

B2 Chapter 3 Checkpoint

● B2 Chapter 3: Adaptation and inheritance

Checkpoint lesson routes

The route through this lesson can be determined using the Checkpoint assessment. Percentage pass marks are supplied in the Checkpoint teacher notes.

Route A (support)

Resources: B2 Chapter 3 Checkpoint: Revision

Students work through tasks in the revision activity, to improve understanding and use of vocabulary, and compose detailed descriptions. They are also supported in producing a histogram.

Route B (extension)

Resources: B2 Chapter 3 Checkpoint: Extension

Students will complete a Twin studies case study task to extend their knowledge of variation.

Progression to secure

No.	Developing outcome	Secure outcome	Making progress
1	State some resources that plants and animals compete for.	Describe some resources that plants and animals compete for.	In Task 1 students are first asked to identify the resources, and must then write a paragraph to demonstrate they know why animals and plants compete for each resource.
2	State what is meant by the term adaptation.	Describe how organisms are adapted to their environments.	Task 2 helps students to provide full answers, describing adaptations for given examples and explaining how they help the organism survive.
3	Name an environmental change.	Describe how organisms adapt to environmental changes.	In Task 3 there is a focus on vocabulary. Students are given key words (e.g., hibernation) and are asked to write definitions and think of examples.
4	Give a possible reason for adaptation or extinction.	Describe how competition can lead to adaptation.	It is important to reinforce that competition might drive adaptation in a population over time, not an individual. Failure of the population to adapt might lead to extinction. An example is given in Task 3 for students to extract information from.
5	State what is meant by the term variation and state that variation is caused by the environment or inheritance.	Describe how variation in species occurs and describe the difference between environmental and inherited variation.	Students need to select the correct definition of variation in Task 4, and can then go on to identify environmental and inherited characteristics in the given example.
6	State that there are two types of variation.	Describe the difference between continuous and discontinuous variation.	Discuss with students variations in blood group and height. In Task 5 students are given prompts to help them recognise the difference.
7	State the two types of graphs that can be drawn when representing the two types of variation.	Represent variation within a species using graphs.	In Task 5 students are given a step-by-step guide to help them plot a histogram. Before plotting their graph they are asked to predict the shape of the graph from given examples.
8	State what is meant by a gene.	Describe how characteristics are inherited.	Students may struggle understanding the relationship between DNA, chromosomes, and characteristics. Students may not realise that chromosomes are made from DNA, and so demonstrating the difference in size may be helpful. Students can complete a cloze activity in Task 6.
9	State how survival rates differ for successful adaptation.	Describe the process of natural selection.	You can use a mnemonic 'Not Very Clear And Simple Problem' where: N = numbers in population large A = adaptations may give advantages V = variation between individuals S = survival of the fittest C = competition to survive P = pass on genes Students can then begin to complete Task 6, in which they are given guidance to write a full description.
10	State that organisms have changed over time.	Describe how organisms evolve over time.	Students are given a template to complete in Task 6, which will help them understand the process of evolution for a given example.

11	State what is meant by the term extinction.	Describe some factors that may lead to extinction.	Use the factors they can cause extinction to pose scenarios to students. Students can consider what could happen in each case. In Task 7 students can identify factors in a given example.
12	State how scientists try to prevent extinction.	Describe the purpose of gene banks.	Start with asking students 'How did they bring the dinosaurs back in Jurassic Park?'. Most will answer that the scientists had the DNA. Then expand the discussion to suggesting if we could store the DNA for any species we could keep the species alive.

Answers to end-of-chapter questions

- 1a** Arctic (1 mark) **b** white fur— camouflage large feet—to stop the bear sinking into snow
thick fur— insulation sharp claws and teeth— to catch and eat prey (4 marks)
- 2a** shelter/food (1 mark) **b** Different to **a**, for example: food/shelter/mates (1 mark)
c Plants are producers they make their own food using photosynthesis. (2 marks) **d** light (1 mark)
- 3a** nucleus (1 mark) **b** DNA (1 mark) **c** A chromosome is a long strand of DNA. A gene is a (short) section of DNA. Chromosomes contain many genes and each gene codes for a single characteristic. (2 marks)
- d** Half of chromosomes come from the mother and half from the father. Genetic material is transferred from mother via the egg and from father via sperm. Sperm and egg's genetic material combine during fertilisation. Embryo/fertilised egg contain pairs of chromosomes/46 chromosomes. (4 marks)
- 4a** fossils (of dinosaur skeletons) (1 mark) **b** No organisms of that species are alive anywhere in the world. (1 mark)
- c** The introduction of new predators can mean more organisms in a species are eaten than number of offspring produced. Destruction of habitat can mean loss of shelter for organisms, which leads to the death of individuals through exposure. Credit any other sensible suggestions of causes of extinction with a relevant explanation. (4 marks)
- d** Gene banks store genetic samples, for example, seeds/eggs/sperm/tissue. Samples from gene bank can be used to create new organisms in the future. Samples can also be used for research. (3 marks)
- 5a** Differences in a characteristic within a species. (1 mark) **b** balance/(bathroom) scales (1 mark)
c histogram (1 mark) **d** x-axis for mass of student, y-axis for number of students (2 marks)
- e** Each student's body mass could take any value (between the smallest and largest mass). (1 mark)
- f** Some variation is passed on in genes (from parents). This is inherited variation. Diet/exercise/lifestyle also affect body mass. This is environmental variation. Overall body mass is a result of both environmental and inherited variation. (4 marks)
- 6** Students should be marked on the use of good English, organisation of information, spelling and grammar, and correct use of specialist scientific terms. The best answers will provide an full overview of the process of natural selection in a logical order (maximum of 6 marks).
Examples of correct scientific points:
Organisms evolve through natural selection slowly over time.
Organisms in a species show variation — this is caused by differences in their genes.
The organisms with the characteristics that are best adapted to the environment survive and reproduce.
Less well adapted organisms die.
This process is known as 'survival of the fittest'.
Genes from successful organisms are passed to the offspring in the next generation.
This means the offspring are likely to possess the characteristics that made their parents successful.
This process is then repeated many times.
Over a long period of time this can lead to the development of a new species.

Answer guide for Big Write

Developing	Secure	Extending
1–2 marks	3–4 marks	5–6 marks
<ul style="list-style-type: none"> The presentation has little or no logical structure. However, the student has correctly used at least one scientific term. An attempt has been made to explain the process of natural selection, but this may contain some misconceptions. 	<ul style="list-style-type: none"> The presentation contains some structure. The student has correctly used at least two scientific terms. The process of natural selection has been explained, but may lack detail. 	<ul style="list-style-type: none"> The presentation is well structured. The student has correctly used a range of scientific terms. The student has clearly explained the process of natural selection through the example of the peppered moth.



B2 Chapter 3 Checkpoint assessment (automarked)	B2 Chapter 3 Checkpoint: Extension
B2 Chapter 3 Checkpoint: Revision	B2 Chapter 3 Progress task (Handling information)