



Department  
for Education

# **Key Stage 4 Similar Schools**

**Guide and technical note for local  
authorities, maintained schools,  
academies and free schools**

**January 2015**

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## Introduction to similar schools

The purpose of similar schools is to provide further context around key stage 4 examination performance and an insight into how schools are performing compared to those with similar intakes (based on the level at which they were assessed at the end of key stage 2).

This information is provided to help schools identify others with similar ability pupils, with whom they might want to collaborate and share good practice. From a parent or governor's perspective, it gives an indication of what schools dealing with children of similar levels of ability have been able to achieve.

To identify schools with similar intakes, we estimated the probability of each pupil achieving 5+A\* to C GCSEs (or equivalent) including English and mathematics GCSEs (5ACEM), at the end of key stage 4. This estimate is based upon the attainment of pupils in key stage 2 tests and teacher assessment.

The pupil estimates can then be averaged for all key stage 4 pupils in a school to calculate a school's estimate of the percentage of pupils achieving 5ACEM.

Once the similar school estimates have been calculated, a similar schools group is selected for each school by taking the 54 schools with the most similar estimates, 27 above and 27 below. This means that each school will have a unique group of 55 schools (including the focus school).

The 5ACEM attainment is then compared across the similar schools group. The summary diagrams on pages 4 and 5 show how to interpret the similar schools comparisons.

The schools included in the measure are state-funded mainstream schools.

## Expiry or review date

This technical guide will next be reviewed before October 2016.

## Who is this advice for?

This guidance is for:

- local authorities
- school leaders, school staff and governing bodies in all maintained schools, academies and free schools

Example of a similar schools comparison, showing how the focus school's 5+ A\* to C GCSEs (or equivalent) including English and mathematics (5ACEM) attainment

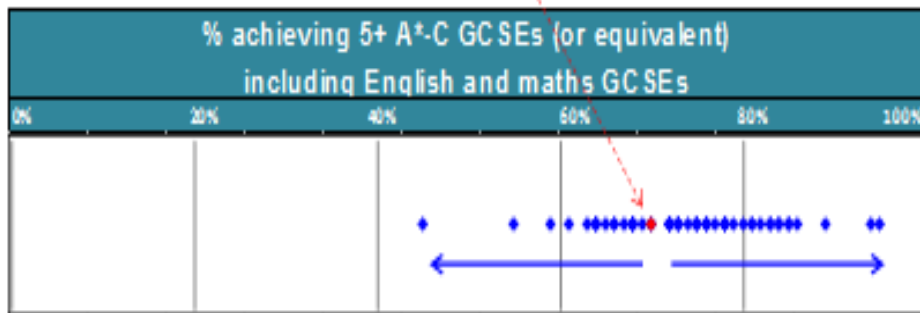
School Name	School Type	% achieving 5+ A*-C GCSEs (or equivalent) including English and maths GCSEs	School position within group (click to see group)	Key: ● School ● Similar Schools					
				% achieving 5+ A*-C GCSEs (or equivalent) including English and maths GCSEs					
				0%	20%	40%	60%	80%	100%
School 279	Community School	70%	35/55	[Chart showing 70% attainment with a red dot for the school and blue dots for similar schools]					

School 279 is the focus school

70% of pupils at this school achieved 5ACEM, which is shown as a red point in the chart

The school has the 35<sup>th</sup> highest 5ACEM attainment in their similar school's group of 55 schools

