ROQED PHYSICS LAB

Determination of the acceleration of a body with uniformly accelerated motion

Purpose of work:
Calculate the acceleration with which a ball rolls along an inclined groove.

Devices and materials:
000 - tripod
001 - with couplings and foot;
021 - metal cylinder.
053 - gutter - with a ruler;
093 - ball;

055 - metronome.

Theoretical part:
In order to calculate the acceleration of a ball rolling down an inclined chute, the length of movement of the ball is measured for a known time t. Since with uniformly accelerated motion without initial velocity,

$$S = \frac{at^2}{2},$$

then by measuring s and t, one can find the acceleration of the ball. it is equal to:

$$a = \frac{2s}{t^2}.$$

No measurements are made absolutely accurately, they are always made with some error associated with the imperfection of measuring instruments and other reasons. but even in the presence of errors, there are several ways to make reliable measurements.

The simplest of them is the calculation of the arithmetic mean from the results of several independent measurements of the same quantity, if the conditions of the experiment do not change. This is what it is proposed to do in the work.

Work progress

1. Assemble the installation shown on the board.

2. Start simulation. The ball will roll down the chute and hit the cylinder.

3. Enter the time (t) and the length of the ball movement (s) in the Table.

4. Puse repeat experience 3 times changing the starting position of the ball and cylinder.

5. Without the formula for calculating the acceleration of the ball.

$$\mathbf{a} = \frac{2s}{t^2}$$

6. Table:

	s (m)	t (s)	a (m / s^2)
1.	...	...	
2.	...	...	
3.	...	...	

7. Make a conclusion:

A. If the initial velocity of the ball is $v_0 = 0$, then by measuring the length of movement s of the ball for a known time t, we can determine its acceleration.
B. The acceleration of the ball can always be determined by measuring the length of movement s of the ball over a known time t.
C. The acceleration of a ball rolling off an inclined chute depends on the time of its movement and does not depend on its movement.