**Explanation of the experiment**

(made by students from Poland)

Two balls, one large e.g. a basketball and the second small e.g. a golf-ball, are released at the same time from a certain height h1 ≈ h2 = h. Just after the elastic collision of the large ball bouncing on the ground, the small ball hits it (also an elastic collision) and as a result reaches a height about nine times greater.

To explain the result of the experiment we calculate the velocity v which the balls reach just before the large ball hits the ground. We assume that both balls fall freely from almost the same height. Since there are no external forces acting here, the law of conservation of energy can be used.

h1 ≈ h2

m – mass of the small ball

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v1 – velocity of the small ball when falling, just before the large ball hits the ground

v2– velocity of the large ball when falling, just before it hits the ground

 = mgh  v1 =

 = Mgh  v2 =

v1  v2 = v

This means both balls have the same velocity v, just before the large ball hits the ground.

NB: this can also be deduced by the fact both balls cover the same distance in the same time

Description of the situation:

We release a large ball from a certain height and a small ball from a similar, but slightly greater height (the small ball onto the large ball). The balls fall at the same time, one above the other but close to each other (the same direction).

The large ball hits the ground and goes upwards (it changes direction). At the same the small ball continues to fall downwards with the velocity v (in the same direction as before, but in the opposite direction to the one which the large ball is travelling, also at velocity v).

Thus now (but only for a very short time) the small ball is moving at a velocity of 2v relative to the large ball. Then the small ball bounces off the large ball and flies upwards at a velocity of 2v relative to the large ball, while the latter continues upwards at a velocity of v. This means that relative to the earth the small ball moves at a velocity of 3v.

Using the law of conservation of energy once again,

 = mgH

we get that the small ball reaches the height of

H = 9h.