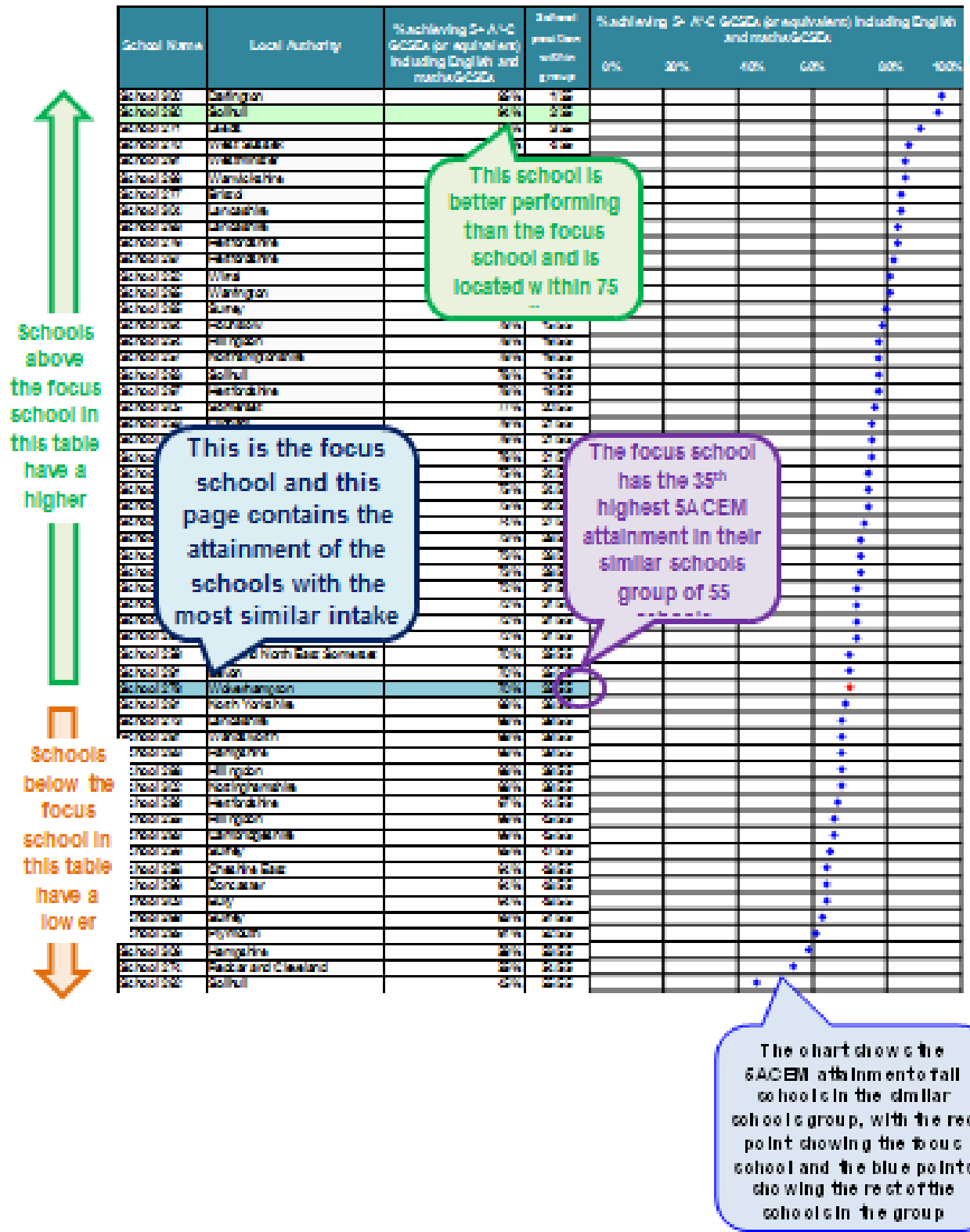
The chart shows the 5ACEM attainment of all schools in the similar schools group, with the red point showing the focus school and the blue points showing the rest of the schools in the group



Schools in the group with lower 5ACEM attainment than the focus school

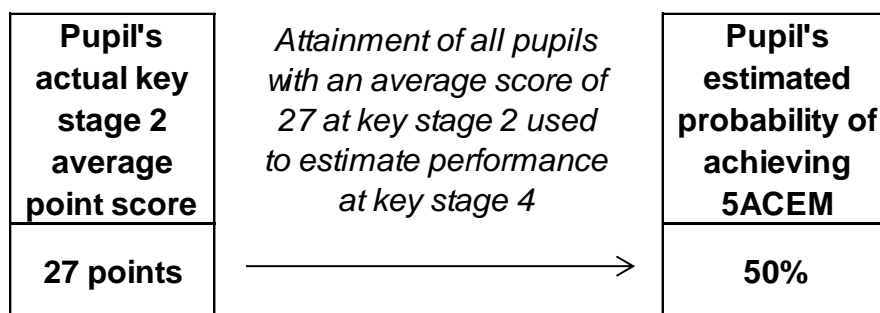
Schools in the group with higher 5ACEM attainment than the focus school

