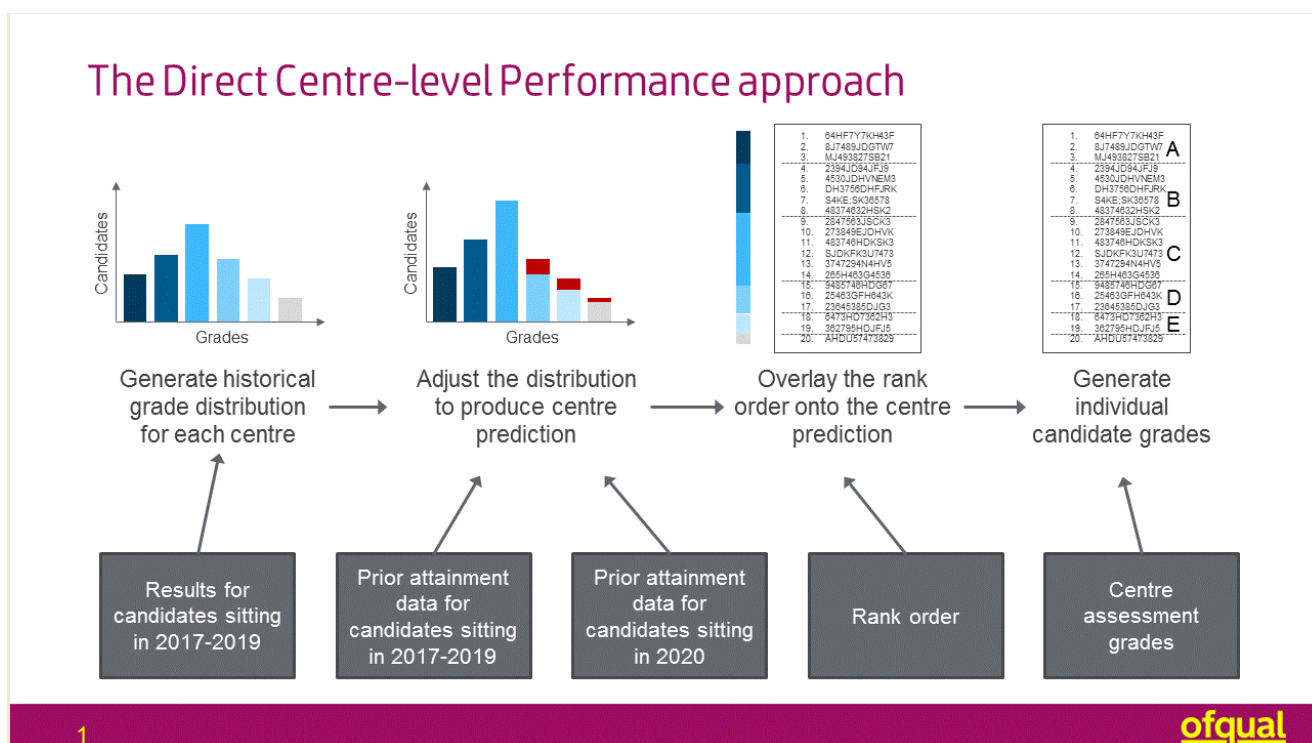
"Previous years"

Ofqual published a blog on 15 May which gave more information at that point about the methodology which was going to be adopted. In particular, it said:

> "For AS/A levels, the standardisation will consider historical data from 2017, 2018 and 2019. For GCSEs, it will consider data from 2018 and 2019, except where there is only a single year of data from the reformed specifications. The model will accommodate those centres for whom there is not this many years of data available."

Comparison with the ASCL subject Transition Matrices approach and Toolkit

From Centre-assessed Grading 2020: Technical guidance

Centre-assessed Grading 2020: Technical guidance
Calculating estimated grade distribution for June 2020
Tiering, managing missing data and other support

18 May 2020

We are very grateful to ASCL member and Executive Headteacher David Blow for sharing his thoughts on some technical aspects of the centre-assessed grading (CAG) process, and to his colleague Joe Bright.

1. Calculating estimated grade distribution for June 2020
The document *Step by step to allocating grades using ASCL approach* gives details on this process with accompanying spreasheets.
The files are as follows:
- Step by step to allocating grades using ASCL approach
- Summary of grade distribution sheet
- KS2 Fine Grade Calculations
- GCSE_subject_VA_GRID_for XXX school_for 2020 using 2019 TMs_v12b - 17may20.xlsx

From Step by step approach to allocating grades using ASCL approach

v2c 21-May-20

Step by step approach to allocating grades using ASCL approach

These are some initial notes on the steps required to implement the ASCL approach whereby in the interests of fairness to the whole cohort of Year 11, the overall national outcomes are in line with previous (and future) cohorts. This means that individual schools need to submit CAGs (Centre Assessed Grades) which are "non-inflationary" i.e. that they take into account in a clearly quantified way:

