Conceptual Questions for Enrichment:

Think about and explain the following problems.

1.) When a ball rolls down an incline, it will naturally gain speed because of gravity. When a ball rolls up an incline, it will naturally lose speed because of gravity. Why doesn't gravity play a role when a ball rolls on a horizontal surface?

2.) You're on the International Space Station and you're given two boxes. One of the boxes is filled with sand, and the other box is filled with feathers. How can you determine which one contains which without opening the boxes? (a scale will always read zero)

3.) Captain Kirk is being chased by an elephant-looking creature on the planet Vulcan. It's a massive creature that is at least 20x more massive than him. He seems threatened at first but realizes that he can use that elephant's mass to his advantage. He starts running away in a zigzag pattern. Why does he do this?

4.) You and your friend want to take a trip to San Francisco and your friend has an idea that could save you the trouble of booking a flight! As the Earth rotates about its axis, it takes about four hours for the US to pass beneath a point above the Earth that is stationary relative to the Sun. Your friend proposes that if you just ascend a helicopter above Bethlehem and wait about three hours, you could just wait for San Francisco to pass underneath you. Will this work? Explain why or why not!

5.) Your friend, who has little science background, proposes to you that the Earth cannot be moving because they don't feel themselves moving. They claim that if the Earth were moving through space, they should feel themselves hurtling through space. Write a letter to them explaining what you learned about the First Law of Motion and *give them an experiment* that they could perform that could prove to them that their conclusion isn't quite right.