

## Rolling Down a Ramp

GLE 0707.11.4 Investigate how Newton's laws of motion explain an object's movement.

GLE 0707.Inq.2 Use appropriate tools and techniques to gather, organize, analyze, and interpret data.

GLE 0707.Inq.4 Recognize possible sources of bias and error, alternative explanations, and questions for further exploration.

GLE 0707.Inq.5 Communicate scientific understanding using descriptions, explanations, and models.

A science class found a variety of rolling objects in different shapes including solid disks, balls, and thin hoops. All the objects had the same diameter, but they were made of different materials. The students formed teams and let the objects go from various heights to roll down a long wooden ramp to the table. They recorded the time it took each object to roll down the ramp (rolling time). Their results are recorded in the table.

Team	Shape	Mass (g)	Height of Ramp (cm)	Rolling Time (s)
A	ball	240	10	3.38
B	disk	240	15	2.86
C	hoop	240	15	3.30
D	ball	240	15	2.76
E	hoop	180	15	3.30
F	ball	240	20	2.39
G	disk	180	20	2.47

1. Tony claimed the class did one experiment because they all followed a similar procedure. Devondria responded that there were too many variables for just one experiment. Which student do you agree with? Use evidence from the data table to support your answer.
2. Which team's experiments would you choose to make a fair test if you want to answer the following question: If the shape of the rolling object changes, what happens to the rolling time? Explain your answer.
3. Janice compared the results of the experiments done by teams A, D, and F. What question did she want to answer? What was the independent variable in these experiments? What was dependent variable in these experiments? What variable were controlled in these experiments?
4. Based on the table, answer this experiment question: If the mass of the rolling object increases, what happens to the rolling time? Be sure to state which teams' experiments you used as evidence to support your answer.