

1. What is Normalisation?

Normalisation as used in the Indian context is a process for ensuring that students are neither advantaged nor disadvantaged by the difficulty of exams that they do for the Boards. This process is used in other countries with similar issues as in India.

2. Normalisation Process requires us to know the following

Percentile Score

Percentile score of a Candidate in a Board or JEE (Main) will reflect what Percentage of Candidates have scored below that Candidate in that Board or JEE (Main) Examination.

A Percentile score is the value of below which a certain Percent of observations fall. For example, the 20th Percentile is the value (or score) below which 20 Percent of the observations may be found.

The Percentile of a Candidate will be calculated as

$$100 \times \frac{\text{Number of candidates in the `group' with aggregate marks less than the candidate}}{\text{Total no. of candidates in the `group'}}$$

Example : Suppose we have , 13711 Candidates in a Board ABCD and a Candidate who has scored 60% of Board marks has 6865 Candidates below him; his Percentile score will be calculated as follows

$$\text{Percentile score for 60\% of Board Marks} = \frac{6865}{13711} * 100$$

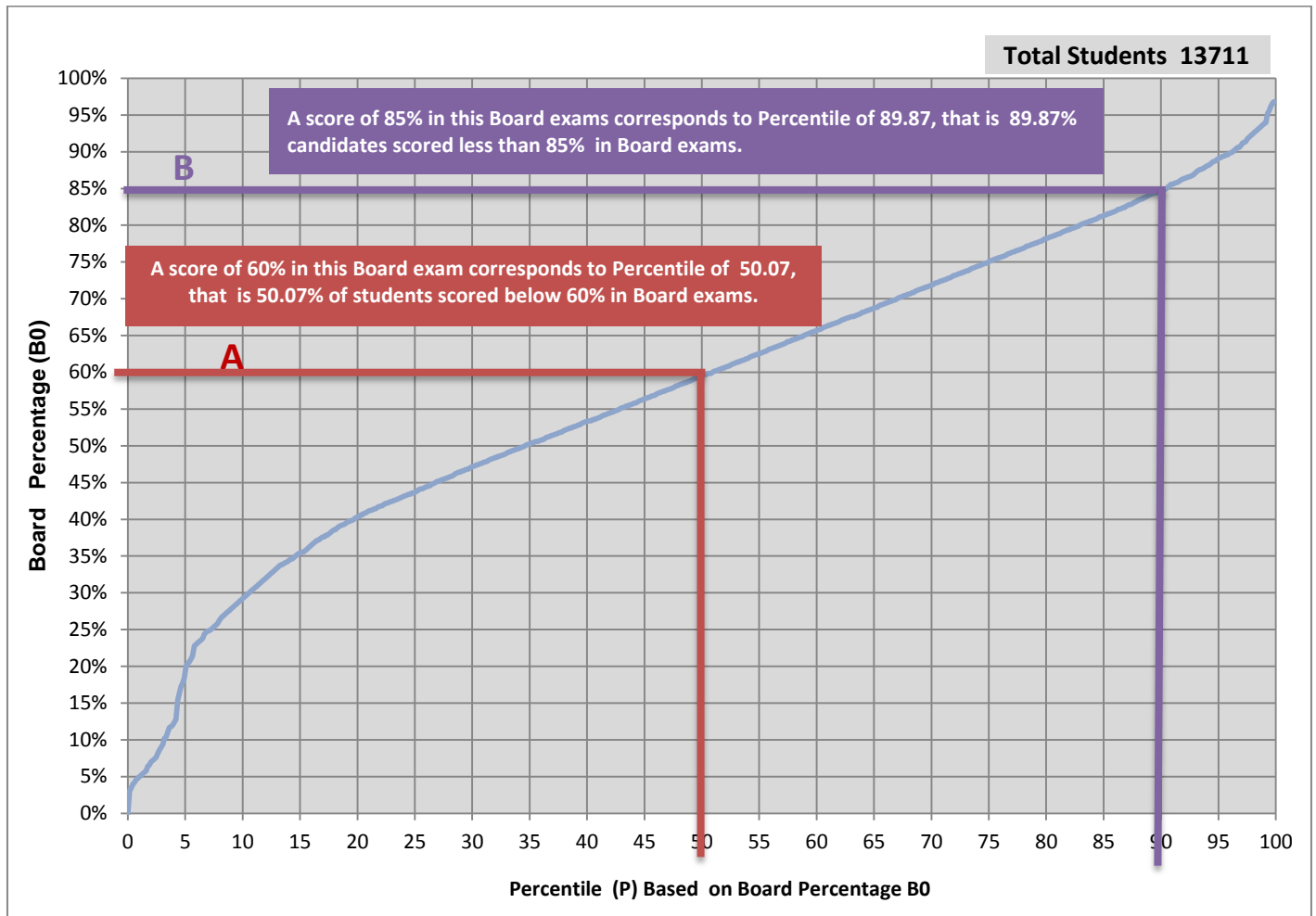
$$\text{Percentile} = 50.07$$

Table 1: Percentage and corresponding Percentile score of 13711 Candidates of Board ABCD.

Board Percentage (B0)	No of candidates below candidate the with Board Percentage B0	Percentile Calculation corresponding to B0	Percentile Score (P)
7%	317	100 X (317/13711)	2.31
----- ----- -----	. . .	----- ----- -----	----- ----- -----
13%	575	100 X (575/13711)	4.19
----- ----- -----	. . .	----- ----- -----	----- ----- -----
21%	774	100 X (774/13711)	5.65
----- ----- -----	. . .	----- ----- -----	----- ----- -----
29%	1349	100 X (1349/13711)	9.84
----- ----- -----	. . .	----- ----- -----	----- ----- -----
58%	6627	100 X (6627/13711)	48.33
----- ----- -----	. . .	----- ----- -----	----- ----- -----
60%	6865	100 X (6865/13711)	50.07
----- ----- -----	. . .	----- ----- -----	----- ----- -----
84%	12203	100 X (12203/13711)	89.00
----- ----- -----	. . .	----- ----- -----	----- ----- -----
