Experiment 1.4: Changing Velocity

Data

Distance between the bottom of the ramp and the wall: 1.50 m

The first time, the ball didn't hit the wall, so I added two books to the stack.

Times it took for the ball to roll 1.50 m: 1.67 s, 1.81 s, 1.79 s, 1.88 s, 1.61 s

Distance between the bottom of the ramp and the wall: 1.50 m

Times it took for the ball to roll 1.00 m: 0.84 s, 0.80 s, 0.91 s, 0.87 s, 0.81 s

Calculations

Average time it took to roll 1.50 m:
(1.67 s + 1.81 s + 1.79 s + 1.88 s + 1.61 s) ÷ 5 = 8.76 s ÷ 5 = 1.75 s

Velocity as it rolled 1.50 m: 1.50 m ÷ 1.75 s = 0.857 m/s

Average time it took to roll 1.00 m:
(0.84 s + 0.80 s + 0.91 s + 0.87 s + 0.81 s) ÷ 5 = 4.23 s ÷ 5 = 0.846 s

Velocity as it rolled 1.00 m: 1.00 m ÷ 0.846 s = 1.18 m/s

Summary

I stacked some hardcover books on the floor near a wall and then used the thinnest hardcover book I had to make a ramp. The top of the ramp was at the very edge of the pile of books, and the bottom was 1.50 m from the wall. I then held a golf ball at the top of the ramp and released it. The ball didn't make it to the wall, so I added two more books to the stack so that the top of the ramp would be higher. I then held the golf ball at the top and released it again, listening to the sound it made when it hit the wall.

I once again held the ball at the top of the ramp and released it. When I saw it hit the bottom of the ramp, I started a timer. When I heard it hit the wall, I stopped the timer. I repeated this four more times.

I then moved the ramp so that it was 1.00 m from the wall, but everything else was the same. I once again held the ball at the top of the ramp and released it. When I saw it hit the bottom of the ramp, I started a timer. When I heard it hit the wall, I stopped the timer. I repeated this four more times.

Conclusion

The velocity of the ball over its 1.50-meter trip was 0.857 m/s, but it was 1.18 m/s over its 1.00-meter trip. If there were no forces acting on the ball during its trip, the velocities should have been the same, since the ramp was the same in each case. However, the calculated velocity of the ball over the 1.00-m trip was faster because throughout the trip, friction slowed the ball down.