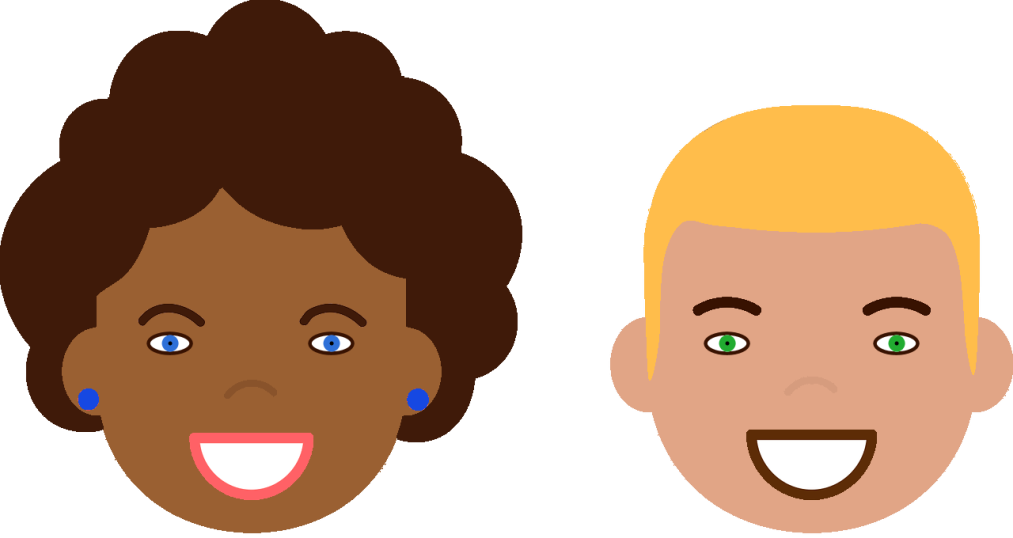
**Baby’s eyes**

Flo has blue eyes. Her husband Joe has green eyes.



|  |  |
| --- | --- |
| Flo | Joe |

Flo wants their baby to have blue eyes.

Look at the statements in the table. Some are right and some are wrong.

Tick **one** box for each statement.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Statements** | | I am **sure** this is right | I **think** this is right | I **think** this is wrong | I am **sure** this is wrong |
| **1** | Flo can have a baby with blue eyes if she decides to. |  |  |  |  |
| **2** | The baby’s eye colour will depend on genetic information it gets from its parents. |  |  |  |  |
| **3** | The baby’s eye colour will depend on its genome. |  |  |  |  |
| **4** | The baby will inherit half of its genome from each parent. |  |  |  |  |
| **5** | The baby’s eyes could be blue or green. |  |  |  |  |

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

|  |
| --- |
| **Diagnostic question** |
| **Baby’s eyes** |

**Overview**

|  |  |
| --- | --- |
| 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: | Explain that biological characteristics are inherited when genetic information stored in the genome of each parent is passed to offspring. |
| Question type: | Confidence grid |
| Key words: | heredity, reproduction, genome |

**What does the research say?**

Research reported by a number of authors (Driver et al., 1994; Schroeder et al., 2007; Williams, 2012; Allen, 2014; Ergazaki et al., 2015) 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:

* all characteristics are inherited from an organism’s mother – perhaps because the mother carries the child and gives birth;
* girls inherit most or all of their characteristics from their mother, and boys from their father;
* the intentions or desires of the parents can influence the characteristics of their offspring.

Children can struggle to explain inheritance because of the need to link together understanding at various interacting levels, including the visible trait/phenotype level (e.g. eye colour), the metaphorical information level (e.g. the ‘genetic information’ that affects eye colour), and the microscopic/molecular structural level (e.g. regions of the genome in which information that affects eye colour is encoded) (Lewis and Kattmann, 2004; Duncan and Reiser, 2007).

Several studies have suggested introducing explanations of heredity to children using, initially, a very simplified idea of genetic material to serve as a ‘conceptual placeholder’ or ‘conceptual peg’. This can help children to “hold in place” a rudimentary scientific explanation upon which more detailed explanations of what is inherited and how can be built later (Solomon and Johnson, 2000; Ergazaki et al., 2015). The concept of “the genome” can usefully be used as such a conceptual placeholder, and is a pro-genomic idea (unlike the more restrictive “genes”) that will help prepare children to learn about the structure and function of the genome later (Airey, Moore and Bennett, 2018).

**Ways to use this question**

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

*Differentiation*

You may choose to read the statements 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. Flo can have a baby with blue eyes if she decides to – **wrong**
2. The baby’s eye colour will depend on genetic information it gets from its parents – **right**
3. The baby’s eye colour will depend on its genome – **right**
4. The baby will inherit half of its genome from each parent – **right**
5. The baby’s eyes could be blue or green – **right**

**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 drawing and group discussions (e.g. Lewis and Kattmann, 2004; Chin and Teou, 2010). If students struggle to explain parents-offspring resemblance in terms of what is inherited, the following BEST ‘response activity’ describes a group discussion and drawing activity that could be used in follow-up to this diagnostic question:

* Response activity: Inheriting the genome

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Images: pixabay.com/monique\_hernandez (1765192)

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