85%	12322	100 X (12322/13711)	89.87
----- ----- -----	. . .	----- ----- -----	----- ----- -----
91%	13274	100 X (13274/13711)	96.81
----- ----- -----	. . .	----- ----- -----	----- ----- -----
94%	13592	100 X (13592/13711)	99.13
----- ----- -----	. . .	----- ----- -----	----- ----- -----
96%	13651	100 X (13651/13711)	99.56

Graphical view of Percentage and their corresponding Percentile of data of 13711 Candidates of Board ABCD is shown the chart 1. Two Board Percentage Marks and corresponding Percentile have also been discussed.

Chart 1



In the above chart,

- (A) 85% Board marks correspond to 89.87 Percentile
- (B) 60% Board marks correspond to 50.07 Percentile

3. Normalisation of Board Marks for JEE (Main)

To find out normalised marks of a Candidate from the Board ABCD who has scored, say , 60% in the Board, following are required to be done :-

Step 1. Calculate Percentile (P_i) of the Candidate with reference to the group of Candidates of Board ABCD who also satisfy the eligibility criteria of JEE (Main).

From the Table 2, this is 50.07

Table 2: Showing the Percentage score in a particular Board, say, ABCD of 13711 Candidates who satisfy the eligibility criteria of JEE (Main) and their corresponding Percentile (P).

Board Percentage (B ₀)	No of candidates below candidate the with Board Percentage (B ₀)	Percentile Calculation corresponding to B ₀	Percentile (P)
5%	200	100 X (200/13711)	1.46
.....
7%	317	100 X (317/13711)	2.31
.....
12%	450	100 X (450/13711)	3.28
.....
13%	575	100 X (575/13711)	4.19
.....
21%	774	100 X (774/13711)	5.65
.....
29%	1349	100 X (1349/13711)	9.84
.....
58%	6627	100 X (6627/13711)	48.33
.....
60%	6865	100 X (6865/13711)	50.07
.....
84%	12203	100 X (12203/13711)	89.00
.....
85%	12322	100 X (12322/13711)	89.87
.....
91%	13274	100 X (13274/13711)	96.81
.....
94%	13592	100 X (13592/13711)	99.13
.....
96%	13651	100 X (13651/13711)	99.56

Step 2. Arrange JEE (Main) score of all 11.5 lakhs Candidates in ascending order and find out Percentile for each score.

Table 3: Showing the JEE (Main) score of 11.5 lakhs Candidates and their corresponding Percentile (P).

