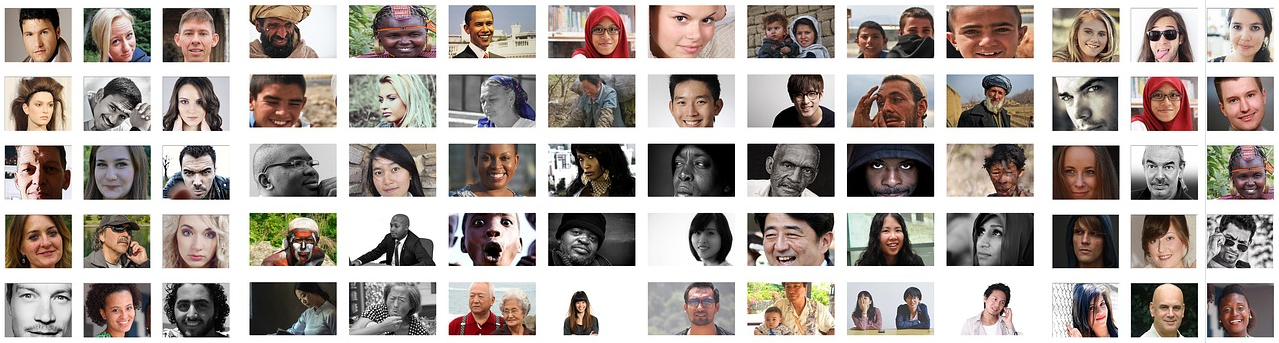
**Continuous and discontinuous variation**

There is variation between members of the same species.



Complete the sentences in the box.

You can only use the words **continuous** and **discontinuous** to fill the gaps.

|  |
| --- |
| A characteristic that shows ………………………………… variation can only have particular values with no  in-betweens.  A characteristic that shows ………………………………… variation can have any value within a range.  Height is an example of a characteristic in humans that shows ………………………………… variation.  Eye colour is an example of a characteristic in humans that shows ………………………………… variation.  Measurements of ………………………………… variation can be plotted using a bar chart.  Measurements of ………………………………… variation can be plotted using a histogram.  Characteristics that are caused by the genome and are **not** affected by the environment usually  show ………………………………… variation. |

*Biology> Big idea BVE: Variation, adaptation and evolution > Topic BVE1: Variation > Key concept BVE1.1: Differences within species*

|  |
| --- |
| **Diagnostic question** |
| **Continuous and discontinuous variation** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | There is variation between individuals of the same species, caused by differences in the genomes, lifestyles and environments of the individuals. |
| Observable learning outcome: | Distinguish between continuous and discontinuous variation. |
| Question type: | Focused cloze |
| Key words: | variation, genome |

**What does the research say?**

Various researchers have described common misunderstandings about variation and its causes, which can persist in students up to undergraduate level, including that variation is only caused by environmental factors; students are much less likely to suggest sexual reproduction, inheritance or differences in the genome as causes of variation, even when given a scenario in which environmental conditions are said to remain constant (Deadman and Kelly, 1978; Hackling and Treagust, 1982; Gott et al., 1985).

**Ways to use this question**

Students should complete the sentences individually. This could be a pencil and paper exercise, or you could use the PowerPoint presentation with an electronic voting system or mini white boards.

Make it clear to students that they can only use the words **continuous** and **discontinuous** to fill the gaps.

*Differentiation*

You may choose to read the sentences to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

**Expected answers**

A characteristic that shows **discontinuous** variation can only have particular values with no in-betweens.

A characteristic that shows **continuous** variation can have any value within a range.

Height is an example of a characteristic in humans that shows **continuous** variation.

Eye colour is an example of a characteristic in humans that shows **discontinuous** variation.

Measurements of **discontinuous** variation can be plotted using a bar chart.

Measurements of **continuous** variation can be plotted using a histogram.

Characteristics that are caused by the genome and are not affected by the environment usually show **discontinuous** variation.

**How to respond - what next?**

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs. Responses often work best when the activities involve paired or small group discussions, which encourage social construction of new ideas (meaning making) through dialogue.

If students have misunderstandings about the differences between continuous and discontinuous variation, the following BEST ‘response activity’ enables students to explore the differences by measuring and plotting examples of variation graphically. It could be used in follow-up to this diagnostic question to help build understanding:

* Response activity: Measuring variation

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

Images: pixabay.com/geralt (2944065)

**References**

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Hackling, M. W. and Treagust, D. F. (1982). What lower secondary students should understand about the mechanisms of inheritance, and what they do understand following instruction. *Research in Science Education,* 12**,** 78-88.