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# UNIT 3 HEREDITY

## SCHEME OF WORK

**Suggested time frame:** 7 periods (1 period is approximately 40 minutes.)

Lesson	No. of Periods	Learning Objective(s)	Process Skill(s)	Vocabulary	Resource(s) and Material(s)
1	3	<ul style="list-style-type: none"> <li>Observe that living things resemble their parents.</li> <li>Identify characteristics that are passed on from parents to their offspring in humans, animals and plants.</li> </ul>	<ul style="list-style-type: none"> <li>Analysing</li> <li>Classifying</li> <li>Communicating</li> <li>Comparing</li> <li>Inferring</li> <li>Observing</li> </ul>	<ul style="list-style-type: none"> <li>Characteristic</li> <li>Heredity</li> <li>Inherit</li> <li>Observable</li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, pp. 32–34</li> <li><b>Activity Book</b>, pp. 27–30</li> <li>Photographs of pupils and their parents</li> <li>Internet</li> <li>Stamp pads</li> </ul> <p>Optional:</p> <ul style="list-style-type: none"> <li>Clear plastic cups, water, red food colouring, blue food colouring, markers, papers</li> </ul>
2	4	<ul style="list-style-type: none"> <li>Understand that characteristics of a living thing resulting from the interactions with the environment cannot be passed on to the offspring.</li> <li>Understand that sexually produced offspring are never identical to either of their parents because the offspring receives genetic information from both parents during sexual reproduction.</li> </ul>	<ul style="list-style-type: none"> <li>Analysing</li> <li>Communicating</li> <li>Comparing</li> <li>Evaluating</li> <li>Inferring</li> <li>Observing</li> </ul>	<ul style="list-style-type: none"> <li>Genetic information</li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, pp. 35–39</li> <li><b>Activity Book</b>, pp. 31–36</li> <li>Pupils' lists of favourite food, favourite colour, hobby and fitness level of themselves and their parents</li> <li>Pens, sheets of white paper, stamp pads, magnifying glasses</li> </ul> <p>Optional:</p> <ul style="list-style-type: none"> <li>Internet</li> </ul>

**Note:** This unit is supported by PowerPoint Slides and an online Question Bank, which can be found at: [www.MCEduHub.com](http://www.MCEduHub.com)

## 3.1 Why Do Living Things Resemble Their Parents?

### 3.2 What Characteristics Are Passed on From Parents to Their Young?

#### Lesson 1

Duration of lesson: 3 periods

#### Learning objectives

- Observe that living things resemble their parents.
- Identify characteristics that are passed on from parents to their offspring in humans, animals and plants.

#### Process skills

- Analysing, classifying, communicating, comparing, inferring, observing

#### Vocabulary

- Characteristic, heredity, inherit, observable

SE	Lesson	Resource(s) and Material(s)
<b>Engage</b> (30 min)	<p><i>(Process skills: Observing, comparing, communicating)</i></p> <p>Note: Tell pupils to bring a photograph of themselves and their parents before the lesson.</p> <ul style="list-style-type: none"> <li>• Tell pupils to look at the photographs of themselves and their parents.</li> <li>• Get pupils to use Explore on Textbook p. 32 to compare themselves to their parents.</li> <li>• Ask pupils the following questions:               <ul style="list-style-type: none"> <li>➢ In what ways do you resemble your parents?</li> <li>➢ Who do you resemble more?</li> </ul> </li> <li>• Get pupils to share their findings with their classmates.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Textbook</b>, Explore, p. 32</li> <li>• Photographs of pupils and their parents</li> </ul>
<b>Explore</b> (50 min)	<p><i>(Process skills: Observing, communicating, classifying)</i></p> <ul style="list-style-type: none"> <li>• Tell pupils to look at the photographs of themselves and their parents again.</li> <li>• Get pupils to observe whether they and their parents have attached earlobes or detached earlobes.</li> <li>• Tell pupils that one characteristic that can be passed on from our parents to us is the type of earlobe.</li> <li>• Get pupils to carry out Activity 1 on Activity Book pp. 27–28.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Activity Book</b>, Activity 1, pp. 27–28</li> <li>• Photographs of pupils and their parents from “Engage”</li> </ul>
<b>Explain</b> (20 min)	<p><i>(Process skills: Inferring, comparing, communicating)</i></p> <ul style="list-style-type: none"> <li>• Guide pupils to conclude from the activities above that we look like or resemble our parents.</li> <li>• Use Textbook p. 32 to explain why living things resemble their parents.</li> <li>• Ask pupils the following questions:               <ul style="list-style-type: none"> <li>➢ What are some characteristics that we can inherit from our parents?</li> <li>➢ What are some characteristics that animals and plants can inherit from their parents?</li> </ul> </li> <li>• Go through the examples of inherited characteristics in humans, animals and plants on Textbook pp. 33–34 with pupils.</li> <li>• Point out that there are some inherited characteristics that are not easily observed, such as blood type.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Textbook</b>, pp. 32–34</li> </ul>

