

## **B7 Evolution FACT SHEET**

<b>Classification</b>	
<b>1. What do we call a group of organisms which can interbreed to produce fertile offspring?</b>	<b>A species</b>
<b>2. Name the scientist who developed the kingdom classification system</b>	<b>Carl Linnaeus</b>
<b>3. What features of organisms need Linnaeus use to classify organisms?</b>	<ul style="list-style-type: none"> <li>• What they looked like</li> <li>• What they did</li> </ul>
<b>4. Name the groups within kingdoms</b>	<ul style="list-style-type: none"> <li>• <b>Kingdom</b></li> <li>• <b>Phylum</b></li> <li>• <b>Class</b></li> <li>• <b>Order</b></li> <li>• <b>Family</b></li> <li>• <b>Genus</b></li> <li>• <b>Species</b></li> </ul> <p><b>(KP Crisps on fried green seaweed)</b></p>
<b>5. Name the system used to name organisms</b>	<b>Binomial</b>
<b>6. What is an organism's first name in the binomial naming system?</b>	Its genus (must start with a capital letter)
<b>7. What is an organism's second name in the binomial naming system?</b>	Its species (must start with a lower case letter)
<b>8. What new evidence can we use to classify organisms?</b>	<ul style="list-style-type: none"> <li>• Cell structures (better microscopes)</li> <li>• Understanding of DNA</li> </ul>
<b>9. Name the scientist who made the three domain classification system</b>	<b>Carl Woese</b>
<b>10. Name the 3 domains</b>	<ul style="list-style-type: none"> <li>• Archaea</li> <li>• Bacteria</li> <li>• Eukaryota</li> </ul>
<b>11. Which kingdoms are in the eukaryote domain?</b>	<b>Animal, plant, fungi, protists</b>
<b>Variation</b>	
<b>12. What is variation?</b>	<b>Differences</b>
<b>13. State 2 causes of variation</b>	<ul style="list-style-type: none"> <li>• <b>Different genes (genetic)</b></li> <li>• <b>Different environmental conditions</b></li> </ul>
<b>14. What causes genetic variation?</b>	<b>Mutations</b>

## **B7 Evolution FACT SHEET**

<b>Evolution</b>	
<b>15. When did life first appear on Earth</b>	<b>More than 3 billion years ago</b>
<b>16. Evolution is the idea that all species have evolved from _____ life forms</b>	<b>Simple</b>
<b>17. Name the process by which evolution occurs</b>	<b>Natural selection</b>
<b>18. Name the scientist who first published the idea of natural selection</b>	<b>Charles Darwin</b>
<b>19. Outline how natural selection occurs</b>	<ul style="list-style-type: none"> <li>• Genetic variation in organisms</li> <li>• So organisms have different phenotypes</li> <li>• Organisms with the phenotypes best suited to the environment survive</li> <li>• These breed and pass on their alleles</li> <li>• This repeats for many generations</li> </ul> <p><i>NOTE – in an exam question you will need to relate this to the example in the exam – include what the phenotypes are and which phenotypes are most likely to survive and reproduce and which alleles will get passed on</i></p>
<b>20. How can 1 species become 2 new species?</b>	Natural selection makes 2 populations of the same species so different to each other that they cannot breed to make fertile offspring
<b>21. Describe 3 effects mutations can have on the phenotype</b>	<ul style="list-style-type: none"> <li>• No effect</li> <li>• A small effect</li> <li>• Make a new phenotype</li> </ul>
<b>22. When can a mutation lead to a rapid change in a species?</b>	<ul style="list-style-type: none"> <li>• When it leads to a new phenotype</li> <li>• Which makes the organism more suited to the environment</li> <li>• Most likely when the environment is changing quickly</li> </ul>
<b>Evidence for evolution - fossils</b>	
<b>23. Why was Darwin's theory not accepted at the time?</b>	<ul style="list-style-type: none"> <li>• <b>Not enough evidence</b></li> <li>• It challenged the idea that God made all the animals and plants</li> <li>• People did not know about genes and DNA</li> </ul>