- expected grade distributions at national level
- results in previous years at individual centre level
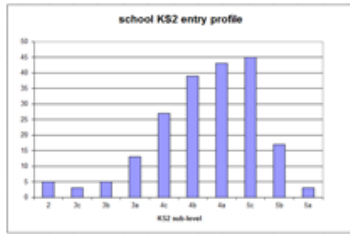- the prior attainment profile of students at centre level

and then further down on page 1:

Overall steps for each subject
1. From the KS2 prior attainment of those entered, use the 2019 DfE Subject Transition Matrices to calculate a "starting grade distribution" for June 2020, with its average grade and % 9-4
2. The school would state the subject VA for 2018 and 2019, giving details of the methodology / provider, and then take the average to use in the 2020 calculations. This figure is entered manually in the spreadsheet.
3. The spreadsheet then calculates what the distribution of grades would be for June 2020 which would give that specified subject VA figure (assuming uniform VA across the prior attainment range). The average grade increases by the VA figure
4. The school can modify the grade distribution to fit the exact pattern of its pupils, PROVIDED that the average grade and the % 9-4 remain the same. This will maintain the necessary national consistency. Schools should consider the % 9-7.

Infographic of ASCL approach

ASCL approach using transition matrices (TM)

GCSE in example

school KS2 entry profile

GCSE English Language

starting grade distribution if in line with national

grade distributions - starting + with VA

Take the school's KS2 profile

Feed into national subject TM
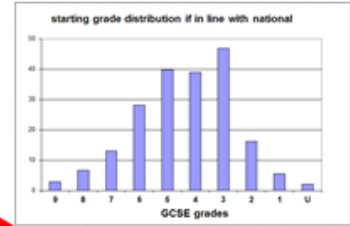
Get starting GCSE grade distribution if in line with national i.e. zero value-added

Apply grade distribution to ranked list of students, and make adjustments to grades whilst keeping key measures (e.g. %9-4) the same
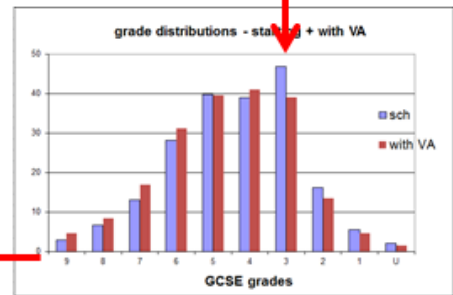
Add in Value-Added from previous years

More about the calculations in the Ofqual standardisation model and the information being sent to centres on the Wednesday, the day before Results Day

To the right is how the additional subject level information may be sent through by the exam board for each subject. The columns may not be in this order, but it is worth re-ordering,

Also, calculate and add in an extra set of numbers for any additional national and centre-level adjustments as below, in red.

You will see that in the example on the right, the percentages in each row in the first three sets of data add up to the percentage in the "calculated grades" set e.g. for grade 6 (in green), 15.7% - 2.0% - 3.3% = 10.4%

Note that exam boards usually work in terms of cumulative percentages, which can then be expressed in terms of percentages

	Historical data		Prior attainment adjustment		calculated grades		CAGs	
9	6	2.7%	9	2.1%	9	10	4.8%	9	12	6.0%
8	10	4.5%	8	3.7%	8	17	8.4%	8	17	8.5%
7	22	9.9%	7	0.5%	7	22	10.9%	7	24	12.0%
6	35	15.7%	6	-2.0%	6	21	10.4%	6	27	13.5%
5	41	18.4%	5	-3.0%	5	36	18.0%	5	37	18.5%
4	50	22.4%	4	0.5%	4	47	23.4%	4	47	23.5%
3	42	18.8%	3	0.2%	3	31	15.7%	3	25	12.5%
2	12	5.4%	2	-3.0%	2	10	5.0%	2	6	3.0%
1	3	1.3%	1	1.0%	1	5	2.5%	1	3	1.5%
U	2	0.9%	U	0.0%	U	2	0.9%	U	2	1.0%
Total	223	100%	Total	0.0%	Total	200	100%	Total	200	100%

