

Lab Instructions

Module Seven Lab Activity

Kinetic Energies and Momentum - A Virtual PhET Lab

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

- Calculate kinetic energies
- Calculate momentum and final velocities
- 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](#)

An example of a lab report is given on the following website:

[Professor K - sample 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 “Momentum, Final Velocities, and Kinetic Energy.”** This is the **“Title”** of your lab report.
- Read the relevant chapter on momentum and kinetic energy 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):

[Collision Lab \(colorado.edu\)](#)

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 “**Intro**” section of the lab. After you click the intro section of the lab, select "Velocity," "Kinetic Energy," and "Values" boxes (upper right-hand corner). Then, move the "Elasticity" scale to 100% elastic. Then check the box "More Data" (bottom left-hand side). Now all the values will appear on the screen. Now you can change the mass values and the initial velocity values as per the scenario given below, and kinetic energy, momenta, and velocity values will appear on the screen. This information constitutes the “**Experimental Details**” section of the lab report. You must keep a record of all the values appearing on the screen as **experimental values** for the scenario. These values form part of the “**Results**” section of the lab report. Now, complete the theoretical calculations of kinetic energy, final velocities, and momenta for each scenario using relevant 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

Please watch the following video to learn more about Newton's Second Law and Momentum:

- [Newton's second law & momentum \(video\) | Khan Academy](#)

Lab Scenario

Set the pink ball mass as 2 kg mass and the blue ball mass as 3kg. The position of blue ball could be -1 and pink ball could be +1. Set the initial velocity of pink ball as -1.5 m/s and that of the blue ball as +3 m/s. Run the experiment and note all the relevant experimental values.

1. Calculate the initial and final kinetic energy values for both balls separately and then the total.
2. Calculate the momenta before and after the collision for each ball.
3. Calculate the final velocity values for each ball.

