Module Twelve Lab Activity

Angular Displacement and Angular Acceleration - A Virtual PhET Lab

Objectives

After completing this lab activity, the students should be able to:

- Calculate angular displacement.
- Calculate angular acceleration.
- Write a lab report

Lab Report

The lab report must include the following:

- Title
- Introduction
- Experimental Details or Theoretical Analysis
- Results
- Discussion
- Conclusions and Summary
- References

Please visit the following website to learn more about lab reports:

ACS Format for Laboratory Reports.
This is a good example of a lab report.

Lab Activity

Please follow the steps given below to conduct the experiment:

- This lab requires you to produce a lab report to **determine** "**Angular Displacement and Angular Acceleration."** This is the**"Title"** of your lab report.
- Read the relevant chapter on circular motions and add an **"Introduction."**

You conduct this lab by connecting to the PhET website by clicking on the link given below (or where applicable through the embedded simulation on the lab page):

PhET Simulation

Attribution:

PhET Interactive Simulations
University of Colorado Boulder
https://phet.colorado.edu

(If you cannot use the above simulation or cannot get to the website by clicking on the link, please copy and paste the link into your browser. If the simulation is not running, please check if you have the latest Java, Adobe Flash, or HTML5 software [depending on the simulated lab]. If you download the relevant software and attempt to run the simulation and it is still not working, please call the IT helpdesk. It also could be that your computer does not have sufficient space to run the simulation. Please check all the possibilities).

- For this experiment, you use the **"Rotation"** section of the lab. After you click the rotation section of the lab, select the "Show X- Position" and "Show Y-Position" boxes (bottom, middle under Position) and "Show Platform Graph" and "Show Ladybug Graph" under Symbol key (bottom left-hand side corner) and "radians" under Angle Units (bottom left-hand side corner). Also, select the first choice under Show Graphs, which covers "theta, omega, X, and Y." In addition, check boxes for "Show Velocity Vector," "Show Acceleration Vector," and "Ruler" (bottom left-hand side corner). Now add relevant values depending on the scenarios given below. You may keep the sim speed to the minimum. This information constitutes the **"Experimental Details"** section of the lab report. You must keep a record of relevant data values appearing on the screen as **experimental values** for each scenario. These values form part of the **"Results"** section of the lab report. Now, complete the theoretical calculations of angular displacement and angular acceleration values for each scenario using relevant circular motion equations. These calculated values also form the **"Results"** section of the lab report.
- Now, you can complete the **"Discussion"** section of your lab report by comparing the values and discussing any differences in the theoretical and experimental values and any other information relevant to the experiment.
- Complete the lab report by adding a summary to the "**Conclusion**" section of your lab report.
- Submit the lab report to the relevant Canvas Dropbox

Lab Scenarios

1. A ladybug walks around a circular track that has a diameter of 3 m. If it moves around the entire track for at an angular velocity of 5 rad/s for 12s, what is the angular displacement? What is angular acceleration?
2. A ladybug walks around a circular track that has a diameter of 3 m. If it moves around the entire track for at an angular velocity of 6 rad/s for 22s, what is the angular displacement? What is angular acceleration?
3. A ladybug walks around a circular track that has a diameter of 3 m. If it moves around the entire track for at an angular velocity of 7 rad/s for 6s, what is the angular displacement? What is angular acceleration?

NB: This simulation does not give angular acceleration values. You can only compare experimental angular displacement values with theoretical angular displacement values for each scenario.