

BLACK BOX – ANSWER KEY

1. Which of the five senses could be used to collect data in this experiment? Explain.

The sense of hearing was the primary sense that was used to collect data hearing how the items interacted with each other and the side of the box. The sense of touch was indirectly used feeling the weight of the items, if they slide or rolled, etc.

2. In what ways does this activity resemble efforts of scientists in exploring atomic and molecular structure?

Since no atom has ever been directly observed, scientists have used indirect scientific experimentation to make conclusions and form theories about the internal structure of the atom. The boxes are sealed and the items inside are unidentified. Therefore, indirect observations were used to make conclusions and form theories about the contents.

3. Name three theories about the nature of the universe that are based primarily on indirect evidence.

Answers vary. The most common theories given by students include the Big Bang Theory, The Extinction Cause of the Dinosaurs, Evolution and Global Warming/Climate Change.

4. There are two eggs in a refrigerator, one is raw and the other is hard-boiled, but it isn't known which is which. After spinning both eggs, one spins easily, the second one comes to rest after a few rotations.

- a) Suggest a model that will account for the different behavior of the two eggs.

The contents in the raw egg are loose whereas the contents in the hard-boiled egg are solid. When the raw egg is spun, the egg comes to a rest fairly quickly because the yolk (more dense) wobbles inside the albumen. The hard-boiled egg spins like a top for an extended period of time because the entire contents are solid.

- b) On the basis of this model, what would be the prediction about how the eggs would spin after they both were boiled for 10 minutes?

If both eggs are hard-boiled, they will spin approximately the same amount of time.

- c) Discuss in detail how to test the model developed in part b.

Place both eggs in a pot of boiling water for 10 minutes, allow them to cool, then spin them timing to see how long it takes them to come to rest.