Marine Science: Modeling the Coriolis Effect

The Coriolis effect is named for a 19th-century French professor of mechanical engineering who calculated much of the mathematics behind the effect. Although Gustave-Gaspard Coriolis's own interest was in the various forces acting upon rotating pieces of machinery, the Coriolis effect is a major topic in earth science, as it exerts ***great influence on the movement of winds and water currents across the earth.***

Because the earth rotates (from west to east around a north-south axis), paths of objects moving great distances across the earth's surface are *deflected*. If a plane left the North Pole, started straight south toward Portland, ME, and maintained that straight-line path, the pilot might look down at landing time to see Portland, OR, instead. From the perspective of a person standing in Portland, ME, who had somehow been able to watch the entire flight, the plane would have veered far to the west. Similarly, although both Anchorage and Los Angeles rotate once a day, Los Angeles "travels" farther. Your students need to picture this phenomenon clearly before they can comprehend the Coriolis effect's interplay with other forces that affect weather systems and ocean currents.

Materials (per each student pair)
1 Balloon (round)
2 Permanent Markers *(different colors, readable when applied to balloons)*

Instructions
1: Blow up a balloon (one each pair of students)
2 :With a marker, **draw the equator on the balloon and label the North and South Poles.**
3: Hold the balloon at eye level and rotate it left to right, simulating the rotation of the earth. While 1 partner rotates the earth balloon, the other examines the movement of the earth from the North Pole perspective and from the South Pole perspective.
4: While 1 partner continues to rotate the balloon steadily from left to right, the other slowly tries to **draw a line straight south from the North Pole to the equator,** using the other marker. While the earth continues to rotate, **1 partner tries to draw a line straight north from the South Pole to the equator.**

Questions:

1: As you look down from the North Pole toward the equator, ***which way*** *is the balloon spinning, clockwise or counterclockwise?* ***Explain what you see and why****.*

2: As you look up from the South Pole toward the equator, ***which way*** *is the balloon spinning, clockwise or counterclockwise?* ***Explain what you see and why****.*

3: ***What happened*** *when you tried to draw a straight line from the North Pole to the equator?* ***Explain what you see and why****.*

4: ***What happened*** *when you tried to draw a straight line from the South Pole to the equator?* ***Explain what you see and why****.*

5: ***Predict*** *what would happen if you again drew lines in the Northern and Southern Hemispheres but with the earth rotating in the opposite direction.*