653-3045 (40-305) Coriolis Effect

Introduction: The Coriolis effect describes the apparent deflection of a moving object when viewed against a rotating background. What this means is that the rotation of a background can create an illusion. Consider an observer standing on the edge of a spinning disc. Someone throws a baseball towards the observer in a straight line. The ball does not deviate from this course at all, but to the observer it will appear to deflect either towards the left or right, depending on which direction the disc is spinning. Why does this occur? Try to visualize the scenario. The ball begins moving straight towards the observer. For every foot the ball moves forwards, the disc rotates a certain number of degrees. Thus, the observer is now slightly to one side of the ball. As the ball continues to travel forward, the disc rotates further, bringing the observer further to one side of the ball. This motion causes the apparent deflection of the ball. A rapidly spinning disc will produce a greater effect than a slower one.

There are three forces involved in Coriolis motion. The first is the Coriolis force, which produces deflection. The Euler force comes into play when the rotational speed is not constant, and describes an accelerating force. Centripetal force makes up the third leg of the triangle.

These forces are not real, and are often referred to as *pseudo forces*. They are used as a convenience.

The most common form of the Coriolis force is in regards to the Earth itself. Meteorologists in particular are concerned with it. Consider Earth's atmosphere: winds blow in one direction or another, and fronts advance in a similar fashion. However, the Earth is rather large. On a scale of hundreds of miles, the Coriolis deflection becomes a significant matter. A storm which was moving towards a certain point may end up far to one side of it. Moving objects appear to veer right in the northern hemisphere, and left in the southern. In addition, the Coriolis Effect is partly responsible for the creation of cyclones.

Contrary to popular belief, sinks do not drain opposite in the southern hemisphere as they do in the northern. While the Coriolis effect is still present, it has a negligible effect on a scale of a few inches. Also, the momentum of the water itself in enough to overpower the Coriolis Effect.

The Coriolis effect was first described in 1835 by Gaspard-Gustave Coriolis, in a paper concerning hydrodynamics.

Operation: To use your Coriolis Effect, kit, you should have received the following items: 1 turntable, 1 launching mechanism, 1 steel ball, and a sheet of carbon paper.

To use, first attach the launcher to the turntable. You do this by using the Velcro, or taping it down if you prefer. The turntable is a very low friction design, and can be used for many other applications as well, such as investigations into centripetal motion.

To conduct the experiment, place the steel ball in the dimple on top of the launcher. With the turntable at rest, gently push the ball so it rolls down the ramp. It becomes clear that the ball rolls in a straight line across the turntable and off the other side. You can verify this by placing the carbon paper on the turntable, and comparing the line the ball makes to a ruler.

To demonstrate the Coriolis Effect, place the ball on top of the launcher, and give the turntable a gentle spin. Centripetal force will nudge the ball out of the dimple, causing it to roll down the ramp. When it reaches the surface of the table, it will very clearly appear to move in a curved path. The carbon paper will prove this.

Remember, the ball is moving in a straight line. The turntable is traveling in a curved path. This is similar to standing on a conveyor belt: even if you stand still, you will still move.

Warranty and Parts:
We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.