

## Using Statistical Analysis to Predict 9-1 Grades for 2017 Cohort

How well are our 2017 cohort doing? This is the big question that school leaders across the country are asking but getting a meaningful answer is much harder than it was under the old performance measures.

Most of us first got an understanding of this when we discovered the difference in the 2015 Progress 8 data compared to that in 2016. To be fair we were given warnings by those in the know but the scale of the difference came as a shock to most of us. Explanations as to why the 2015 numbers differed so widely from 2016 ones are now well documented and basically tell us that data from one cohort cannot reliably be used to predict performance of the next. You would think once bitten school leaders may learn their lesson but I am discovering that in many schools they are applying the same flawed logic to use 2016 data to predict 2017 outcomes. Little do many realise that 2017 numbers will be even more out of step with the 2016 numbers and must be used very carefully indeed if any sense is to be made from them.

The reasons for the variation between 2016 and 2017 numbers will be because: -

- 1) The uncertainties around the new English and Maths grading. We already know that fewer students will achieve the level 5 'good pass' compared to those achieving the C grade in 2016 – perhaps around 20% of 2017 students will score a grade 4 whereas the same performance in 2016 would have achieved a C grade. As a C in 2016 was worth 5 points this means that 20% of students will instantly have a lower Att8 score. Uncertainties in the other grades and how they relate to legacy grading also means it is nigh on impossible to link the 2016 and 2017 points. As En and Ma are doubled in the Att8 calculations and English Lit can be included in the open bucket this uncertainty will have a big impact on the 2017 numbers.
- 2) Schools are working year on year to improve their Att8/Prog8 numbers. Just as we saw a big rise in national Att8 and Prog8 between 2015 and 2016 they will be a similar affect as schools 'play the game' better.
- 3) National variations between the performance of cohorts from one to the next. As the new performance measures are always comparative they will only apply to one year's cohort. Raise figures tell us that the 2017 cohort performed much better nationally in KS2 SATS than the 2016 one so this needs factoring in. Eventually the new National Reference Tests should help us with this issue but they are unlikely to provide much useful help for the next few years.

Therefore schools that are using the Prog8 2016 numbers to predict or comment on 2017 performance may find they get a better prediction from reading the student's palms or looking at their tealeaves. It is my view that wrong data can be worse than no data and 2016 data will definitely be wrong when it comes to 2017.

Does this honestly mean that school leaders are left reading tealeaves in the important work of knowing how their 2017 cohorts are doing? Can I suggest an alternative?

Ofqual has told us the following about the new GCSE grading:-

*‘Statistical predictions will be used in 2017 to ensure there is alignment between the new and current grading structures, such that:*

- *broadly the same proportion of students will achieve a grade 4 and above as currently achieve a grade C and above (nearly 70% of students in 2016)*
- *broadly the same proportion of students will achieve a grade 7 and above as currently achieve a grade A and above (around 20% in 2016)*
- *broadly the same proportion of students will achieve a grade 1 and above as currently achieve a grade G and above (99% in 2016)*

*All other grade boundaries will be set arithmetically, as now. For example, the boundaries at grades 5 and 6 will be set based on the difference in marks between grades 4 and 7; grade 5 will be set at one third of the difference in marks, and grade 6 at two thirds the difference in marks. The government’s definition of a ‘good pass’ will be set at grade 5 for reformed GCSEs. A grade 4 will continue to be a level 2 achievement. The Department for Education does not expect employers, colleges or universities to raise the bar to a grade 5 if a grade 4 would meet their requirements.’*

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/537147/Pstcard - Grading New GCSEs.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/537147/Pstcard_-_Grading_New_GCSEs.pdf)

Regarding the award of top grades it has also told us that the numbers being awarded grade 9 will be based on the following formula:-

*Percentage of those achieving at least grade 7 who should be awarded grade 9 = 7% + 0.5 × (percentage of candidates awarded grade 7 or above).*

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So putting this into numbers for English and Maths we get the following statistical predictions for 2017