Example of a similar schools group table, showing how the focus school's 5ACEM attainment compares to their similar schools



## Selecting Similar School Groups

A statistical model is used to calculate the probability of achieving 5ACEM for pupils at the end of key stage 4 in 2015. Each pupil's key stage 4 estimate is calculated based on the actual 5ACEM attainment of all pupils nationally with the same level of achievement at key stage 2. For example, calculation of an estimated outcome for a pupil who scored an average of 27 points at key stage 2 will be based on the actual key stage 4 outcome of all pupils nationally that also scored an average of 27 points at key stage 2.



Section A of the technical annex provides a more detailed description of how pupils' estimated key stage 4 5ACEM attainment is calculated.

The individual pupil 5ACEM estimated probabilities are then averaged to calculate a school level estimated probability or, for the purposes of this explanation, a school estimate.

For more information on calculating school estimates, please see section B of the technical annex.

Once the school estimates have been calculated, a similar schools group is selected for each school by taking the 54 schools with the most similar estimates, 27 above and 27 below. This means that each school has a unique group.

The diagram overleaf demonstrates how a school's similar schools group is selected.

School 279's  
Similar Schools  
group consisting of  
55 schools

Rank of school estimate	School	School estimate
1	School 1	98.51%
2	School 2	98.29%
⋮	⋮	⋮
251	School 251	75.37%
<b>252</b>	<b>School 252</b>	<b>75.36%</b>
<b>253</b>	<b>School 253</b>	<b>75.33%</b>
<b>254</b>	<b>School 254</b>	<b>75.24%</b>
<b>255</b>	<b>School 255</b>	<b>75.18%</b>
<b>256</b>	<b>School 256</b>	<b>75.15%</b>
⋮	⋮	⋮
<b>274</b>	<b>School 274</b>	<b>74.53%</b>
<b>275</b>	<b>School 275</b>	<b>74.50%</b>
<b>276</b>	<b>School 276</b>	<b>74.46%</b>
<b>277</b>	<b>School 277</b>	<b>74.45%</b>
<b>278</b>	<b>School 278</b>	<b>74.45%</b>
<b>279</b>	<b>School 279</b>	<b>74.37%</b>
<b>280</b>	<b>School 280</b>	<b>74.32%</b>
<b>281</b>	<b>School 281</b>	<b>74.31%</b>
<b>282</b>	<b>School 282</b>	<b>74.31%</b>
<b>283</b>	<b>School 283</b>	<b>74.28%</b>
<b>284</b>	<b>School 284</b>	<b>74.26%</b>
⋮	⋮	⋮
<b>302</b>	<b>School 302</b>	<b>73.77%</b>
<b>303</b>	<b>School 303</b>	<b>73.70%</b>
<b>304</b>	<b>School 304</b>	<b>73.59%</b>
<b>305</b>	<b>School 305</b>	<b>73.58%</b>
<b>306</b>	<b>School 306</b>	<b>73.56%</b>
307	School 307	73.55%
⋮	⋮	⋮
3020	School 3020	28.69%
3021	School 3021	22.89%

27 most similar schools with a higher estimate

27 most similar schools with a lower estimate

## Better Performing Similar Schools

Where possible we have highlighted schools within each similar schools group that are both better performing than the focus school and within travelling distance should schools wish to collaborate. To be highlighted as such, a school needs to:

- have at least 40% of their pupils achieving 5ACEM
- have 5ACEM attainment that is at least 17 percentage points (one standard deviation) higher than the focus school
- be located within 75 miles of the focus school

