

UNIT 5 (Core) STATISTICS AND TRANSFORMATIONS

Recommended Prior Knowledge

It is strongly recommended that candidates have a thorough understanding of Unit 1, Unit 3 and Unit 4.

Context

This unit revises and develops mathematical concepts in Statistics and establishes a deeper understanding of Transformations. Candidates should use calculators where appropriate.

Outline

The topics in this unit may be studied sequentially. There is some element of choice, however, and Centres may wish to teach topics in a different order, for example Statistics need not be studied first. Basic ideas of vectors are studied together with various transformations of the plane. Candidates are also introduced to simple statistical concepts and diagrams. With all sections it is expected that candidates will be set questions of varying difficulty to complete for themselves. The unit gives candidates the opportunity to work investigatively and thus establish the skills needed for the submission of coursework.

	Learning Outcomes	Suggested Teaching Activities	Resources
33	Collect, classify and tabulate statistical data; read, interpret and draw simple inferences from tables and statistical diagrams; construct and use bar charts, pie charts, pictograms, simple frequency distributions, histograms with equal intervals and scatter diagrams (including drawing a line of best fit by eye), understand what is meant by positive, negative and zero correlation; calculate the mean, median and mode for individual and discrete data and distinguish between the purposes for which they are used; calculate the range.	<p>Use simple examples to revise collecting data and presenting it in a frequency (tally) chart. For example, record the different makes of car in a car park, record the number of letters in each of the first 100 words in a book, etc. Use the data collected to construct a pictogram, a bar chart and a pie chart. Point out that the bars in a bar chart can be drawn apart.</p> <p>From data collected show how to work out the mean, the median and the mode. Use simple examples to highlight how these averages may be used. For example in a discussion about average wages the owner of a company with a few highly paid managers and a large work force may wish to quote the mean wage rather than the median. Point out how the mode can be recognised from a frequency diagram.</p> <p>Use a simple example to show how discrete data can be grouped into equal classes. Draw a histogram to illustrate the data (i.e. with a continuous scale along the horizontal axis). Point out that this information could also be displayed in a bar chart (i.e. with bars separated).</p> <p>Class activity: Investigate the length of words used in two different newspapers and present the findings using statistical diagrams.</p>	<p>Compare the median and the mean interactively at http://www.standards.nctm.org/document/eexamples/chap6/6.6/index.htm</p> <p>Download newspaper stories - worldwide coverage at http://www.newsparadise.com/</p>

<p>35</p>	<p>Describe a translation by using a vector represented by $\begin{pmatrix} x \\ y \end{pmatrix}$, \vec{AB} or \mathbf{a}; add and subtract vectors and multiply a vector by a scalar.</p>	<p>Use the concept of translation to explain a vector. Use simple diagrams to illustrate column vectors in two dimensions, explaining the significance of positive and negative numbers. Introduce the various forms of vector notation.</p> <p>Show how to add and subtract vectors algebraically and by making use of a vector triangle. Show how to multiply a column vector by a scalar and illustrate this with a diagram.</p>	<p>Interactive work on vector sums at http://www.standards.nctm.org/document/eexamples/chap7/7.1/art2.htm</p>
<p>37</p>	<p>Reflect simple plane figures in horizontal or vertical lines; rotate simple plane figures about the origin, vertices or mid points of edges of the figures, through multiples of 90°; construct given translations and enlargements of simple plane figures; recognise and describe reflections, rotations, translations and enlargements.</p>	<p>Draw an arrow shape on squared paper. Use this to illustrate: reflection in a line (mirror line), rotation about any point (centre of rotation) through multiples of 90° (in both clockwise and anti-clockwise directions) and translation by a vector. Several different examples of each translation should be drawn. Use the word image appropriately.</p> <p>Class activity: Using a pre-drawn shape on (x,y) coordinate axes to complete a number of transformations using the equations of lines to represent mirror lines and coordinates to represent centres of rotation.</p> <p>Work with (x,y) coordinate axes to show how to find: the equation of a simple mirror line given a shape and its (reflected) image, the centre and angle of rotation given a shape and its (rotated) image, the vector of a translation.</p> <p>Draw a triangle on squared paper. Use this to illustrate enlargement by a positive integer scale factor about any point (centre of enlargement). Show how to find the centre of enlargement given a shape and its (enlarged) image. Draw straightforward enlargements using negative and/or fractional ($\frac{1}{2}$) scale factors.</p>	<p>Try the investigation at http://nrich.maths.org/public/leg.php</p>

