Interpreting Performance Data

Expected Outcomes

- Understand the terms mean, median, mode, standard deviation
- Use these terms to interpret performance data supplied by EAU

Measures of Central Tendency

- Mean … the average score
- Median … the value that lies in the middle after ranking all the scores
- Mode … the most frequently occurring score

Measures of Central Tendency

Which measure of Central Tendency should be used?

Measures of Central Tendency

The measure you choose should give you a good indication of the typical score in the sample or population.

Measures of Central Tendency

Mean … the most frequently used but is sensitive to extreme scores

e.g. 1 2 3 4 5 6 7 8 9 10

Mean = 5.5 (median = 5.5)

e.g. 1 2 3 4 5 6 7 8 9 20

Mean = 6.5 (median = 5.5)

e.g. 1 2 3 4 5 6 7 8 9 100

Mean = 14.5 (median = 5.5)

Measures of Central Tendency

Median

… is not sensitive to extreme scores

… use it when you are unable to use the mean because of extreme scores

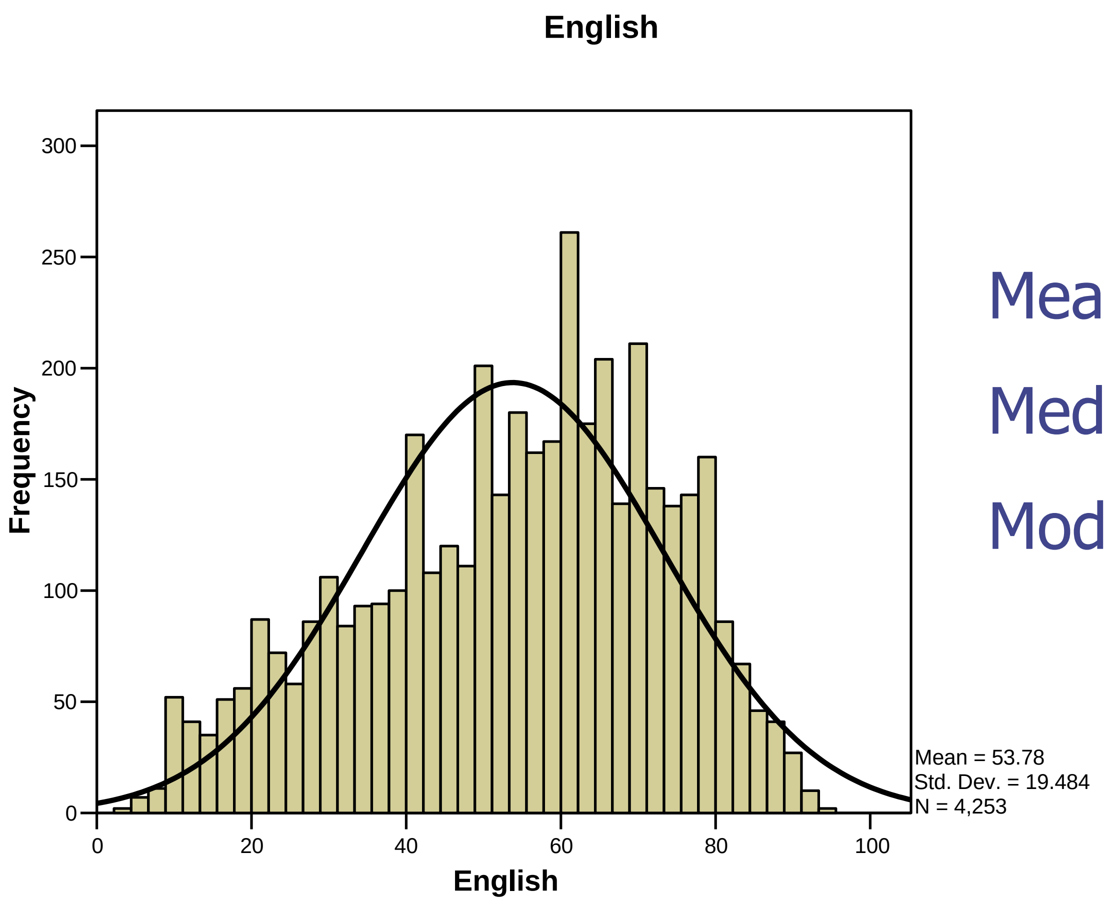
Measures of Central Tendency

Mode

… does not involve any calculation or ordering of data

… use it when you have categories (e.g. occupation)