School Name	Local Authority	% achieving 5+ A*-C GCSEs (or equivalent) including English and maths GCSEs	School position within group
School 300	Darlington	95%	1/55
School 280	Solihull	94%	2/55
School 271	Leeds	89%	3/55
School 270	West Sussex	86%	4/55
School 261	Westminster	85%	5/55
School 266	Warwickshire	85%	6/55
School 277	Bristol	84%	7/55
School 304	Lancashire	84%	8/55
School 263	Lancashire	83%	9/55
School 276	Hertfordshire	83%	10/55
School 287	Hertfordshire	82%	11/55
School 252	Wirral	81%	12/55
School 265	Warrington	81%	13/55
School 285	Surrey	80%	14/55
School 284	Hounslow	79%	15/55
School 254	Hillingdon	78%	16/55
School 257	Northamptonshire	78%	16/55
School 263	Solihull	78%	16/55
School 267	Hertfordshire	78%	16/55
School 305	Somerset	77%	20/55
School 253	Oldham	76%	21/55
School 298	Surrey	76%	21/55
School 301	Lancashire	76%	21/55
School 271	Warrington	75%	24/55
School 292	Hertfordshire	75%	24/55
School 294	Essex	75%	24/55
School 297	Staffordshire	74%	27/55
School 259	Staffordshire	73%	28/55
School 275	Hertfordshire	73%	28/55
School 290	Leeds	73%	28/55
School 268	Salford	72%	31/55
School 277	Essex	72%	31/55
School 286	Oxfordshire	72%	31/55
School 289	Northamptonshire	72%	31/55
School 259	Bath and North East Somerset	70%	35/55
School 291	Devon	70%	35/55
School 279	Wolverhampton	70%	35/55
School 281	North Yorkshire	69%	38/55
School 273	Lancashire	68%	39/55

School 280 is a better performing school because it has 5ACEM attainment that is 24 percentage points higher than the focus school and is located 20 miles away

The focus school is highlighted in blue

If there are no schools within a group that meet the above criteria we have, where possible, found an additional better performing school outside of the group. The information for this school is displayed at the bottom of the group page.



This better performing school will meet the criteria set out above and to ensure that the school has a similar intake, the school's similar school estimate must be within 12 percentage points (one standard deviation of the estimates) of the focus school.

If a school has 5ACEM attainment that is 84% or higher it is not possible for there to be a better performing school based on the criteria set out above. In these instances any additional, better performing school has to meet the following criteria:

- 100% 5ACEM attainment
- a best 8 average point score (APS) that is at least 41 points higher than the focus school
- located within 75 miles of the focus school
- the school's similar school estimate must be within 12 percentage points of the focus school

Within each similar schools group, to provide an additional point for comparison, we have also highlighted any school that has a similar proportion of disadvantaged pupils; that is those schools within 2 percentage points difference (plus or minus) of the focus school.

## Average Grade per Pupil

The similar schools page also shows an average grade per pupil. This is the average grade based on the school's total average point score per pupil capped to the best 8 qualifications. This total point score is available on performance tables.

The average grade per pupil has been added to offer further context to the measure. Users can also select specific schools for wider comparison on the website by ticking the box next to the school name and then clicking the 'compare' button.

The average total point score is calculated by dividing the total number of points achieved by pupils at the end of key stage 4 in their best 8 qualifications by the number of pupils on roll. The average grade is then calculated by dividing this point score by 8 and applying the following grade boundaries:

Average Grade	Total average point score per pupil divided by 8
A*	57.0+
A*-	55.0-56.9
A+	53.0-54.9
A	51-52.9
A-	49.0-50.9
B+	47.0-48.9
B	45.0-46.9
B-	43.0-44.9
C+	41.0-42.9
C	39.0-40.9
C -	37.0-38.9
D+	35.0-36.9
D	33.0-34.9
D-	31.0-32.9

E+	29.0-30.9
E	27.0-28.9
E-	25.0-26.9
F+	23.0-24.9
F	21.0-22.9
F-	19.0-20.9
G+	17.0-18.9
G	15.0-16.9
G-	8.0-14.9
U	7.9 or below

# Technical Annex

## Section A – Calculating pupil estimates

Behind the key stage 4 similar schools measure sits a statistical model used to identify schools with the most similar intakes. The model generates an estimate of attainment for each pupil achieving at least 5 A\* to C GCSEs (and equivalencies) including English and mathematics (5ACEM).