	Historical data		Pr			calculated grades		CAGs	
9	6	2.7%	9	2.1%	9	0.0%	9	10	4.8%	9	12	6.0%
8	10	4.5%	8	3.7%	8	0.2%	8	17	8.4%	8	17	8.5%
7	22	9.9%	7	0.5%	7	0.5%	7	22	10.9%	7	24	12.0%
6	35	15.7%	6	-2.0%	6	-3.3%	6	21	10.4%	6	27	13.5%
5	41	18.4%	5	-3.0%	5	2.6%	5	36	18.0%	5	37	18.5%
4	50	22.4%	4	0.5%	4	0.5%	4	47	23.4%	4	47	23.5%
3	42	18.8%	3	0.2%	3	-3.3%	3	31	15.7%	3	25	12.5%
2	12	5.4%	2	-3.0%	2	2.6%	2	10	5.0%	2	6	3.0%
1	3	1.3%	1	1.0%	1	0.2%	1	5	2.5%	1	3	1.5%
U	2	0.9%	U	0.0%	U	0.0%	U	2	0.9%	U	2	1.0%
Total	223	100%	Total	0.0%	Total	0.00%	Total	200	100%	Total	200	100%

getting a particular grade. Do be aware that because the percentages must add up to 100%, an increase in one grade will carry through in the cumulative percentages until there is a corresponding reduction. Stacked column graphs are very helpful for demonstrating this.
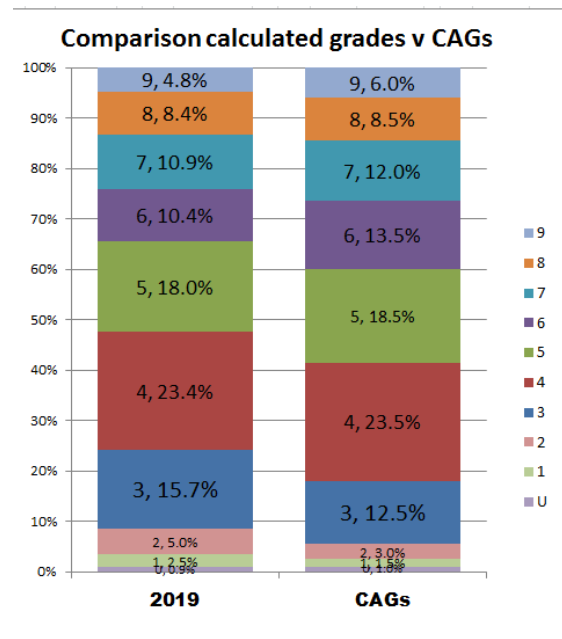
"Historical data"
Although this is presented as a single set of data, it will have been generated from the relevant number of previous years, typically two years for GCSE and three for A-level. The total number of students may well be different from the number for 2020.

"Prior attainment adjustment"
This accounts for any change in prior attainment between the years for the historical data and for 2020 and is expressed in terms of changes to the percentage of output grades. Overall, these must add to 0.

"National and centre-level adjustment"
This may well not be in the information sent out by the exam boards but is worth calculating as the difference between the calculated grade percentage and the sum of the historical data and the prior attainment adjustment. This will include any changes made at a national level in a particular subject to maintain comparable outcomes (and any changes resulting from the National Reference Test) as well as the GCSE ML adjustment in French and German. At a centre level this will deal with particular cases such as very small numbers etc where the CAGs are given greater weight. Overall, these must add to 0.

Comparison calculated grades v CAGs

	2019	CAGs
9	4.8%	6.0%
8	8.4%	8.5%
7	10.9%	12.0%
6	10.4%	13.5%
5	18.0%	18.5%
4	23.4%	23.5%
3	15.7%	12.5%
2	5.0%	3.0%
1	2.5%	1.5%
U	0.9%	1.0%

"Calculated grades"
These are the percentages actually awarded and should match the figures from the individual pupil lists.

"CAGs"
These are the percentages from the grades submitted and should match the figures from the individual pupil lists.

How do the two different methodologies compare?

Although these are two different methodologies, they should in fact give similar answers in most cases because the underlying principles are the same of using national subject figures, prior attainment and centre-level previous years' results.

The easiest way to understand this is to consider the simplest scenario in a typical subject, and then see the effect of changing each assumption. For convenience, in all the examples below, we assume no national or centre level adjustment.

1. **"start"** begin with the situation where the KS2 prior attainment profile of the pupils and their GCSE outcomes have remained static with zero value-added across three years (2018 and 2019 for previous years, and then calculated for 2020). In this case:
   Ofqual standardisation: by construction, the historical outcomes (2018 and 2019) match those in 2020, and there will be no prior attainment adjustment, because the profile remains the same, and we assume no national adjustment, so the calculated outcomes are those they should be
   ASCL TM approach: putting the 2018 and 2019 outcomes into the TMs gives zero value-added, by construction, and repeating it in 2020 will have the same outcome from the TM calculation i.e. zero value added.
   Note that this argument works for any KS2 prior attainment distribution.