A Distribution Curve



Mean: 54

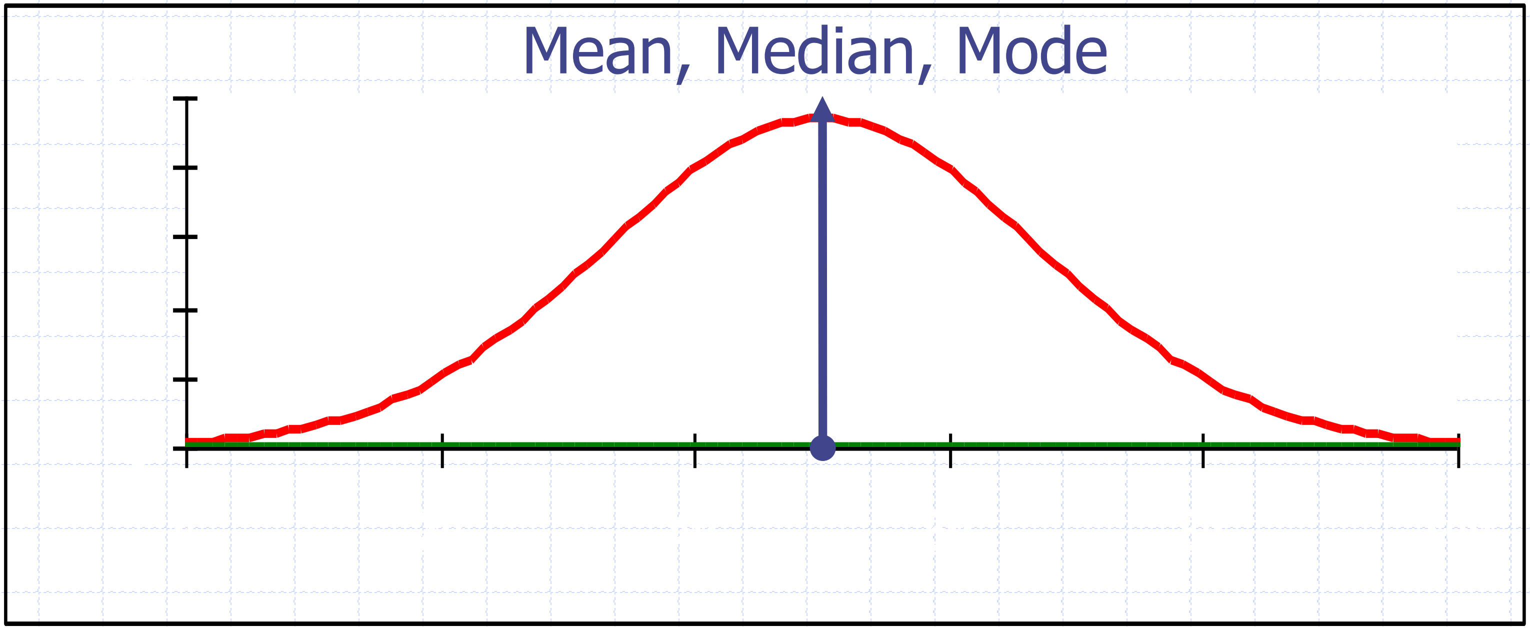
Median: 56

Mode: 63

The Normal Distribution Curve

In everyday life many variables such as height, weight, shoe size and exam marks all tend to be normally distributed, that is, they all tend to look like the following curve:

The Normal Distribution Curve



- It is bell-shaped and symmetrical about the mean
- The mean, median and mode are equal
- It is a function of the mean and the standard deviation

Variation or Spread of Distributions

Measures that indicate the spread of scores:

