TEACHERS TRAIL GUIDES

Trail Guide First Robotics: 8.1 Inertia

Visit the **Forces in Motion Gallery**

First Robotics Exhibit

What are 2 forces that act upon the ball as it leaves the robot's arm?

What could you do to get a perfect shot if the target were twice the distance?

Draw the path of the ball as it leaves the robotic arm.

Does the ball travel in a straight line? Why or why not?

Teacher Notes:
Gravity, air resistance (or friction), and thrust (from the arm) are all acting on the ball. The flight of the ball is affected by the energy of the ball as it leaves the robot and the mass of the ball.
If you change the distance you need to change the speed of the throw, alter the trajectory of release, or change the mass of the projectile. Compare and contrast the parts of the human arm to that of the robot. Identify the shoulder, the elbow, the hand and other parts such as tendons and bones.

Trail Guide Mag-Lev Track: 8.1 Inertia

Visit the **Forces in Motion Gallery**

Mag-Lev Test track

Explain why the track allows the vehicle to move so fast.

Design a vehicle that would be more efficient, allowing it to travel faster. What changes would you make to increase the speed of vehicle on the Mag-Lev test track?

Draw the track and vehicle. Label the forces that are at work.

Teachers Notes:
Magnetic levitation transport or maglev is a form of transportation that suspends guides or propels vehicles by electromagnetic force. There is no rolling friction between the track and the train. Excluding the effects of gravity; air resistance is the only force working against the forward motion of the train, allowing it to move quickly.
Students can use their imagination. Focus on more aerodynamic features of the train, the use of various materials or different track designs.
Forces at work include air resistance on the nose of the train, magnetic force between the track and the train, and inertia.

Trail Guide Gravity Race: 8.1 Inertia

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Gravity Race

Build your own car.

What variables remained the same each time you raced the car you assembled?

Which variable did you change?

How did the variable that you changed affect the motion of the car?

Name and explain two forces that affected the operation of the car.

Teachers Notes:
Students may list the various parts of the car that could be changed, such as the wheels and their size, body length and weight of the car. Students should remember to test only one variable at a time. Gravity will slow down the car. Air resistance or drag, will also affect the motion of the car. Friction is also a factor.

Trail Guide Rube Goldberg's: 8.1 Inertia

Visit the **Invention Dimension Gallery**

Rube Goldberg's

Select one of the machines:
1. Can You Win A Gold Star?
2. Can You Ring The Bell?
3. Can You Play A Tune Or Spin The Wheel?

Describe the motion of the ball as it traveled through the machine.

Name three simple machines that you saw in action as the ball traveled through the device.

Teachers Notes:
As the golf balls travels through the device, moving obstacles help propel it through a complicated path of spirals, ramps, chutes and ladders. Levers, inclined planes, wedges, screws, wheels and pulleys are found in more than one location on each machine.

Trail Guide Crash Helmet: 8.1 Inertia

Visit the **Sports Gallery**

Crash Helmet Test

Choose either helmet type or hammer height. Design an investigation that shows; A) How the height of the hammer affects force, ***or*** B) Which helmet gives the best protection.

Make a prediction and give a reason.

Show your data to prove or disprove your prediction.

What did you use as a control in this investigation?

Teachers Notes:
The investigation should have a testable question, a procedure and a data table. A prediction should be based on observation and be directly related to the testable question. An example of a control could be a trail without a helmet.

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