JEE (Main) Score	No of candidates below candidate the with JEE (Main) Score	Percentile Calculation corresponding to JEE (Main)	Percentile (P)
10	26673	100 X (26673/1153667)	2.31
----- ----- -----	. . .	----- ----- -----	----- ----- -----
18	48381	100 X (48381/1153667)	4.19
----- ----- -----	. . .	----- ----- -----	----- ----- -----
20	65126	100 X (65126/1153667)	5.65
----- ----- -----	. . .	----- ----- -----	----- ----- -----
30	113507	100 X (113507/1153667)	9.84
----- ----- -----	. . .	----- ----- -----	----- ----- -----
35	230733	100 X (230733/1153667)	20.00
----- ----- -----	. . .	----- ----- -----	----- ----- -----
41	403785	100 X (403785/1153667)	35.00
----- ----- -----	. . .	----- ----- -----	----- ----- -----
43	557607	100 X (557607/1153667)	48.33
----- ----- -----	. . .	----- ----- -----	----- ----- -----
48	577633	100 X (577633/1153667)	50.07
----- ----- -----	. . .	----- ----- -----	----- ----- -----
80	1116897	100 X (1116897/1153667)	96.81
----- ----- -----	. . .	----- ----- -----	----- ----- -----
218	1143654	100 X (1143654/1153667)	99.13
----- ----- -----	. . .	----- ----- -----	----- ----- -----
343	1153007	100 X (1153007/1153667)	99.94

Step 3. Arrange JEE (Main) score of Candidates from Board ABCD only, in ascending order and find out the Percentile for each score.

Table 4: Showing the JEE (Main) score of Candidates from Board ABCD who satisfy the eligibility criteria of JEE (Main) and their corresponding Percentile (P).

JEE (Main) Score	No of candidates below candidate the with JEE (Main) Score	Percentile Calculation corresponding to JEE (Main)	Percentile (P)
4	31	$100 \times (31/13711)$	0.23
----- ----- -----	. . .	----- ----- -----	----- ----- -----
12	400	$100 \times (400/13711)$	2.92
----- ----- -----	. . .	----- ----- -----	----- ----- -----
15	812	$100 \times (812/13711)$	5.92
----- ----- -----	. . .	----- ----- -----	----- ----- -----
20	1350	$100 \times (1350/13711)$	9.85
----- ----- -----	. . .	----- ----- -----	----- ----- -----
60	6627	$100 \times (6627/13711)$	48.33
----- ----- -----	. . .	----- ----- -----	----- ----- -----
80	6865	$100 \times (6865/13711)$	50.07
----- ----- -----	. . .	----- ----- -----	----- ----- -----
100	12203	$100 \times (12203/13711)$	89.00
----- ----- -----	. . .	----- ----- -----	----- ----- -----
130	12322	$100 \times (12322/13711)$	89.87
----- ----- -----	. . .	----- ----- -----	----- ----- -----
150	13274	$100 \times (13274/13711)$	96.81
----- ----- -----	. . .	----- ----- -----	----- ----- -----
220	13592	$100 \times (13592/13711)$	99.13
----- ----- -----	. . .	----- ----- -----	----- ----- -----
338	13651	$100 \times (13651/13711)$	99.56

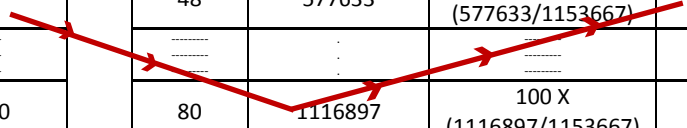
Step 4. 4.i Use Percentile (Pi), 50.07, calculated from step 1 (Table 2) and find out the same Percentile in the Percentile calculated in step 2 (Table 3).

Table 2 (Reproduced)

Board Percentage (B ₀)	No of candidates below candidate the with Board Percentage B ₀	Percentile Calculation corresponding to B ₀	Percentile (P)
5%	200	100 X (200/13711)	1.46
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
7%	317	100 X (317/13711)	2.31
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
12%	450	100 X (450/13711)	3.28
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-----	.	-----	-----
13%	575	100 X (575/13711)	4.19
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-----	.	-----	-----
21%	774	100 X (774/13711)	5.65
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-----	.	-----	-----
-----	.	-----	-----
29%	1349	100 X (1349/13711)	9.84
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-----	.	-----	-----
-----	.	-----	-----
58%	6627	100 X (6627/13711)	48.33
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-----	.	-----	-----
-----	.	-----	-----
60%	6865	100 X (6865/13711)	50.07
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
84%	12203	100 X (12203/13711)	89.00
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
85%	12322	100 X (12322/13711)	89.87
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
96%	13651	100 X (13651/13711)	99.56

