

Circular Motion

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Contents

1	Introduction	2
1.1	Circular Motion	2
1.2	Aim of the Experiment	2
1.3	Apparatuses	2
2	Data Collection	2
2.1	Procedure	2
2.2	Screenshots	2
2.3	Raw Data Table	3
3	Data Processing	3
4	Conclusion	4
5	Evaluation	4

1 Introduction

1.1 Circular Motion

Circular motion refers to the motion of an object that moves along a circular path. In circular motion, an object moves with a constant speed around a fixed point or axis without changing its distance from the center.

1.2 Aim of the Experiment

To find the relationship between t (Time) and v (Linear Velocity) when there exists a angular acceleration(α)

1.3 Apparatuses

1. laptop
2. <https://phet.colorado.edu/en/simulations/legacy/rotation>

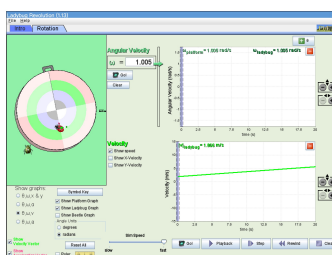
2 Data Collection

2.1 Procedure

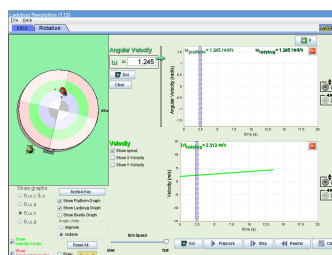
Simulate with the software.

All the data are recorded in the raw data table.

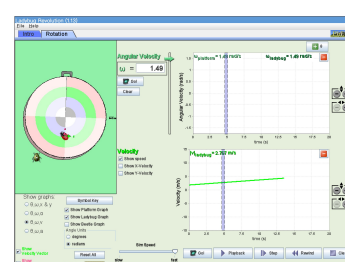
2.2 Screenshots



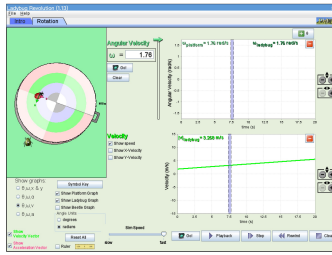
(a) 0s



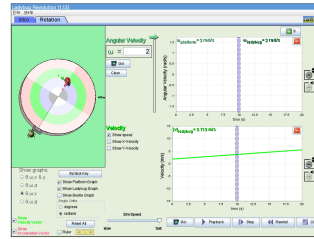
(b) 2.50s



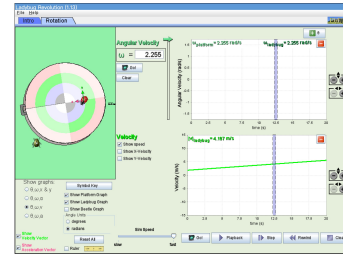
(c) 5.00s



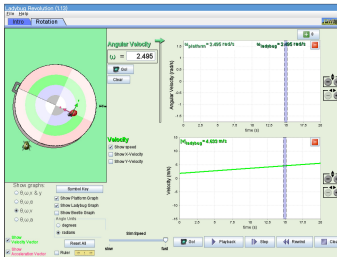
(d) 7.50s



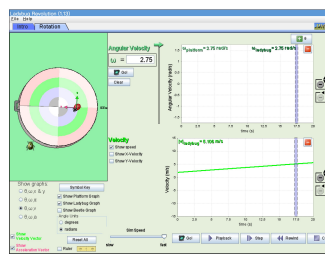
(e) 10.0s



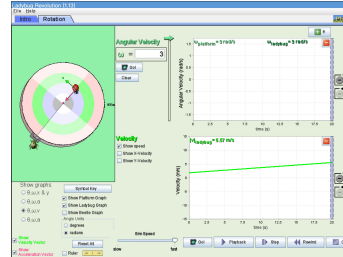
(f) 12.5s



(g) 15.0s



(h) 17.5s



(i) 20.0s

2.3 Raw Data Table

time(s)	$\alpha(m s^{-2})$	$v(m s^{-1})$
0	0.1	1.866
2.50	0.1	2.312
5.00	0.1	2.767
7.50	0.1	3.268
10.0	0.1	3.713
12.5	0.1	4.187
15.0	0.1	4.633
17.5	0.1	5.106
20.0	0.1	5.57

