

Student Discussion Worksheet

Directions: Have you ever wished you could move a heavy object using a magic wand like Harry Potter's? Sadly, magic exists only in fictional stories. But physics is very real, and scientists recently used it to move an asteroid in outer space! Read about this cool achievement in the *Science News* article "[NASA's DART mission successfully shoved an asteroid](#)" and answer the following questions as instructed by your teacher. A version of the article appears in the November 5, 2022 issue of *Science News*.

Understanding force

1. Imagine a stationary object. What is it? How can it be set in motion? List every way you can think of. (Hint: Don't forget to consider how objects can attract one another.)

2. What is force? What forces are involved in the scenarios you listed above? Are those forces considered contact or non-contact?

3. What forces act on stationary objects on Earth? What needs to be true about those forces for the object to remain stationary? Why would a stationary object move?

4. Think about an object on Earth that is moving at a constant velocity, like a car on the highway. What forces act on the car? What needs to be true about the forces for the car to remain moving at a constant velocity?

5. What would happen if an additional force is applied to the car?

6. What scientific law relates to your answers for questions No. 3 through 5? Define it.

Diversion tactics

1. Think of a time when you've diverted the path of a moving object. Explain what happened and what force you used to divert the object.

2. What conditions did you consider (either consciously or not) when you estimated the amount of force needed to divert the object? What scientific laws applied? Define the laws.

3. Are you familiar with any movies or sci-fi stories about trying to interrupt an asteroid's path? How did the characters plan to stop the asteroid from hitting Earth? Were they successful?

4. Do scientific laws apply the same way to Earth and to the asteroid? How would the influence of Earth's gravity on the asteroid change over time?

5. Imagine that you are a NASA scientist trying to protect Earth from a large asteroid. Based on your answers to the previous questions, how would you form a plan for stopping the asteroid from hitting Earth? What information about the asteroid and the forces acting on it would you need to know? What types of strategies might you consider?

