

In the wild, bumblebees must **compete** with a number of different factors in order to survive. For example, they must be able to find food, avoid **predators** and survive in various weather conditions.

Every time a bumblebee larvae hatches from an egg, it has almost identical genes to its parents, this is called **inheritance**. However, some of its **genes** will be different and this will lead to the new bumblebee having slightly different **characteristics** to its parents, such as slightly more hair or a rounder shape.

If a new characteristic is useful to a bumblebee it will be more likely to survive and pass on its genes and therefore its characteristics, to the next **generation**. Bumblebees with characteristics that are less useful are less likely to survive and pass on their genes.

This means that the useful characteristics become more common in all bumblebees and the less useful characteristics become less common. Over time bumblebees will slowly change to have all of the most useful characteristics to help them survive.

**Task 1:** Use the information above and the key word definitions to answer the following questions.

1. Complete the following sentence:  
*Bumblebees share almost all of their characteristics with their parents. This is called \_\_\_\_\_.*
2. *Why are some characteristics of a bumblebee different to that of its parents?* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. *Why is a useful characteristic more likely to be passed on to the next generation of bumblebees than a less useful characteristic?*  
\_\_\_\_\_  
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### Key word definitions

**Compete:** to try to win or get something that others are also trying to get.

**Predator:** an animal that hunts other animals for food.

**Inheritance:** the process of passing something to younger generations

**Genes:** A gene causes a particular characteristic, such as eye colour, to be passed on from parent to child.

**Characteristics:** something that makes a person or thing different from others.

**Generation:** a group of people, or animals, who were born around the same time.



Bumblebees first appeared around 35 million years ago, in an area of Asia known as the Himalayas. The climate in this area was cooling down and the characteristics that were useful for survival were changing.

Two key characteristics that are very useful for surviving in cooler climates are hair and size. Having more hair means less heat is lost from the body (a bit like wearing a big furry coat). The bigger and rounder an animal is, the less heat it loses too.

**Task 2:** Use the information above to decide which bee from each line is most likely to survive and pass on its genes, in a cooling climate. Make sure to explain each choice.



Which bee is most likely to survive in a cooling climate? A or B? \_\_\_\_\_

Explain why:



Which bee is most likely to survive in a cooling climate? C or D? \_\_\_\_\_

Explain why:

**Task 3:** Use your answers from task 2 to sketch a bee that combines the best characteristics for surviving in a cold climate. Describe your bee and explain why it will survive to pass on its genes.

Draw your sketch here:

Description and explanation here:

## Overview

This lesson explores how the inheritance of genes can lead to changes in characteristics and how these changes can determine how likely an animal is to survive and reproduce, in a certain environment.

Bumblebees are used as a case study of how a particular animal's characteristics could change if its environment was to change.

## Task 1

In this task, students are to use the information from the top of the worksheet and the keyword definitions to complete the three questions.

### Answers

1. *Inheritance*
2. *Not all of the genes inherited are identical to the parent's genes, some of them are slightly different and therefore lead to slight changes in characteristics.*
3. *If a new characteristic is useful to a bumblebee it will be more likely to survive and pass on its genes and therefore its characteristics, to the next generation. Bumblebees with characteristics that are less useful are less likely to survive and pass on their genes.*

## Task 2

In this task, students have to use the information at the top of the worksheet to determine which of the two bees, shown in each line, is most likely to survive in a cooling climate.

### Answers

1. *B: This bee is larger and rounder and will therefore lose less heat and will be more likely to survive in a cooling climate.*
2. *C: This bee is hairier and will therefore lose less heat and will be more likely to survive in a cooling climate.*

## Task 3

In this task, students should combine the characteristics of bee B and C to create a bee that is very likely to survive in a cooling climate.

### Answers



*This bee is large, round and very hairy. This will allow it to retain as much heat as possible and therefore survive in a cooling climate to pass on its genes.*