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"Higher" Performance Pinewood Car

The purpose of my experiment was to use moveable weights to vary the center of mass between the front, middle and rear of a pinewood car and determine which achieves the highest speed. I started with a basic pinewood car and removable weights added to make the total weight 5.0 ounces (standard racing limit). I used a track about 5 meters in total length with the first half at a 30-degree incline and last half horizontal. I tested a control car with a neutral center of mass and various improvements to isolate the relative effect of each. Then I tested the subject car with the weights placed towards the front, middle, and aft. I recorded each trial with a digital camera and I analyzed the video frame by frame to determine time and distance measurements to calculate the speed. The car with aft center of mass reached the highest speed at an average of 457.4 cm/sec over 10 trials. The weight-middle car was next fastest and the weight-forward car was the slowest. The control had a nearly identical center of mass and speed to the weight-middle car. This shows that further aft placement of the center of mass results in higher speed. The test results indicate the "higher" the mass of the car, and the "higher" you place it, the "higher" the speed will be. Which means, the car with the furthest aft center of mass should achieve the highest speed, and it did.