Physics IA

Tri Minh Dao

Research question:

How does the height of dropping a ball affect its number of bounces?

Hypothesis:

I believed that as the height when you drop a ball increase, the number of times it bounces will also increase. So the heights vs time graph should increase linearly.

Variables list:

Independent: different heights of dropping the ball

Dependent: the times the ball will bounce

Controlled: + the same tennis ball

+ using the same surface of collision

+ wind (using the same room for experiment)

Controlling the variables:

+ The heights where I drop the ball will be measured using a measuring stick.

+ One tennis ball will be dropped on the same floor for every trial.

+ A timer will be used to calculate the time which the ball stop bouncing.

Method:

1. To begin the experiment, a measuring stick will be used to measure the height which the ball will be dropped.

2. The tennis ball then will be placed at the chosen point next to the measuring stick.

3. Start the timer when the ball is dropped and stop it when the ball stops bouncing.

4. Repeat step 1 to 3 for 5 times at 1 height.

5. Repeat step 1 to 4 for 5 times at five different heights.

Collecting data:

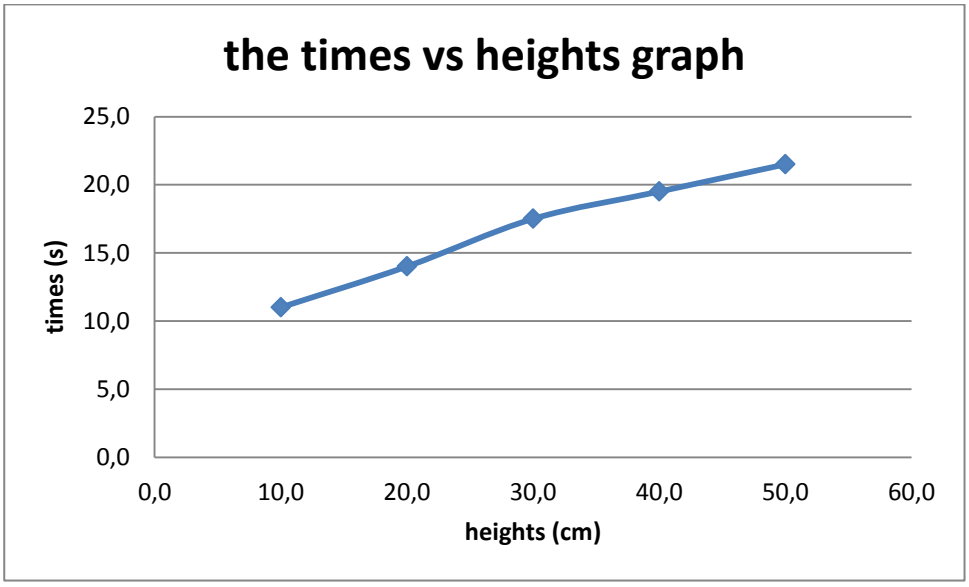
Table1: the heights of dropping the ball and it stopping time at 5 different heights.

	trial	Heights(cm) +-0.3				
		10	20	30	40	50
Time(s) +-0.1	1	3	3	3.5	4	4
	2	2	2	4	4	4.5
	3	2	3	3	3.5	4.5
	4	2	3	3.5	4	4.5
	5	2	3	3.5	4	4

The relationship between the heights of dropping the ball and its stopping time is increase proportionally. Since I collected the data at 5 different heights and 5 times at each height, I will find the mean of time at height so that a graph of heights vs time can be plotted.

	Heights(cm) +-0.3				
	10	20	30	40	50
Mean+-0.1	11	14	17.5	19.5	21.5
Standard deviation	8.8	7.2	14	34.9	17.2

The low standard deviation shows that the numbers are very close to the mean.



Conclusion:

The aim of this experiment was to examine how the height when a ball is dropped affects its time of bounces. I predicted that it will directly proportional. This prediction turned out to be correct as the heights vs time graph appears to be linearly. I found a positive relationship between the height of dropping a ball and the times it bounces. As I predicted the time that the ball can bounce increased when I increased the height.

Evaluation:

In general, the method and apparatus worked well. There were however some modifications that were made when collecting the data that were not stated in the original plan.

Some of the weaknesses of this experiment are:

1. Human's error: the time when the timer started may different to the actual time it started since I made human's error. Also the heights where the ball is dropped may not be as exactly because my hand might have made the human's error.

2. Air resistant: due to the air that exists in the testing room. The potential energy is reduced hence the ball will bounce more.

3. The surface of the floor: the floor used in the experiment is made of wood, which reduces the potential energy so the ball will bounce more.

Suggested improvements:

The investigation could have had more accurate results if the following modification is made in the future:

1. The human's error, which is unavoidable, can be reduced by testing more trial.

2. The air resistant can be prevented by doing the experiment in a vacuum environment.

3. To reduce the potential energy absorbed by the floor, an elastic surface can be used to reduce the friction force.