**Like mother like daughter**

**Part 1**

Amy is good at playing the violin.



Amy’s mother is also good at playing the violin.

Which statement is true?

|  |  |
| --- | --- |
| **A** | Amy can play the violin because it runs in the family. |
| **B** | Amy inherited her ability to play the violin from her mother. |
| **C** | Playing the violin is a skill that has to be learnt, not inherited. |
| **D** | It was in Amy’s nature to play the violin. |

**Like mother like daughter**

**Part 2**

Amy goes jogging every morning. She has big strong muscles in her legs.



Will Amy’s children inherit big strong leg muscles?

|  |  |
| --- | --- |
| **A** | No, because big strong muscles are caused by your lifestyle and cannot be inherited. |
| **B** | Possibly, because Amy’s children will inherit some of her features. |
| **C** | Yes, because Amy’s children will inherit her features. |
| **D** | Yes, because Amy’s children will inherit genetic information from her genome. |

*Biology> Big idea BHL: Heredity and life cycles > Topic BHL1: Inheritance and the genome > Key concept BHL1.1: Heredity and genetic information*

|  |
| --- |
| **Diagnostic question** |
| **Like mother like daughter** |

**Overview**

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| --- | --- |
| Learning focus: | Similarities and differences between family members can be explained by the passing of genetic information from one generation to the next and the effects of the interaction of organisms with their environment. |
| Observable learning outcome: | Use the idea that some characteristics cannot be inherited because they are caused by the environment or have to be learnt. |
| Question type: | Simple multiple choice |
| Key words: | heredity, reproduction |

**What does the research say?**

Research reported by a number of authors (Driver et al., 1994; Williams, 2012; Cisterna, Williams and Merritt, 2013; Allen, 2014) suggests that children up to age 11 have numerous misunderstandings about family resemblance and how characteristics are passed from one generation to the next, including that acquired characteristics (resulting from interaction with the environment or from learning) can be passed from parents to offspring.

An organism’s characteristics are not only affected by multiple regions of the genome but by the organism’s lifestyle and environment as well. Research indicates that most students at secondary school level think of genes as the only determinants of an organism’s characteristics – a conception dubbed ‘genetic determinism’ (Jamieson and Radick, 2017).

**Ways to use this question**

Students should complete the questions 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.

The answers to the questions will show you whether students understand that some characteristics cannot be inherited because they are caused by the environment or have to be learnt.

*Differentiation*

You may choose to read the questions 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**

1. C - Playing the violin is a skill that has to be learnt, not inherited.
2. A - No, because big strong muscles are caused by your lifestyle and cannot be inherited.

**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 through dialogue.

Researchers have used formative assessments coupled with constructivist approaches that enable students to build their own explanations of heredity, which may help to develop students’ understanding and overcome misconceptions, including the use of group discussions (e.g. Chin and Teou, 2010). If students have misunderstandings about inherited ad acquired characteristics, the following BEST ‘response activity’ describes a group discussion activity that could be used in follow-up to this diagnostic question:

* Response activity: Can it be inherited?

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