

Animals Including Humans Scientific Knowledge

Introduction

As part of the new framework, OFSTED inspectors will evaluate the extent to which “Teachers have a good knowledge of the subject(s) and courses they teach”. This guidance has been provided to help you develop a broader knowledge of the concepts in this area of science and not just of the content taught in year 2. This will help you to anticipate and answer questions the children may pose. Alongside this, we have also provided some examples of the possible misconceptions you may find the children have.

Lesson	Scientific Knowledge	Possible Child Misconceptions
Lesson 1 Animal Offspring	<p>Animals that are viviparous give birth to live young. This is very common in mammals but also in other groups.</p> <p>Oviparous animals produce eggs that develop and hatch outside of the body. Examples include birds.</p> <p>Ovoviviparous animals produce eggs that hatch within the body. Examples include some fish and certain reptiles.</p> <p>Patterns within groups:</p> <p>Birds All birds lay eggs.</p> <p>Amphibians Most amphibians lay eggs but there are a few that do not in this group. For example, many caecilians (a wormlike and limbless amphibian) give birth to live young.</p> <p>Mammals All mammals give birth to live young with the exception of monotremes (which includes the duck-billed platypus and echidnas) who lay eggs.</p> <p>Fish Most fish lay eggs but some do give birth to live young. For example, different species of shark can be oviparous, ovoviviparous or viviparous. The hammerhead example given in this lesson is viviparous.</p> <p>Reptiles Most reptiles lay eggs but some, such as some lizards and snakes, give birth to live young.</p>	<p>Animals quite often either do not seem to fit into their group or do not follow the patterns generally seen in their group. For example, dolphins and whales seem like fish but are actually mammals.</p> <p>Throughout the lessons and eBook these irregularities are addressed (look out for the ‘Be Careful!’ slides in some Lesson Presentations throughout the unit).</p> <p>Children should be encouraged to spot patterns within the different animal groups but should also be aware that biology doesn’t always follow these patterns and there are often exceptions.</p> <p>In this lesson, children sort animals into those offspring that do look like their adult when they are born and those that do not. Children may have the misconception that because an animal’s young is a different colour or size, they do look different to their adult. However, when looking closely they should see that they do look similar to the adult. The aim of this activity is to identify the young that look drastically different to their adults (such as tadpoles) and to form the basis for understanding processes such as metamorphosis.</p>

Lesson 2 Life Cycles

This lesson examines how animal offspring grow into adults through the use of life cycle diagrams.

Metamorphosis describes the process in which there are major changes in the form or structure between the young and adult forms of an animal.

Metamorphosis is commonly found in the insect and amphibian groups but is also seen in some fish. Common examples of animals that undergo metamorphosis include frogs and butterflies.

We tend to call the pupa of a butterfly a 'chrysalis'.

See below (lesson 3) for further information about the human life cycle.

Children may assume that there is a sudden leap between each of the stages given in a life cycle diagram and nothing in between. Using the example of our own human life cycle is a good way to show how there are still changes in between each stage given.

Children can access the lesson content without using the term 'metamorphosis' (although this is used in the content and may be appropriate depending on your class) but should instead identify that some animals (such as frogs) have big changes across their life cycles.

The term 'cocoon' is often misused but may be one children have heard. It tends to be used when talking about the life cycle of moths. A cocoon is a silky protective covering that forms around the pupa of certain insects such as moths.

Lesson 3

Growing Up

The stages in the human life cycle used in this lesson match those suggested in the non-statutory notes and guidance of the science national curriculum: baby, toddler, child, teenager and adult.

Pupils return to the human life cycle in year 5 where they will describe more stages and learn about adolescence and puberty.

Human growth can be separated into the following stages (some content here would not be appropriate for year 2 but is provided for your scientific knowledge):

- **Fertilisation:** The male and female sex cells fuse together.
- **Prenatal:** The cells develop and grow into a foetus inside the mother's uterus. After around nine months, the baby is born.
- **Infancy:** Rapid growth and development. Children may learn to walk and talk.
- **Childhood:** Children learn new skills and become more independent.
- **Adolescence:** The body starts to change over a few years. The changes occur to enable reproduction during adulthood.
- **Early adulthood:** The human body is at its peak of fitness and strength.
- **Middle adulthood:** Ability to reproduce decreases. There may be hair loss or hair may turn grey.
- **Late adulthood:** Leading a healthy lifestyle can help to slow down the decline in fitness and health which occurs during this stage.

This lesson focuses on different activities that humans can do at different stages in their life cycles. As people are all different and may do these activities at different times or not do them at all (including things like walking and talking), this lesson has been worded carefully to acknowledge this. This can also be addressed through further discussions with children. For example, some may think that everyone goes to university after school and it is important to discuss the fact that although many people do, there are also lots of other career paths and life choices that can be made at this stage.

Children may bring up elements of puberty in discussions (perhaps voice changes or changes in skin). However, puberty isn't referenced in the science curriculum until year 5 and the lesson does not cover this topic. Any comments regarding puberty from children should be handled in line with your school's policies on this topic.

Lesson 4

Survival

All animals need oxygen (although the term 'oxygen' is used in this unit, it is not essential for covering the curriculum aims). Animals use this oxygen in their cells for a process called respiration (specifically aerobic respiration).

Respiration is a chemical reaction that provides energy for an organism. In aerobic respiration, energy is released from glucose (which comes from food) by reacting with oxygen.

Note that breathing and respiration are not the same thing. Breathing is generally described as the process of getting air in and out of the lungs. However, different animals have different ways of breathing that may not involve lungs. Fish have gills to remove oxygen from the water. The amphibian group can use multiple different ways of breathing including gills, lungs and breathing through their skin.

Water, food and air are essential for us to stay alive but through discussion children should also be made aware of other things that we do need beyond these three absolute essentials (for example, education, appropriate shelter and exercise).

A misconception about fish not needing air and water is addressed in the [Lesson Presentation](#).

Lesson 5 Exercise

Information in this lesson is matched to NHS guidance on physical activity.

The NHS recommends that children and young people aged 5-18 should aim to do an average of at least 60 minutes of moderate intensity physical activity a day across the week.

Please see the NHS website for more detailed guidance on exercise requirements for children and young people aged 5-18 years, including the different types it should include.

See the [Awesome Offspring to Healthy Adults eBook](#) for detail on what happens to our bodies when we exercise.

Children may think that exercise (or physical activity) only involves team sports (like football) or organised activities (like PE lessons) but actually the NHS also recommends everyday activities such as walking to school and skipping with a rope.

Lesson 6 Healthy Living

Information in this lesson matches the government and NHS Eatwell Guide guidance. Please see the NHS and government Eatwell Guide webpages for more detailed information on this.

Nutrients are substances that living things need to stay alive and healthy. Children learn more about specific nutrients in our year 3 'Animals Including Humans' unit. Briefly, each group does the following:

- **Carbohydrates:** provide energy
- **Protein:** helps growth and repair
- **Fibre:** helps us digest the food that we have eaten
- **Fats:** provide energy
- **Vitamins and minerals:** keep us healthy (for example: help us grow, keep our bones strong, boost the immune system)
- **Water:** moves nutrients around our bodies and helps us to get rid of waste.

Food can be a sensitive issue and the lessons and eBook are worded carefully to reflect this. Adapt discussions as needed for your specific class and see the Eatwell Guide information for more detail on the current government/NHS guidance.