The estimated key stage 4 attainment outcome is expressed as a probability of achieving the attainment measure, and is based on the performance nationally of all pupils with the same key stage 2 prior attainment.

### Pupil eligibility for inclusion in the similar school model

Pupils are included in the key stage 4 similar schools model if:

- their key stage 4 attainment can be matched to their attainment at key stage 2
- they have a key stage 2 average point score that is greater than zero
- they attend a state-funded maintained mainstream school (including academies and city technology colleges)

### Methodology for pupil similar schools calculation

The estimated key stage 4 attainment of the pupil,  $EP_p$ , is given by:

$$EP_p = \frac{1}{1 + e^{-E_p}}$$

where  $e^{-E_p}$  is the exponential function of  $E_p$  and

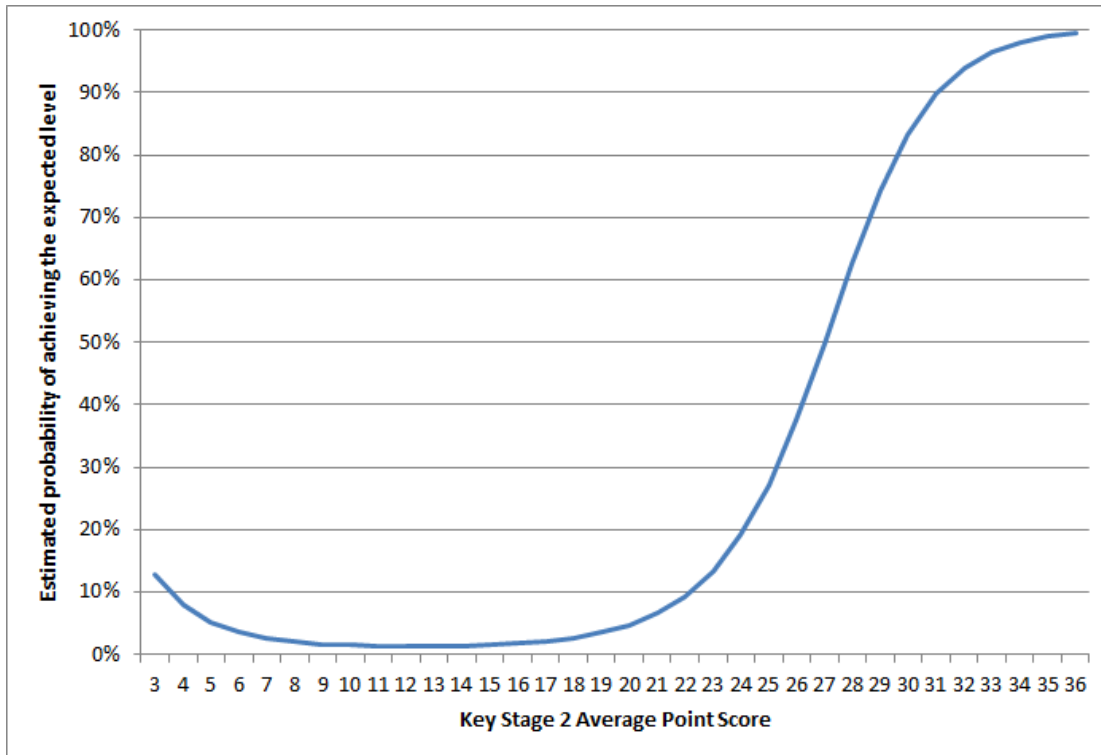
$$E_p = c + (c_1 \times KS2APS) + (c_2 \times KS2APS^2) + (c_3 \times KS2APS^3)$$

$KS2APS$	is the pupil's key stage 2 average point score (APS)
$KS2APS^2$	is the pupil's key stage 2 APS squared
$KS2APS^3$	is the pupil's key stage 2 APS cubed
$c_i$	are the coefficients from the similar schools model
$c$	is the constant from the similar schools model

where:

The constant and coefficients are derived from the statistical model and based on the relationship between the attainment and prior attainment variables for all pupils.

