Year 13 Science: The evidence for evolution: fossils, anatomy, DNA and Gondwana

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. A bone has 25% of its original carbon-14. Using a half-life of 5730 years, find its age.

2. Explain why carbon-14 cannot date a 2–million-year-old fossil.

3. Are a bat's wing and a human arm homologous or analogous?

4. Are a butterfly's wing and a bird's wing homologous or analogous?

5. Two species differ at 12 of 400 bases in a gene that changes by 1.0% per million years. Find the percentage difference and the time since they split.

Exam-style question: where did kiwi come from?

Zealandia began separating from Gondwana about 80 million years ago. Kiwi and moa were long thought to descend from flightless birds that were on the land when it split. A 2014 study of ancient DNA found that the closest relatives of kiwi are the extinct elephant birds of Madagascar, and that moa are most closely related to tinamous, South American birds that can fly. A small fossil kiwi relative from St Bathans in Central Otago, about 19 to 16 million years old, may have been able to fly.

6. Describe what biogeographic and molecular evidence are.

7. Explain the vicariance hypothesis for the origin of kiwi and moa.

8. Explain how the DNA results challenge that hypothesis.

9. Discuss how the fossil, molecular and biogeographic evidence together support a different origin for kiwi, and one limitation of the evidence.

Fix the mistake

10. Correct this statement: "Carbon-14 dating showed the dinosaur bones were 70 million years old."

11. Correct this statement: "After two half-lives all of the isotope has decayed."

12. Correct this statement: "Bird wings and insect wings are homologous because both are used for flying."

13. Correct this statement: "New Zealand's plants and animals are all here because they rode Zealandia away from Gondwana."