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The Perfect Turn

This project examined the physics and the art of ballet. The project focused on how the length of the preparation position in fourth position affects the pirouette and the magnitude of the torque produced. A pirouette refers to a turn where the dancer is on one straight leg and is turning on the toe; the other leg is bent at the knee. The torque is the initial rotational momentum before the turn. The pirouettes of professional dancers were filmed from: their most comfortable position, 2 inches wider than #1, 2 inches wider than #2, and 4 inches wider than #3. Materials included the following: a "Logger Lite" Load cell, a laptop computer with Microsoft Excel and the Logger Lite program; a 4 x 4 foot wooden platform with a cutout for the load cell, a measuring tape with inch markings, a video camera, DVD's in order to record video, and a cable that connected the camera to the laptop computer, a ruler with centimeter markings, a pencil and a notebook. Pirouettes were performed on the platform. Video recordings were made of each of the dancers in each of the pirouettes and frame-by-frame analyses were conducted. An innovative "performance index" was calculated for each dancer. Results indicated that the perfect turn involved a starting position that was about 45% of a particular dancer's leg length. Also, the torque that produced the most satisfactory performance index also was produced from a turn about 40-45% of the dancer's leg length.