**Scenario 1:**

Mr. Nestor is demonstrating how to pass a soccer ball in gym class.

Some important factors are:

* Mass of Mr. Nestor is 90 Kg
* Mass of soccer ball is 2 Kg
* Applied force on the soccer ball is 60 N.

Also, unfortunately for Mr. Nestor the floor of the gym has been freshly waxed making the floor completely frictionless.

Questions:

1. Draw a Free Body Diagram to show all of the forces on the soccer ball when Mr. Nestor kicks the ball
2. Use Newton’s Second Law to determine the acceleration of the soccer ball.
3. Use a famous 5 equation to find the final speed of the soccer ball if the applied force lasts for 0.25 s.
4. Use Newton’s First Law to describe the motion of the soccer ball and how far it will go before it stops moving.
5. Use Newton’s Third Law and draw an Action / Reaction diagram to describe what happens to Mr. Nestor.

**Scenario 2:**

Mr. Nestor has a habit of putting his smartphone on the dashboard of his car. This is not the smartest thing to do since there is very little friction between the dashboard and hard surface of his smartphone. Use the concept of inertia and Newton’s first law when answering the following questions.

1. Explain what will happen to the smartphone if Mr. Nestor accelerates quickly forward when he pulls out of the parking lot at LASS.
2. Explain how this is connected to the need for headrests as a safety device in cars.
3. Explain what will happen to the smartphone if Mr. Nestor slams on the brakes for a red light at the corner of Father Tobin and Bramalea.
4. Explain how this is connected to the need for seatbelts as a safety device in cars.