## **B7 Evolution FACT SHEET**

<p><b>24. Why is Darwin's theory now accepted?</b></p>	<ul style="list-style-type: none"> <li>• <b>More evidence</b></li> <li>• <b>e.g. fossils</b></li> <li>• e.g. understanding about genes</li> <li>• we see it happening – e.g. antibiotic resistant bacteria and selective breeding</li> </ul>
<p><b>25. What are fossils</b></p>	<ul style="list-style-type: none"> <li>• <b>Remains of organisms from millions of years ago</b></li> <li>• <b>Found in rocks</b></li> </ul>
<p><b>26. What do fossils show us?</b></p>	<p><b>How organisms have changed</b></p>
<p><b>27. What is the problem with the fossil record</b></p>	<p><b>There are gaps in it</b></p>
<p><b>28. Describe how fossils are formed</b></p>	<ul style="list-style-type: none"> <li>• <b>The body is covered in sediment</b></li> <li>• <b>The soft parts decay</b></li> <li>• <b>The hard parts are replaced by minerals</b></li> </ul>
<p><b>29. List other ways organisms can be preserved</b></p>	<ul style="list-style-type: none"> <li>• <b>Their body doesn't decay, e.g. in ice</b></li> <li>• <b>Footprints or root traces</b></li> </ul>
<p><b>30. State 2 reasons why we are not certain about how life began</b></p>	<ul style="list-style-type: none"> <li>• <b>Not enough evidence</b></li> <li>• <b>No-one was there</b></li> <li>• <b>No fossils</b> from early species as they didn't have any hard parts</li> <li>• Geological activity (volcanoes etc) could have destroyed fossils of early life</li> </ul>
<p><b>31. How do we describe a species when there are no individuals of it alive?</b></p>	<p><b>Extinct</b></p>
<p><b>32. List reasons why a species may become extinct</b></p>	<ul style="list-style-type: none"> <li>• <b>Environmental change</b></li> <li>• <b>New predators</b></li> <li>• <b>New disease</b></li> <li>• <b>More successful competitors</b></li> <li>• <b>Catastrophic event e.g. volcanoes, asteroids</b></li> <li>• <b>Speciation</b></li> </ul>
<p><b>Evidence for evolution - Antibiotic resistance</b></p>	
<p><b>33. Why can bacteria evolve rapidly?</b></p>	<p><b>They reproduce quickly</b></p>
<p><b>34. What produces new strains of bacteria?</b></p>	<p><b>Mutations</b></p>
<p><b>35. What do we call bacteria that aren't killed by antibiotics?</b></p>	<p><b>Antibiotic resistant</b></p>

## **B7 Evolution FACT SHEET**

<b>36. Name an example of an antibiotic resistant bacteria</b>	<b>MRSA</b>
37. Explain how antibiotic populations of bacteria arise	<ul style="list-style-type: none"> <li>• Mutations make a new strain that is resistant to the antibiotic</li> <li>• These are not killed if antibiotics are used</li> <li>• They survive and reproduce</li> <li>• This makes more resistant bacteria</li> <li>• The resistant strain will then spread because people are not immune to it and there is no effective treatment.</li> </ul>
<b>38. What can doctors do to reduce the evolution of antibiotic resistant bacteria?</b>	<b>Do not give them for viral infections</b>
<b>39. What can patients do to reduce the evolution of antibiotic resistant bacteria?</b>	<b>Take all the ones they are given</b>
40. What can farmers do to reduce the evolution of antibiotic resistant bacteria	Use less antibiotics
41. Why is it likely we will not be able to keep developing antibiotics to kill resistant bacteria?	<ul style="list-style-type: none"> <li>• It costs a lot</li> <li>• They take a long time to develop</li> </ul>
<b>Selective breeding</b>	
<b>42. Name the process by which humans breed plants and animals for particular characteristics</b>	<b>Selective breeding/ artificial selection</b>
43. What were the first examples of selective breeding?	Food crops and domesticated animals
<b>44. Outline how selective breeding is done</b>	<ul style="list-style-type: none"> <li>• <b>Choose parents with the characteristics you want</b></li> <li>• <b>Breed them</b></li> <li>• <b>Chose the offspring with the desired characteristics</b></li> <li>• <b>Breed them</b></li> <li>• <b>Repeat for many generations</b></li> </ul> <p><i>NOTE – in the exam, you will need to relate this to the question – say what the characteristic is that is wanted, say which animals/ plants you will chose</i></p>
<b>45. List some examples of selective breeding</b>	<ul style="list-style-type: none"> <li>• Disease resistance in food crops</li> <li>• <b>Animals which make more meat/milk</b></li> <li>• <b>Dogs with a gentle nature</b></li> <li>• <b>Large or unusual flowers</b></li> </ul>

## **B7 Evolution FACT SHEET**

46. Explain a disadvantage of selective breeding	<ul style="list-style-type: none"> <li>• It can lead to ‘inbreeding’</li> <li>• This can make it more likely to get a disease or inherited problem</li> </ul>
<b>Genetic engineering</b>	
47. Name the process that takes a gene from one organism and puts it into another	Genetic engineering/ genetic modification
48. Give an example of how have bacteria been genetically engineered	To make human insulin for diabetics
49. What do we call crop plants that have been genetically engineered?	Genetically modified/ GM
50. Describe 3 ways crops have been genetically engineered	<ul style="list-style-type: none"> <li>• To produce more or bigger or better fruit/ vegetables</li> <li>• Resistant to insect attack (so insects won’t eat them)</li> <li>• Resistant to herbicides (so we can spray weed killers on crops to kill weeds but not harm the crop)</li> </ul>
51. List some concerns with GM crops	<ul style="list-style-type: none"> <li>• <b>We are not sure how they could affect human health when they are eaten</b></li> <li>• How they will effect wild flowers</li> <li>• How they will effect insects</li> </ul>
52. What do some people hope genetic modification will allow us to treat?	Inherited conditions
53. HT Outline how genetic engineering is done	<ul style="list-style-type: none"> <li>• <i>enzymes are used to isolate the required gene</i></li> <li>• <i>this gene is inserted into a vector, usually a bacterial plasmid or a virus</i></li> <li>• <i>the vector is used to insert the gene into the required cells</i></li> <li>• <i>genes are transferred to the cells of animals, plants or microorganisms at an early stage in their development so that they develop with desired characteristics.</i></li> </ul>