Subject	% of students nationally who will be awarded a 9 grade	% of students nationally who will be awarded a 7+ grade	% of students nationally who will be awarded a 4+ grade
Maths	3.7	21.5	70.5
English Language	3.4	18.8	71.3

These percentages are much better than either 2016 Prog8 or tealeaves as they are based on the methodology that Ofqual will use in the summer to award the English and Maths grades. It still leaves some guesswork as to where the other grade percentages will work as the ‘difference in marks’ is not the same as the percentages. However with some extrapolated guesswork we could arrive at something like this:-

Subject	Estimated % of students in 2017 who will be awarded a grade:
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	9	8	7	6	5	4	3	2	1
Maths	3.7	7.4	10.4	13.0	18.0	18.0	18.5	8.0	1.0
English	3.4	6.8	8.6	14.5	19.0	19.0	18.7	8.0	1.0

So for a 'nationally average' cohort these could be applied when predicting where they should be at. Clearly if a school cohort is materially different to a 'nationally average' one then the figures will need adjusting. However at least this provides some sort of measure. Taking this further we can link the outcomes with KS2 results using this 2016 national transition matrix for English. 2016 is the most up to date transition matrix we have.

Pupil Numbers		Attainment at End of KS4									No of students	% of students
		U	G	F	E	D	C	B	A	A*		
Attainment at End of KS2	W	6	18	16	18	15	8	4	0	0	85	0.02
	1	65	111	189	145	90	23	X	X	0	623	0.13
	2	764	1,152	3,258	4,754	3,440	1,025	109	22	3	14,527	2.93
	3c	374	391	1,491	3,556	4,154	1,530	142	X	X	11,638	2.35
	3b	450	410	1,621	4,908	8,631	4,301	496	X	X	20,817	4.20
	3a	483	404	1,396	5,559	13,628	10,668	1,898	172	7	34,215	6.90
	4c	512	436	1,281	5,832	20,895	24,865	6,813	844	49	61,527	12.41
	4b	443	428	946	4,347	22,274	41,848	19,903	3,692	292	94,173	19.00
	4a	174	193	409	1,941	12,939	38,992	34,284	11,051	1,338	101,321	20.44
	5c	72	82	157	613	4,868	23,190	37,542	20,911	4,379	91,814	18.52
	5b	17	16	32	81	794	6,130	19,507	21,835	9,340	57,752	11.65
5a	X	X	X	5	9	160	1,101	2,877	3,084	7,236	1.46	
											495,728	

<https://www.raiseonline.org/documentlibrary/ViewDocumentLibrary.aspx>

English 2016 National Transition Matrix – Maths is almost identical in terms of % at each level. By applying the % I arrive at the following target predictions based on 2016 performance.

KS2 FPS	Sublevel	Eng/Maths 9-1 Grade
0-15	1c-2c	1
15-22	2b-3b	2
22-24.5	3a-4c	3
24.5-27.0	4c-4b	4
27.0-29.0	4b-4a	5
29.0-31.0	4a-5c	6
31.0-32.5	top 5c bottom 5b	7
32.5-33.5	top5b	8
>33.5	Very top 5b,5a	9

However this hits a problem as the 2015 National Cohort scored lower in their KS2 tests compared to 2017. This may be in part due to the change from KS2 English to Reading. Looking at Raise data for each cohort

Cohort	National KS2 AFPS
2015	27.5
2016	27.6
2017	28.5
2018	28.7

As the 2017 KS2 start was a whole point above that in 2015 this must be built into the predictions as follows, raising each threshold by one point.

KS2 FPS (2012)	Sublevel	Eng/Maths 9-1 Grade
0-16	1c-2b	1
16-23	2a-3a	2
23-25.5	3a-4c	3
25.5-28.0	Top 4c, 4b	4
28.0-30.0	4a	5
30-32.0	5c	6
32.0-33.5	most 5b	7
33.5-34.5	top 5b, bottom 5a	8
>34.5	most of 5a	9

### 9-1 Grade Predictor

Using this table will not be perfect but in the very imperfect world of data prediction that we currently inhabit this maybe the best predictor there can be.