SE	Lesson	Resource(s) and Material(s)																									
<b>Elaborate</b>  (10 min)	<i>(Process skills: Communicating, classifying, comparing, analysing)</i> <ul style="list-style-type: none"> <li>Divide pupils into groups of four or five.</li> <li>Ask pupils the following questions:               <ul style="list-style-type: none"> <li>What is your blood type?</li> <li>Why is it important to know your blood type?</li> </ul> </li> <li>Get pupils to use Research on Textbook p. 33 to find out. Pupils may look up the information at: <a href="https://www.redcrossblood.org/donate-blood/blood-types.html">https://www.redcrossblood.org/donate-blood/blood-types.html</a></li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, Research, p. 33</li> <li>Internet</li> </ul>																									
<b>Evaluate</b>  (10 min)	<i>(Process skills: Observing, comparing, communicating)</i> Note: Get pupils to complete steps 3 and 4 of Activity 2 on Activity Book p. 30 before the lesson. <ul style="list-style-type: none"> <li>Get pupils to answer the question in Quick Check on Textbook p. 34.</li> <li>Get pupils to complete Activity 2 on Activity Book pp. 29–30.</li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, Quick Check, p. 34</li> <li><b>Activity Book</b>, Activity 2, pp. 29–30</li> <li>Stamp pads</li> </ul>																									
<b>Additional Activity</b>	<i>(Process skills: Observing, analysing, inferring)</i> Note: Prepare sets of four cups before the lesson. Do the following for each set of four cups: <ol style="list-style-type: none"> <li>Fill two-thirds of each cup with water.</li> <li>Leave one of the cups with plain water.</li> <li>For the remaining cups, add red colouring into one cup, blue colouring into another cup, and both red and blue colouring in the last cup.</li> <li>Label the cups accordingly.</li> </ol> <ul style="list-style-type: none"> <li>Tell pupils that they are going to perform mock blood transfusion.</li> <li>Divide pupils into groups of four or five.</li> <li>Give each group a set of four cups filled with four different types of water and four empty cups.</li> <li>Get pupils to carry out the following activity:               <ul style="list-style-type: none"> <li>Draw a table with the headings as shown.</li> </ul> </li> </ul> <table border="1" style="margin: 10px auto;"> <thead> <tr> <th></th> <th>Red-coloured water</th> <th>Blue-coloured water</th> <th>Purple-coloured water</th> <th>Clear water</th> </tr> </thead> <tbody> <tr> <th>Red-coloured water</th> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>Blue-coloured water</th> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>Purple-coloured water</th> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>Clear water</th> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>Pour a small amount of red-coloured water into four empty cups. (These will represent the receivers' cups.)</li> <li>Add a small amount of red-coloured water, blue-coloured water, purple-coloured water and clear water separately into the four cups.</li> <li>Observe any colour changes and record the observations in the table.</li> <li>Rinse the cups and repeat the steps above for blue-coloured water, purple-coloured water and clear water.</li> </ul>		Red-coloured water	Blue-coloured water	Purple-coloured water	Clear water	Red-coloured water					Blue-coloured water					Purple-coloured water					Clear water					<ul style="list-style-type: none"> <li>Clear plastic cups, water, red food colouring, blue food colouring, markers, papers</li> </ul>
	Red-coloured water	Blue-coloured water	Purple-coloured water	Clear water																							
Red-coloured water																											
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### 3.3 What Characteristics Are Not Passed on From Parents to Their Young?

### 3.4 Why Are Living Things Not Identical to Their Parents?

## Lesson 2

Duration of lesson: 4 periods

### Learning objectives

- Understand that characteristics of a living thing resulting from the interactions with the environment cannot be passed on to the offspring.
- Understand that sexually produced offspring are never identical to either of their parents because the offspring receives genetic information from both parents during sexual reproduction.

