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Destructive Darts: The Effect of Launch Angles on Travel Distances

This research was conducted to determine the effect of launch angles on the distance a Nerf dart will travel. I hypothesized that if I launched a dart at a 40-degree angle, it will travel farther than a dart shot at any other angle.

A launch rig consisting of two wood boards hinged together was constructed. The upper board held a Nerf gun. A small wooden arm attached to the side of the bottom board adjusted the launch angle. Nerf darts were shot at 10-degree intervals between 10 and 90 degrees. For each angle, six Nerf darts were shot. After a dart was shot, the distance the dart traveled was marked and the distance from the launch pad recorded.

The mean or average for a 50-degree launch is 1173 cm; this mean is the longest distance of any recorded shooting angle. However, the difference in travel distance between 40 and 50 degrees was only 9 cm. It is possible that the best launch angle is actually between 40 and 50 degrees. Collecting additional data at 1 or 2 degree intervals is needed. During this investigation, darts launched from the control angle of 90 degrees did not go straight up and down, probably because of wind. Conducting the experiment inside without wind might change the results. Dart mass and aerodynamics might also affect the distance the darts traveled. Based on the data collected, 50 degrees is the best angle to shoot a dart and have it travel the farthest distance.