





### Pool Game Observations Worksheet - Answers

For each scenario below use the cue to hit the cue marble into the other marbles.

1. One marble and the cue marble on the table on opposite sides.
  - a. What do you observe?

When the cue hits the cue marble it speeds up. When the cue marble hits the other marble it either stops or slows down and changes direction. The marble that is hit speeds up. It then slows down until it stops.

- b. What CHANGES in speed and direction do you observe?

Every marble slows down as it rolls along (due to friction). Marbles speed up when hit. If marbles don't hit each other straight on then both marbles change direction.

- c. Can you hit the marble with the cue marble so it goes into a hole? Try a few times!

Students may pick up on the idea that hitting a marble on one side makes it move in the other direction and allows you to make it go where you want it to go.

2. Several marbles in a triangle on one side and cue marble on opposite side.
  - a. Which marble got hit by the cue marble first? What happens to it?

The marble that gets hit first speeds up. The cue marble may stop or slow down and change direction. The first marble that starts moving quickly runs into other marbles.

- b. Can you tell which marbles got hit after the first one? How do they move?

Students should notice that the marbles move in different directions. Some may hardly move at all because they are surrounded by other marbles.

- c. Why do some marbles speed up?

Marbles speed up because they get hit by the cue or another marble.

- d. What makes the marbles slow down?

Marbles slow down because they hit something or simply as they roll along due to friction.

e. Why do some marbles change direction?

Because they hit something (the side of the table or another marble).

3. How can you explain your observations in terms of forces acting on the marbles?

Each time a marble speeds up, slows down, or changes direction, there is a force acting on it. A force makes it speed up. A force pushes it into a new direction.

The concept that a force (friction) slows the marbles down as they move is a bit more tricky. A good discussion for wrapping up!