

CHAPTER 4	Modelling Adaptation and Natural Selection Answer Key	BLM 4.3.4A
ANSWER KEY		

1. The degree of change you observe in the organism likely depends on the creativity and artistic ability of the group members. While some members might reproduce the drawing very faithfully, others might drastically alter its features. Overall, you will likely see small changes in the organism between environmental changes. Immediately after an environmental change, you may see more change in one feature of the organism as each artist exerts bias toward adapting the organism to the new environmental conditions.
2. While adaptations in an organism may make it more suited to its environment, it is an overstatement to say that the organism is closer to being perfect. You might discuss how to define perfection in an organism. An organism could be perfectly suited to its environment, in the sense that it is able to survive and has a high degree of reproductive success, but any sudden change in the environment might reverse this situation.
3. The drawings will likely show minor changes from one artist to the next in the first part of the activity across all groups. After an environmental change, however, the drawings may show more variation across groups, since the starting point is different. (Each group has chosen a different drawing with which to proceed.) One of the organism's features will likely be exaggerated in each group, and the chosen feature will vary from group to group.
4. Possible similarities could include the following:
 - Each new artist models the influx of new genetic information in the organism, either from the addition of gametes from a mating partner, crossing over of chromosomes during meiosis, or random mutations (UV damage to DNA, errors in chromosome separation, errors during transcription or translation, etc.).
 - Selection occurs after a change in environmental conditions, and acts on variation already present in the population.

Differences between the model and natural events could include the following:

- In terms of timescale, natural selection acts over the course of many generations. In this model, changes occur in only a few generations. In addition, mutations are rare events, so the model may exaggerate the amount of change from one generation to the next.
- The drawing oversimplifies the organism, presenting only its main physical features. In reality, an organism is composed of a complex network of physical, physiological, and behavioural features that could undergo variation and natural selection.
- Some environmental changes may have very little effect on a population of organisms, and all phenotypes will continue to reproduce.
- This model looks at an individual and its direct descendants, rather than at an entire population. (If there are a number of groups in the class, the combined data will more closely approximate natural selection acting on a *population*.)