Table 1: Raw Data Table

3 Data Processing

Entering all the data into the data table, I drew a best-fit line with a slope of $0.1860 \pm 0.002 m s^{-2}$

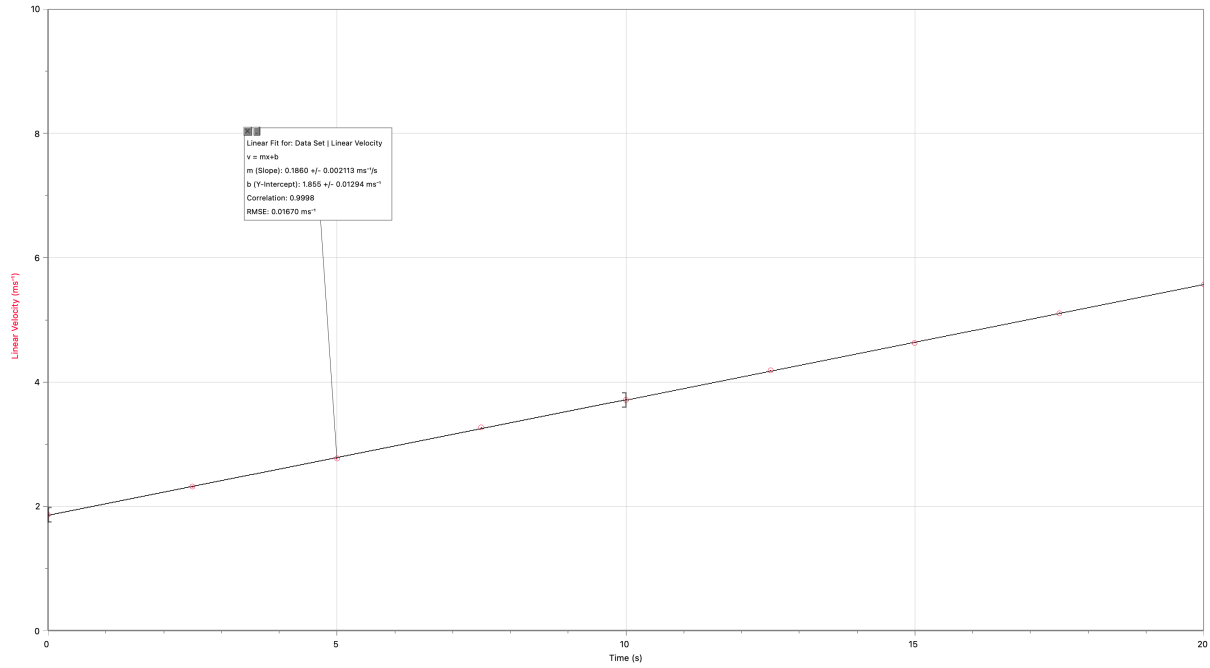


Figure 1: Relation Between t and v

4 Conclusion

When an angular acceleration of 0.1 rad s^{-2} is present, the correlation between linear velocity(v) and time(t) is

$$v = 0.186t$$

The Y-intercept of correlation is dismissed because the initial velocity for rotation was set to be 0.100 ms^{-2} .

We can also deduce the numerical value through formulas. Given that $v = r\omega$ and $\alpha = \frac{\Delta\omega}{\Delta t}$, we can know that $a = \frac{\Delta v}{\Delta t} = r \frac{\Delta\omega}{\Delta t}$. The radius of the rotation is about 1.86m, so the linear acceleration is supposed to be 0.186 ms^{-2} .

5 Evaluation

This investigation is on a simulation software, thus there's no uncertainty and very precise.
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