Table 3 (Reproduced)

JEE (Main) Score	No of candidates below candidate the with JEE (Main) Score	Percentile Calculation corresponding to JEE (Main)	Percentile (P)
10	26673	100 X (26673/1153667)	2.31
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
18	48381	100 X (48381/1153667)	4.19
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
20	65126	100 X (65126/1153667)	5.65
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
30	113507	100 X (113507/1153667)	9.84
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
35	230733	100 X (230733/1153667)	20.00
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
41	403785	100 X (403785/1153667)	35.00
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
43	557607	100 X (557607/1153667)	48.33
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
48	577633	100 X (577633/1153667)	50.07
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
80	1116897	100 X (1116897/1153667)	96.81
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
218	1143654	100 X (1143654/1153667)	99.13
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
343	1153007	100 X (1153007/1153667)	99.94



4.ii Now, to find B1, find out JEE (Main) score, corresponding to the matched Percentile in 4.i above. This is B1.

Here, B1 = 48.

Table 2 (Reproduced)

Board Percentage (B0)	No of candidates below candidate the with Board Percentage B ₀	Percentile Calculation corresponding to B0	Percentile (P)
5%	200	100 X (200/13711)	1.46
-----	.	-----	-----
-----	.	-----	-----
7%	317	100 X (317/13711)	2.31
-----	.	-----	-----
-----	.	-----	-----
12%	450	100 X (450/13711)	3.28
-----	.	-----	-----
-----	.	-----	-----
13%	575	100 X (575/13711)	4.19
-----	.	-----	-----
-----	.	-----	-----
21%	774	100 X (774/13711)	5.65
-----	.	-----	-----
-----	.	-----	-----
29%	1349	100 X (1349/13711)	9.84
-----	.	-----	-----
-----	.	-----	-----
58%	6627	100 X (6627/13711)	48.33
-----	.	-----	-----
-----	.	-----	-----
60%	6865	100 X (6865/13711)	50.07
-----	.	-----	-----
-----	.	-----	-----
84%	12203	100 X (12203/13711)	89.00
-----	.	-----	-----
-----	.	-----	-----
85%	12322	100 X (12322/13711)	89.87
-----	.	-----	-----
-----	.	-----	-----
96%	13651	100 X (13651/13711)	99.56

Table 3 (Reproduced)

JEE (Main) Score	No of candidates below candidate the with JEE (Main) Score	Percentile Calculation corresponding to JEE (Main)	Percentile (P)
10	26673	100 X (26673/1153667)	2.31
-----	.	-----	-----
-----	.	-----	-----
18	48381	100 X (48381/1153667)	4.19
-----	.	-----	-----
-----	.	-----	-----
20	65126	100 X (65126/1153667)	5.65
-----	.	-----	-----
-----	.	-----	-----
30	113507	100 X (113507/1153667)	9.84
-----	.	-----	-----
-----	.	-----	-----
35	230733	100 X (230733/1153667)	20.00
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-----	.	-----	-----
41	403785	100 X (403785/1153667)	35.00
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-----	.	-----	-----
43	557607	100 X (557607/1153667)	48.33
-----	.	-----	-----
-----	.	-----	-----
48	577633	100 X (577633/1153667)	50.07
-----	.	-----	-----
-----	.	-----	-----
80	1116897	100 X (1116897/1153667)	96.81
-----	.	-----	-----
-----	.	-----	-----
218	1143654	100 X (1143654/1153667)	99.13
-----	.	-----	-----
-----	.	-----	-----
343	1153007	100 X (1153007/1153667)	99.94



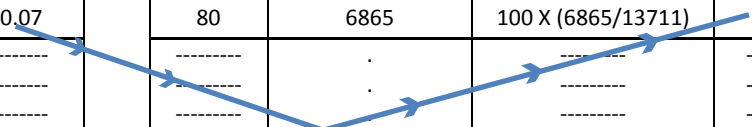
Step 5. 5.i Use Percentile (Pi), 50.07, calculated from step 1 (Table 2) and find out the same Percentile in the Percentile calculated in step 3 (Table 4).