- Range
- Standard Deviation

Variation or Spread of Distributions

Range

- It compares the minimum score with the maximum score
- Max score – Min score = Range
- It is a crude indication of the spread of the scores because it does not tell us much about the shape of the distribution and how much the scores vary from the mean

Variation or Spread of Distributions

Standard Deviation

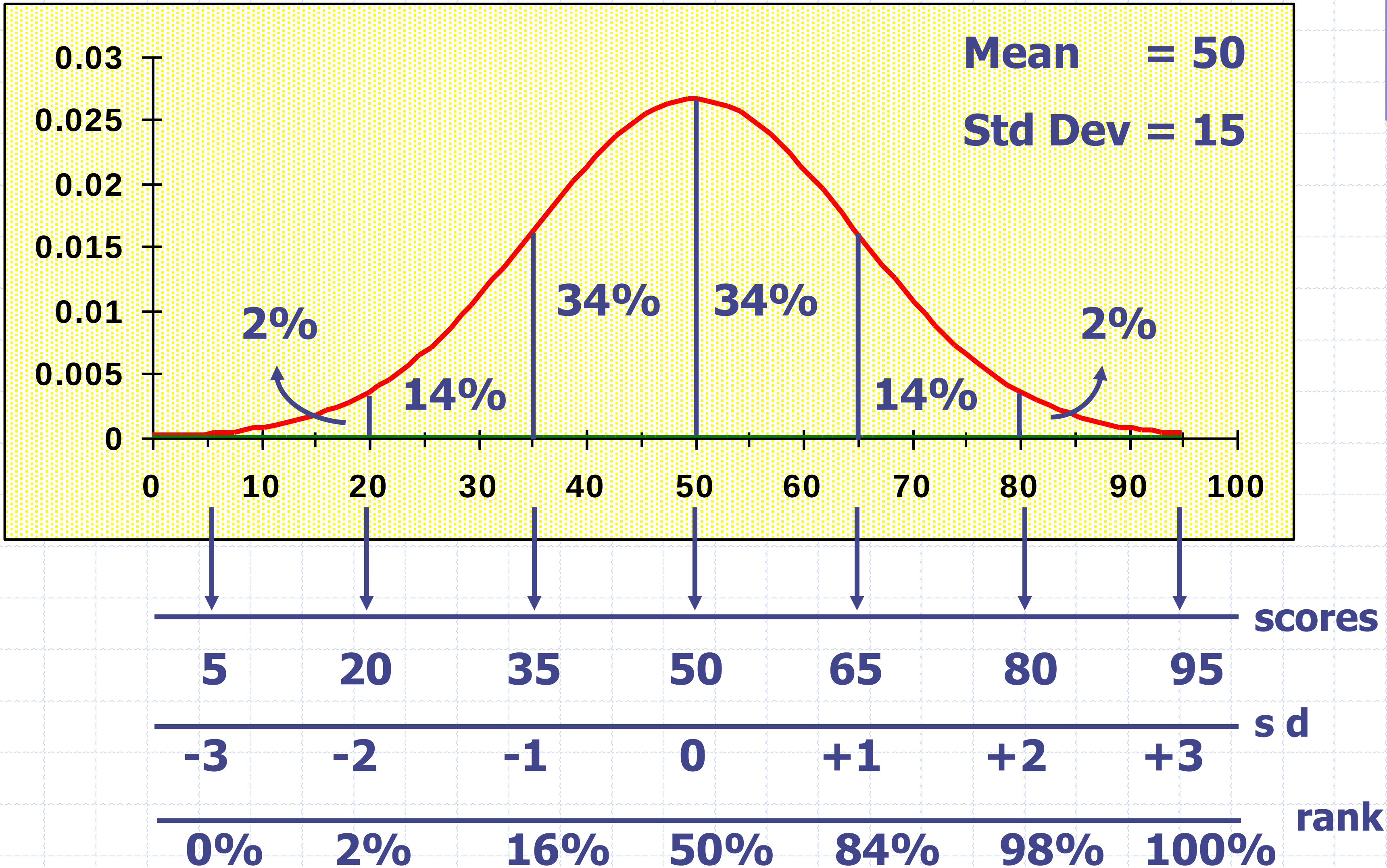
- It tells us what is happening between the minimum and maximum scores
- It tells us how much the scores in the data set vary around the mean
- It is useful when we need to compare groups using the same scale

