

Solutions to Discussion Questions On the Shoulders of Giants: Inertia

Part One

1. Describe what happened when the following occurred. Discuss how the results matched your initial expectations.

- a. The tablecloth was pulled slowly

Answer: The dishes moved with the tablecloth

- b. The tablecloth was rapidly removed

Answer: The dishes resisted motion, and only moved a small distance.

2. Why did the dishes move with the tablecloth initially?

Answer: The dishes accelerated with the tablecloth because of friction between the two. Friction is significant in this case because the acceleration is small. (Note: this can be a good connection to Newton's second law, $F=ma$).

3. Why did the dishes stay on the table when the tablecloth was removed quickly?

Answer: The law of inertia states that objects at rest tend to resist motion. They will only begin to move if a force acts on them. In the second case, the force needed to move the dishes along with the tablecloth is much greater than the frictional force. Exception for small movements because of friction, they maintain their original position.

Source: Physics Department at the University of Illinois at Urbana-Champaign, *Physics Van: Tablecloth and Dishes* <https://van.physics.illinois.edu/demos/Tablecloth%20And%20Dishes/tablecloth_and_dishes.php> (Accessed 18 June 2020).

Part Two

The discussion questions for part two should facilitate reflection. The solutions provided below are possible answers to provide talking points, but they are by no means indicative of all possible answers.

1. How can the history of physics be useful to physics as a whole?
 - History can show how collaboration is important to increasing understandings of the natural world.
 - History can show that scientists are often inspired by other scientists and build off that.
2. How did diversity benefit scholarship during the Islamic Golden Age?
 - In the case of the Islamic Golden Age, the convergence of scholarly work from many cultures and geographical areas benefitted research development. Scholars from different backgrounds can offer different ways of thinking about the same topic, driving creative solutions.
3. What conclusions can you draw from the timeline of events provided at the end of the reading?
 - Many scientific developments in the Islamic world preceded similar developments in Europe. European natural philosophers built on the works of Muslim scholars and dealt with the same questions.