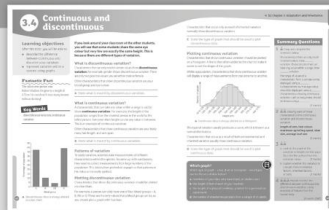


3.4 Continuous and discontinuous



Biology NC link:

- the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation.

Working Scientifically NC link:

- present observations and data using appropriate methods, including tables and graphs.

Band	Outcome	Checkpoint	
		Question	Activity
Developing	State that there are two types of variation (Level 3).	1, 2	Starter 2, Main, Plenary 1
	State the two types of graphs that can be drawn when representing the two types of variation (Level 4).	1	Maths, Main, Plenary 2
	Record results in a table and plot a graph on axes provided (Level 4).		Main
Secure	Describe the difference between continuous and discontinuous variation (Level 6).	A, B, 4	Starter 2, Main, Plenary 1
	Represent variation within a species using graphs (Level 6).	C, D, 1	Maths, Main, Plenary 2
	Record results in a table and plot a histogram (Level 6).		Main
Extending	Explain the causes of continuous and discontinuous variation (Level 7).	3, 4	Main, Plenary 1
	Represent variation within a species using the appropriate type of graph (Level 7).	C, D	Maths, Main, Plenary 2
	Record results in a table and identify and plot an appropriate graph (Level 7).		Main

Maths

Students suggest the appropriate type of graph to draw for different continuous and discontinuous variations in the student-book activity. Students will then display the results of the class experiment on arm span in an appropriate graph, and interpret results to answer questions relating to mode, mean, and range.

Literacy

Students use scientific terminology when describing the differences between continuous and discontinuous data, and when drawing conclusions from results of the class experiment to measure arm span.

APP

Students collect results using appropriate ranges (AF4), display data obtained appropriately in tables and graphs (AF3), and draw conclusions using their data (AF5).

Key Words

discontinuous variation, continuous variation

Answers from the student book

In-text questions	<p>A Characteristics that can only result in certain values.</p> <p>B Characteristics that can take any value within a range.</p> <p>C bar chart</p> <p>D histogram, often with a line added</p>
Activity	<p>Which graph?</p> <p>a bar chart</p> <p>b histogram</p> <p>c histogram</p> <p>d histogram</p>

Summary Questions

- discontinuous, continuous, graph, bar chart, histogram (5 marks)
- Continuous: length of arm, maximum sprinting speed, average leaf size. Discontinuous: hair colour, shoe size. (5 marks)
- Most people are of an average height, around 150 cm. Few people are very short, below 135 cm. Few people are very tall, above 170 cm. (3 marks)
 - Height is affected by both inherited and environmental factors. If your parents are tall, you are also likely to be tall (inherited). However, growth can be affected by environmental factors, for example, malnourishment. (3 marks)
- 6 mark question. Example answers: Continuous variation is variation that can take any value within a range. For example, height, body mass, arm span, hair length, or length of feet. Continuous data should be plotted on a histogram. A line is often added to the histogram to see the shape of the graph. This type of variation usually produces a curve known as a normal distribution. Discontinuous variation is variation that can only result in certain values. For example, gender, blood type, eye colour, or shoe size. Discontinuous variation should be plotted on a bar chart.



Starter	Support/Extension	Resources
<p>Types of variation (10 min) Ask students to look around them. List as many sources of variation as they can just by looking at their classmates. Students should suggest different ways they can categorise the variations listed, justifying their suggestions using examples. Feedback as a class discussion.</p> <p>Discontinuous or continuous (10 min) Introduce the difference between discontinuous and continuous variation using examples. Students will then apply their new-found knowledge to group variations given on the interactive resource into the correct category.</p>	<p>Support: Students concentrate on listing variations, not grouping them.</p> <p>Extension: Students should offer other variations to add to the existing list.</p>	<p>Interactive: Discontinuous or continuous</p>
Main	Support/Extension	Resources
<p>Investigating arm span (40 min) Formally introduce the difference between continuous and discontinuous variation. For students struggling to grasp this idea, parallels can be drawn to continuous and discrete data (which they have met in the Working Scientifically unit in Book 1 as well as in Maths lessons). Demonstrate how to measure arm span before issuing the practical sheet. Split the class into groups of five or six for students to measure the arm spans of students within their own group. Collate results at the front of the class. Students then plot a suitable graph to show the class results for arm span and answer the questions that follow.</p>	<p>Support: A labelled graph grid is available for students in the accompanying support sheet.</p>	<p>Practical: Investigating arm span</p> <p>Skill sheet: Drawing graphs</p> <p>Skill sheet: Recording results</p> <p>Skill sheet: Calculating range</p>
Plenary	Support/Extension	Resources
<p>Causes of discontinuous or continuous variation (5 min) Ask the class to work in pairs to list eight ways humans vary. Students should categorise these variations into continuous and discontinuous variations, and suggest possible causes for these (inherited, environmental, or both).</p> <p>Which type of graph? (5 min) Call out different types of continuous (e.g., hair length) and discontinuous variations (e.g., tongue-rolling), for students to decide on the correct type of variation using a mini-whiteboard. Students should also suggest the type of graph needed to display the results.</p>	<p>Extension: Students should spot trends in their results, for example, that most inherited variations are discontinuous.</p> <p>Extension: Students should justify their choice of graph and draw a sketch-graph for one of the variations mentioned.</p>	
Homework	Support/Extension	Resources
<p>During the lesson draw a tally chart on the board with a list for eye colour. Students should add their eye colour to the tally during the course of the lesson, copy the tally at the end of the lesson, and prepare a suitable graph to display results for homework.</p>	<p>Extension: Students should state the type of variation this is, and describe possible trends shown by the graph.</p>	