### Process skills

- Analysing, communicating, comparing, evaluating, inferring, observing

### Vocabulary

- Genetic information

5E	Lesson	Resource(s) and Material(s)
<b>Engage</b> (20 min)	<p>(Process skills: Comparing, analysing, evaluating) Note: Get pupils to list down their and their parents' favourite food, favourite colour, hobby and fitness level (e.g. how often they and their parents exercise) separately before the lesson.</p> <ul style="list-style-type: none"><li>• Get pupils to compare the characteristics of themselves and their parents which they have listed down.</li><li>• Get pupils to discuss whether each of the characteristics listed can be inherited from our parents.</li></ul>	<ul style="list-style-type: none"><li>• Pupils' lists of favourite food, favourite colour, hobby and fitness level of themselves and their parents</li></ul>
<b>Explore</b> (40 min)	<p>(Process skills: Observing, comparing, inferring, communicating) Note: Tell pupils to record the fingerprints of their parents on white paper before the lesson.</p> <ul style="list-style-type: none"><li>• Divide pupils into groups of four or five.</li><li>• Get pupils to trace their hands on white paper.</li><li>• Tell pupils to gently press each finger on a stamp pad and make a print of each finger on their traced hands.</li><li>• Get pupils to observe how similar and different their fingerprints are. (Pupils may use a magnifying glass to do so.)</li><li>• Get pupils to compare their fingerprints with the fingerprints of their parents and their group members.</li></ul>	<ul style="list-style-type: none"><li>• Pens, sheets of white paper, stamp pads, magnifying glasses</li></ul>

5E	Lesson	Resource(s) and Material(s)
<b>Explain</b> (20 min)	<p>(Process skill: <i>Inferring</i>)</p> <ul style="list-style-type: none"> <li>Ask pupils the following questions:               <ul style="list-style-type: none"> <li>What are some characteristics that we do not inherit from our parents?</li> <li>Why are living things not identical to their parents?</li> </ul> </li> <li>Explain to pupils that we do not inherit characteristics such as likes and dislikes, learned behaviours, changes in physical features, and abilities or skills from our parents.</li> <li>Use Textbook p. 35 to explain further.</li> <li>Use Textbook p. 36 to explain why the young of living things resemble their parents, but are never identical to them.</li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, pp. 35–36</li> </ul>
<b>Elaborate</b> (40 min)	<p>(Process skills: <i>Observing, analysing, communicating</i>)</p> <ul style="list-style-type: none"> <li>Get pupils look at the picture on Textbook p. 31 to discuss in what ways the boy resembles his parents.</li> <li>Ask pupils the following question:               <ul style="list-style-type: none"> <li>Why is the boy similar but not identical to his parents?                   <ul style="list-style-type: none"> <li>This is because the boy carries a combination of genetic information from both parents.</li> </ul> </li> </ul> </li> <li>Get pupils to look at the diagram of a family tree in Activity 3 on Activity Book p. 31.</li> <li>Tell pupils that a family tree is a diagram showing the relationships among the members of a family.</li> <li>Guide pupils through the family tree in Activity 3 on Activity Book p. 31.</li> <li>Get pupils to complete Activity 3 on Activity Book pp. 31–32.</li> <li>Ask pupils the following question:               <ul style="list-style-type: none"> <li>How is a family tree important?                   <ul style="list-style-type: none"> <li>Certain medical conditions can be inherited. The doctor can use the family tree to trace a certain medical condition in a family and predict those at risk of developing the medical condition.</li> </ul> </li> </ul> </li> <li>Get pupils to use Science Today on Textbook p. 40 to find out how characteristics such as fingerprints are used in biometric identification.</li> <li>Get pupils to discuss some other uses of biometrics.</li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, p. 31 and Science Today, p. 40</li> <li><b>Activity Book</b>, Activity 3, pp. 31–32</li> </ul>
<b>Evaluate</b> (40 min)	<p>(Process skills: <i>Analysing, comparing, evaluating, inferring, observing</i>)</p> <ul style="list-style-type: none"> <li>Get pupils to answer the questions in Quick Check on Textbook p. 35 and p. 36.</li> <li>Go through What We Have Learnt on Textbook p. 37 and Science Glossary on Textbook p. 39 to recall the concepts and vocabulary learnt in this unit.</li> <li>Get pupils to complete Test Yourself on Textbook p. 38.</li> <li>Get pupils to complete Let's Review on Activity Book pp. 33–36.</li> </ul>	<ul style="list-style-type: none"> <li><b>Textbook</b>, pp. 35–39</li> <li><b>Activity Book</b>, Let's Review, pp. 33–36</li> </ul>
<b>Reinforcement for Struggling Learners</b>	<p>(Process skill: <i>Communicating</i>)</p> <ul style="list-style-type: none"> <li>Get pupils to share with a classmate an inherited characteristic and a non-inherited characteristic that they have.</li> </ul>	