The chart below shows the estimated probability of achieving 5ACEM for different levels of prior attainment.



## Worked example 1

A pupil at the end of key stage 4 has the following prior attainment:

Surname	Jones
Forename	Gillian
Key stage 2 fine graded average point score	31.53 (Level 5c)

The first step to calculating Gillian's estimated key stage 4 attainment is inserting the following values, reflecting her key stage 2 (KS2) outcomes, into the formulae given above for  $E_p$ :

Notation	Description	Pupil value
$KS2APS$	Key stage 2 APS	31.53
$KS2APS^2$	Key stage 2 APS squared	994.14
$KS2APS^3$	Key stage 2 APS cubed	31345.26

The table below presents the 2015 key stage 4 similar schools model coefficients:

Coefficient	Applied to	Coefficient
$c$	Constant applied to all pupils	0.078509
$c_1$	$KS2APS$	-0.776934
$c_2$	$KS2APS^2$	0.038262
$c_3$	$KS2APS^3$	-0.000356

Gillian's estimated key stage 4 attainment,  $E_p$ , is calculated as:

$$\begin{aligned}
 E_p &= c + (c_1 \times KS2APS) + (c_2 \times KS2APS^2) + (c_3 \times KS2APS^3) \\
 &= 0.078509 + (-0.776934 \times 31.53) + (0.038262 \times 994.14) + (-0.000356 \times 31345.26) \\
 &= 0.078509 - 24.496729 + 38.037819 - 11.158913 \\
 &= 2.460686 \text{ (to 6 decimal places, or d.p.)}
 \end{aligned}$$

Calculate  $EP_p$  by inserting the value calculated for  $E_p$

$$EP_p = \frac{1}{1 + e^{-2.460686}}$$

to give Gillian's estimated probability of achieving the 5ACEM measure,

$$EP_p = 92.1339\%. \text{ (to 4d.p.)}$$

## Section B – Calculating school estimates

The school estimate is calculated as the average estimate of all pupils in the school.

### School eligibility for inclusion in similar school

All state-funded maintained mainstream schools will be included in similar schools, provided they have at least one eligible pupil in the measure.

Schools will be excluded from the measure if they have their 5ACEM result suppressed in performance tables under the small numbers/suppression rules.

### Methodology for schools estimates

The key stage 4 school estimate,  $EP_s$ , is given by:

$$EP_s = \frac{\sum_{p=1}^{n_s} EP_p}{n_s},$$

$n_s$	is the number of eligible pupils in the school
$\sum_{p=1}^{n_s} EP_p$	is the sum of the estimates of eligible pupils within the school

where:

Continuation of worked example 1

Gillian is one of 100 pupils in her school's key stage 4 cohort, who have a range of key stage 4 similar schools estimates:

Pupil #	Pupil name	Similar School estimate
1	Gillian	92.1339%
2	Lindsay	76.1586%

and so on	and so on	and so on
100	David	51.1499%
<b>Average</b>		<b>74.3721%</b>

To calculate  $\overline{EP}_p$ , the average estimate for all eligible pupils within the school key stage 4 cohort is calculated using the formula below:

$$EP_s = \frac{\sum_{p=1}^{n_s} EP_p}{n_s} = \frac{(92.1339\% + 76.1586\% + \dots + 51.1499\%)}{100} = 74.3721\% \text{ (to 4d.p.)}$$

Round this to 2 decimal places. Hence the final key stage 4 school estimate for this school,  $EP_s$ , is 74.37%

The school's group will then be made up of 54 schools with the closest estimates to 74.37%, with 27 schools above and 27 below.





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