Calculating a Mean and a Standard Deviation

	Data x	Deviation x - Mean	Absolute Deviation |x - Mean|	Squared Deviation $(x\text{-Mean})^2$
	10	-20	20	400
	20	-10	10	100
	30	0	0	0
	40	10	10	100
	50	20	20	400
Sums	150	0	60	1000
Means	30	0	12	200
				Variance

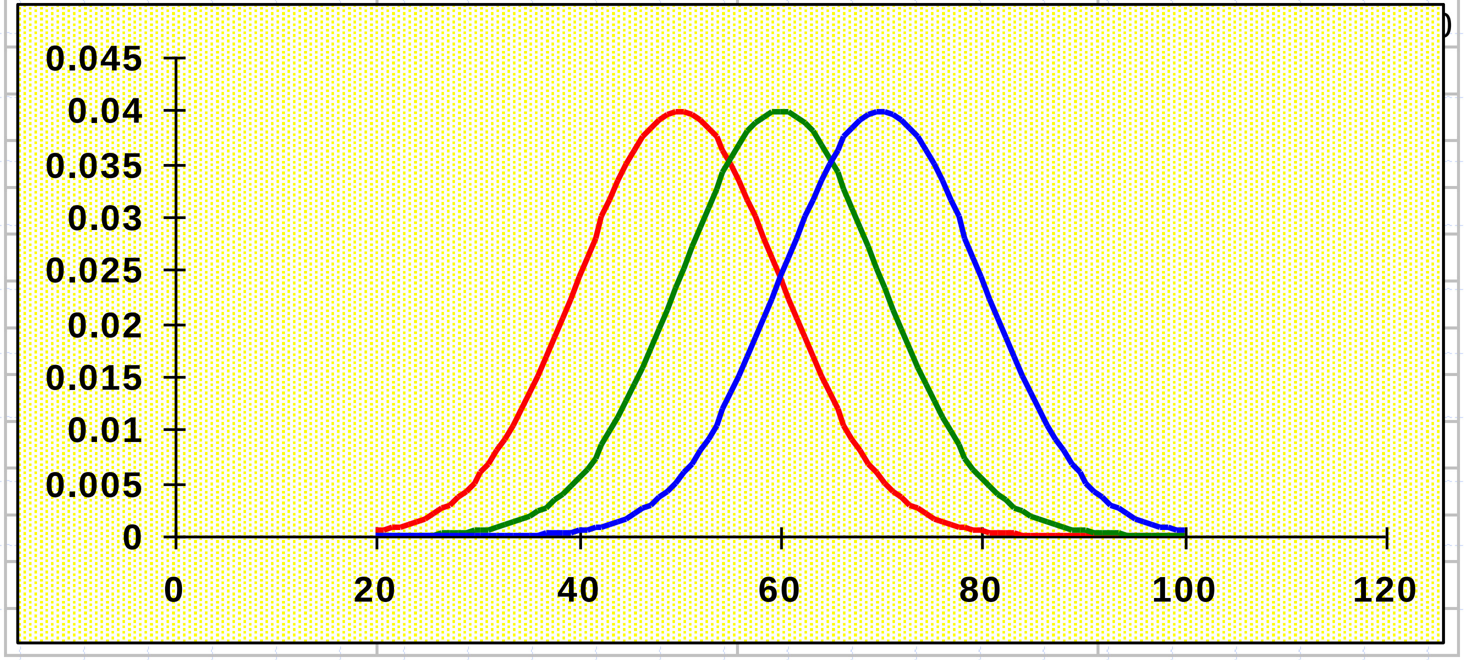
Standard deviation = $\sqrt{\text{Variance}}$ = 14.1421356