2. **change in prior attainment in 2020:** Now suppose that the KS2 prior attainment distribution in 2020 becomes skewed towards the upper end (i.e. more Level 5 and fewer Level 4) relative to that in 2018 and 2019, but VA remains zero in all three years. In this case:

> **Ofqual standardisation:** there will be a positive prior attainment adjustment for the higher grades, because there are more KS2 Level 5, so the calculated outcomes increase at the higher grades
> **ASCL TM approach:** putting the higher KS2 prior attainment distribution into the TM will automatically give an increase in higher grades

3. **VA was positive in 2018 and 2019** (and same reasoning applies for any combination of VA incl negative VA), but prior attainment profile stays the same

> **Ofqual standardisation:** if the VA was higher in 2018/19, then the grades obtained will be higher, and so the historical data will be correspondingly higher. There is no prior attainment adjustment, leading to the 2020 calculated grades being higher
> **ASCL TM approach:** putting the same KS2 prior attainment distribution into the TM will give the zero VA grade distribution, but then adding in the VA from 2018/19 will increase the grade distribution correspondingly.

Particular differences between approaches

There are some small technical differences between the two approaches which do not lead to a systematic variation across all schools but will lead to individual schools getting small mismatches in some subjects, and indeed, these may balance out. These differences for KS2 and matched pupils are ones which apply in a normal year and are not a particular feature of the standardisation model. Also see Annex 1 for more information

KS2:

Exam boards use the marks in the Reading and Maths tests, which are then normalised and combined.
ASCL TMs: DfE have a complex flowchart (published in their Performance Tables Guidance) which ASCL replicated, which starts from the marks in the Reading and Maths tests, converts them to fine scores in Reading and Maths and then combines them, but also uses Teacher Assessment information if Test results not available.

Matched pupils:

Exam boards: see pp13-15 in [Requirements for the calculation of results in summer 2020](#) for the matching criteria.

ASCL TMs: DfE do extensive work to track pupils and then match their KS2 results to their GCSE, and similarly at AL

uniform VA v grade-specific VA + anchor & arithmetic grades

Exam boards: the calculations are grade-specific in the standardisation model working off cumulative percentages. Normally, it is only the anchor points 7/A, 4/C, 1/G and 9 as a special case which are used to set the marks for the grade boundaries, and then the intermediate grades boundaries are calculated arithmetically as equal mark dividers, without formal consideration of the percentages obtaining each grade

ASCL TMs: the ASCL Toolkit used uniform VA as its input in order to make it easier for schools to obtain and use figures. Using grade-specific VA did slightly increase accuracy but not by enough to make it worth introducing. TMs always look at each grade and give a VA score for each KS2 input value and for each GCSE grade output, as well as an overall score. Schools are now very focussed on average grades, having moved away from an accountability induced focus on thresholds, whereas exam boards have a defined statutory duty to focus on maintaining standards which are defined by cumulative percentages at thresholds

Annex 1 - Technical information

"Requirements for the calculation of results in summer 2020"

This very technical document was [issued](#) on 7 July, with a number of Annexes, specifying the information to be supplied and used by the exam boards. It refers to the Prediction Matrices and specified that these were to be derived from the first two years after reform where possible. This has caused some confusion, as these are national matrices for each subject which translate from prior attainment at a national level for each board to use; they are not the historical data used for each centre.

Annex E is embargoed until results day as it contains the fine details which might enable a school or candidate to know their result in advance of others. GCSEs and A Levels in Summer 2012

Contents

Prediction matrices

Comparable outcomes

"Our approach to setting and maintaining standards" [Ofqual, Summer 2012](#)

1. Note that some of these documents date from when Science was included in the KS2 input value.
2. There is a particular issue regarding AL Transition Matrices for 2020, because the input variable is the average GCSE score. The published DfE subject TMs had as input GCSE from 2017 when only English and maths had transitioned and were on 9-1 score, and the other GCSEs were on 8.5-1. But for AL in 2020, the GCSEs were taken in 2018 when almost all GCSEs had transitioned to 9-1. So it is very difficult to use the 2019 TMs. Whereas for GCSE, there was stability between 2014 and 2015 at KS2, and so it has been possible to use the 2019 GCSE TMs.

[Ofqual video](#) explaining approach

These are the matrices used by the exam boards to calculate in any year for each subject how many of each grade should be allocated, to take into account any changes in prior attainment

Research in 2013-14 on the use of KS2 data in prediction matrices

Exploring the value of GCSE prediction matrices based upon attainment at Key Stage 2

Tom Benton and Tom Sutch
Cambridge Assessment Research Report 20th May 2013
https://www.cambridgeassessment.org.uk/Images/181034-exploring-the-value-of-gcse-prediction-matrices-based-upon-attainment-at-key-stage-2.pdf

Analysis of use of Key Stage 2 data in GCSE predictions

Tom Benton and Tom Sutch
UCLES ARD Research Division
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/429074/2014-06-16-analysis-of-use-of-key-stage-2-data-in-gcse-predictions.pdf
Appendix 1 has description of how year-on-year KS2 variances are taken into account