Table 2 (Reproduced)

Board Percentage (B0)	No of candidates below candidate the with Board Percentage B ₀	Percentile Calculation corresponding to B0	Percentile (P)
7%	317	100 X (317/13711)	2.31
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
13%	575	100 X (575/13711)	4.19
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-----	.	-----	-----
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21%	774	100 X (774/13711)	5.65
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-----	.	-----	-----
29%	1349	100 X (1349/13711)	9.84
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-----	.	-----	-----
-----	.	-----	-----
58%	6627	100 X (6627/13711)	48.33
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-----	.	-----	-----
-----	.	-----	-----
60%	6865	100 X (6865/13711)	50.07
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-----	.	-----	-----
-----	.	-----	-----
84%	12203	100 X (12203/13711)	89.00
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-----	.	-----	-----
-----	.	-----	-----
85%	12322	100 X (12322/13711)	89.87
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-----	.	-----	-----
91%	13274	100 X (13274/13711)	96.81
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
94%	13592	100 X (13592/13711)	99.13
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
96%	13651	100 X (13651/13711)	99.56

Table 4 (Reproduced)

JEE Score	No of candidates below candidate the with JEE (Main) Score	Percentile Calculation corresponding to JEE (Main)	Percentile (P)
4	31	100 X (31/13711)	0.23
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
12	400	100 X (400/13711)	2.92
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15	812	100 X (812/13711)	5.92
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20	1350	100 X (1350/13711)	9.85
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-----	.	-----	-----
60	6627	100 X (6627/13711)	48.33
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-----	.	-----	-----
-----	.	-----	-----
80	6865	100 X (6865/13711)	50.07
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-----	.	-----	-----
-----	.	-----	-----
100	12203	100 X (12203/13711)	89.00
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-----	.	-----	-----
-----	.	-----	-----
130	12322	100 X (12322/13711)	89.87
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-----	.	-----	-----
150	13274	100 X (13274/13711)	96.81
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
220	13592	100 X (13592/13711)	99.13
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
338	13651	100 X (13651/13711)	99.56



5. ii Now, to find B2, find out JEE (Main) score, corresponding to the matched Percentile in 5.i. above. This is B2.

Here B2 = 80.

Table 2 (Reproduced)

Board Percentage (B0)	No of candidates below candidate the with Board Percentage B ₀	Percentile Calculation corresponding to B0	Percentile (P)
7%	317	100 X (317/13711)	2.31
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
13%	575	100 X (575/13711)	4.19
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-----	.	-----	-----
-----	.	-----	-----
21%	774	100 X (774/13711)	5.65
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-----	.	-----	-----
29%	1349	100 X (1349/13711)	9.84
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-----	.	-----	-----
58%	6627	100 X (6627/13711)	48.33
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-----	.	-----	-----
60%	6865	100 X (6865/13711)	50.07
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-----	.	-----	-----
84%	12203	100 X (12203/13711)	89.00
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-----	.	-----	-----
85%	12322	100 X (12322/13711)	89.87
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-----	.	-----	-----
91%	13274	100 X (13274/13711)	96.81
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-----	.	-----	-----
94%	13592	100 X (13592/13711)	99.13
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-----	.	-----	-----
96%	13651	100 X (13651/13711)	99.56

Table 4 (Reproduced)

JEE Score	No of candidates below candidate the with JEE (Main) Score	Percentile Calculation corresponding to JEE (Main)	Percentile (P)
4	31	100 X (31/13711)	0.23
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
12	400	100 X (400/13711)	2.92
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
15	812	100 X (812/13711)	5.92
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
20	1350	100 X (1350/13711)	9.85
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
60	6627	100 X (6627/13711)	48.33
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
80	6865	100 X (6865/13711)	50.07
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
100	12203	100 X (12203/13711)	89.00
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
130	12322	100 X (12322/13711)	89.87
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
150	13274	100 X (13274/13711)	96.81
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-----	.	-----	-----
-----	.	-----	-----
220	13592	100 X (13592/13711)	99.13
-----	.	-----	-----
-----	.	-----	-----
-----	.	-----	-----
338	13651	100 X (13651/13711)	99.56



Step 6. Normalised Board mark of the Candidate from Board ABCD who has scored 60% will be

$$B_{\text{final}} = 0.5 * (B1 + B2)$$

$$\Rightarrow B_{\text{final}} = 0.5 * (48+80)$$

$$\Rightarrow B_{\text{final}} = 0.5 * (128)$$

$$\Rightarrow B_{\text{final}} = 64$$