Interpreting Distributions



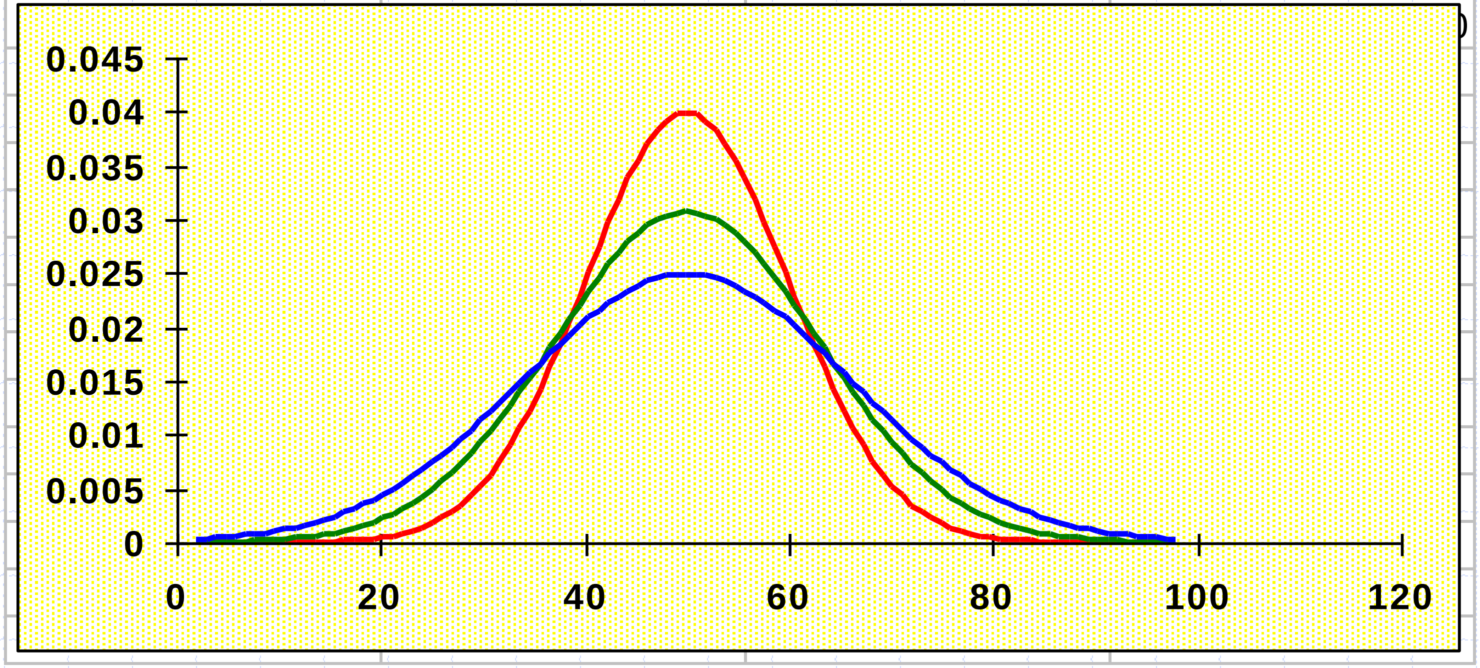
Interpreting Distributions

	School A	School B	School C
Mean	50	60	70
S.d.	10	10	10



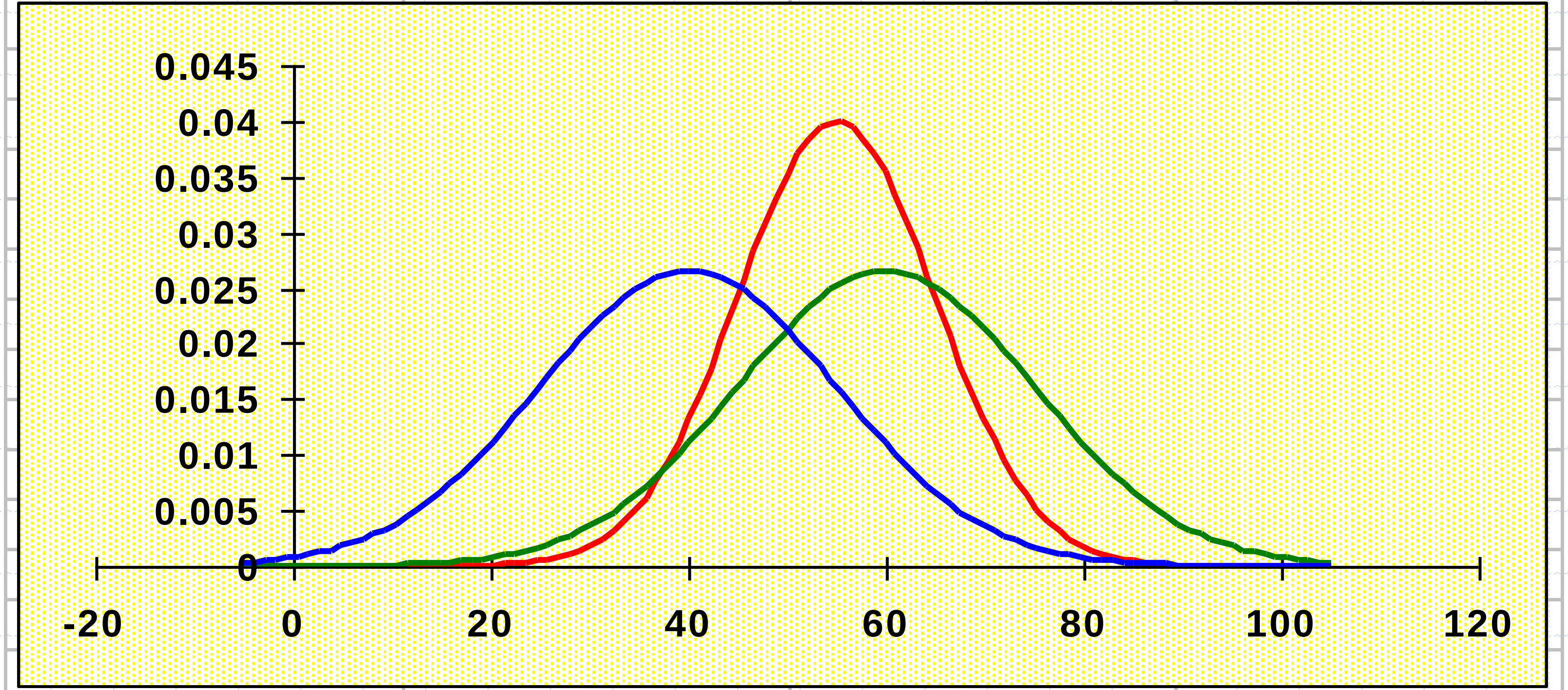
Interpreting Distributions

	School A	School B	School C
Mean	50	50	50
S.d.	10	13	16



Interpreting Distributions

	National Mean	School A	School B
Mean	55	60	40
S.d.	10	15	15



The Z-score

The z-score is a conversion of the raw score into a standard score based on the mean and the standard deviation.

$$\text{z-score} = \frac{\text{Raw score} - \text{Mean}}{\text{Standard Deviation}}$$

Example	z-score
Mean = 55	$\frac{65 - 55}{15}$
Standard Deviation = 15	
Raw Score = 65	= 0.67

Converting z-scores into Percentiles

- Use table provided to convert the z-score into a percentile:

z-score = 0.67

Percentile = 74.86% (from table provided)

Interpretation: 75% of the group scored below this score.

Comparing School Performance with National Performance

	National Mean	School A	School B
Mean	55	60	40
S.d.	10	15	15

Z-score for Mean of School A = (60 – 55)/10 = 0.2

A z-score of 0.2 is equivalent to a percentile of 57.93% on a national basis

Z-score for Mean of School B = (40 – 55)/10 = -1.5

A z-score of –1.5 is equivalent to a percentile of (100-93.32)%, that is, 6.68%!