

PhET Collision Lab: Introduction in One Dimension

Homework assignment which may be done with a partner

Learning goals:

- Draw "before-and-after" pictures of collisions.
- Construct appropriate vector representations of "before-and-after" collisions.
- Explain what variables are conserved and under what conditions.
- What does “elasticity” mean?
- Identify vector and scalar quantities.

Directions:

1. Experiment with one-dimension elastic collisions (**Check 1d and set elasticity at 100%**). Make a table like this to help you organize your thoughts about collisions; use landscape layout so you can fit everything; “x” means there would not be a drawing in that box. Try varying mass and initial speed (including some initial zero velocity). I am expecting several trials. The **Restart** button is handy for replaying an experiment.

	Mass 1	Mass 2	Initial velocity 1	Initial velocity 2	Initial total velocity	Initial total momentum	Kinetic energy initial	Final velocity 1	Final velocity 2	Final total velocity	Final total momentum	Kinetic energy final
Trial 1												
Pictures of balls with vector	x	x					x					x
More trials												
Pictures of balls with vector	x	x					x					x

2. Think about the relationships you observed and then answer these questions:
 - a. What the difference between the quantities that have vector drawings and the ones that don't?
 - b. In your own words, what does “elastic collision” mean?
 - c. List quantities that have the same value (and direction if a vector) before and after the collision. If a quantity has the same value (and direction if a vector), it is said to be “conserved”
 - d. What quantities are not “conserved”?
 - e. Run one more experiment to check your answer to 2c and 2d. Describe your experiment and explain how it supports your answers.
3. Try some of the experiments again, varying the elasticity. Record your results in a similar data table, but add a column for “elasticity”.
4. Describe:
 - a. Any changes you need to make to your definition of “elastic collision” from 2b.
 - b. Adaptations to your ideas about quantities that are conserved when the elasticity is varied.