Investigation of the dependence of the body's flight range on the throwing angle

Purpose of the work: To investigate the dependence of the body's flight range on the throwing angle.

Equipment:
065 - laboratory ballistic pistol;
ruler

Theoretical part:
When the projectile departure angle changes from 90^0 to $0^{0,\ the}$ range of its fall is maximum, when the product cosα sin α is the largest, since $L = \frac{v_0^2 \sin 2\alpha}{g}$

where L is the flight range, $V_{0\ is\ the}$ initial speed, g is the acceleration of gravity ($g = 9,8\ m/s^2$).
This dependence in this work must be verified experimentally using a ballistic pistol. It is easy to make sure that the maximum range will be when shooting at an angle of 45^0, and for two angles giving a total of 90^0, the flight range is the same. The initial speed depends only on the elasticity of the pistol spring, the mass of the ball and other parameters of the device. At different angles of inclination of the trunk, only the direction of the velocity changes, but not its magnitude. If the value of the initial velocity of the projectile is known, it would be interesting to make sure that the results obtained are correct.
After pressing the trigger, the ball under the action of the spring moves along the rod in a given direction. On the table in the place where the ball falls, you need to put a strip of paper and fix it with two pieces of adhesive tape, and put a sheet of copy paper on top. When the ball falls on the paper, a clearly visible trace remains.

Workflow

1. Assemble the installation shown on the board.

2. Start the simulation.

3. Set the angle of the ballistic pistol to 45^{degrees}. Proizvediteshot.

4. Enter the distance of the balloon (L) in the table.

5. Make one shot at gun at initial angles of 20, 30,40,45, 50, 60,70 degrees

6. Enter results to the table.

α	20^{o}	30^{o}	40^{o}	45^{o}	50^{o}	60^{o}	70^{o}
L (m)							

7. Conclusion:
A. The maximum flight range at a given take-off speed is achieved at a throw angle of 45 °.
B. Maximum flight range for a given take-off speed is achieved at a throw angle of 30 °.
C. The maximum flight range at a given take-off speed is achieved at a throw angle of 60 °.