

TRI-COUNTY CHARTER SCHOOL PARTNERSHIP
Performance Assessment

Vehicles in Motion

Grade Level: 6th Grade

Florida Sunshine State Standards Addressed:

SC.C.1.3: The student understands that types of motion may be described, measured, and predicted.

SC.C.2.3: The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.

Author: Shirley Charles

Subject: Science

School: Miami Shores/Barry University Charter School

Phone and Email: Shirlech@nova.edu

Assessment Scenario for Students

You and your colleagues are engineers hired by Charles Automotive Industries. The Chief Executive Officer (CEO) named C. Charles wants your vehicle to demonstrate the concepts of physics. C. Charles has given you a set of criteria. You must follow the criteria in order to get compensated for your hard work. Your goal is to design and build a vehicle that is powered only through Newton's third law of motion.

Your vehicle must:

- Move forward by pushing back on something
- Not be powered by any form of electricity or use gravity in order to move
- Travel a minimum distance of 1.0 meter
- Be built following safety guidelines

Getting started:

Brainstorm possible designs for your vehicle, but be careful not to lock yourself into a single idea. Remember that a car with wheels is only one type of vehicle. Try to think of ways to use recycled household materials to build your vehicle. The CEO of Charles Automotive Industries has given you and your colleagues tasks and due dates. At the end of each task, you must report on your products.

TRI-COUNTY CHARTER SCHOOL PARTNERSHIP
Performance Assessment

Task 1: Brainstorm

You must brainstorm all possible ideas for your vehicle. Make sure all of your colleagues participate in this session. Draw a diagram of your proposed design. Use labeled arrows to show each place that a force is acting on it. Be sure to include friction forces in your diagram. Brainstorm ways to reduce forces that slow down your vehicle. Make sure that all brainstorm ideas are written down on paper.

TRI-COUNTY CHARTER SCHOOL PARTNERSHIP
Performance Assessment

Task 1: Scoring Guide

4 Exemplary

- Criteria in the proficient category have been met.
- Colors are added to the vehicle's diagram.

3 Proficient

- Draws a diagram of the vehicle.
- Uses labeled arrows to show each place that a force is acting on it.
- Writes down brainstorm ideas about ways to reduce the forces that slow down the vehicle.

2 Progressing

- Two out of the criteria for a proficient score are met.
- More work is needed.

1 Not meeting the standard(s)

- Fewer than two of the criteria for a proficient score are met.

TRI-COUNTY CHARTER SCHOOL PARTNERSHIP
Performance Assessment

Task 2:
Use Materials from Home

Bring materials from home to construct your vehicle. Some possibilities are listed below:

- Recycled items from home
- Toys or building block sets
- Balloons
- Straws
- Fishing lines
- Paper towel roll

Think about ways to keep the vehicle going in a straight line. Begin to build and test your vehicle. Construct your vehicle and identify the force that propels it. Make sure that your vehicle is powered according to Newton's Third Law of Motion. Add to your diagram so that it shows the force exerted by your vehicle to make it move.

TRI-COUNTY CHARTER SCHOOL PARTNERSHIP
Performance Assessment

Task 2: Scoring Guide

4 Exemplary:

- Criteria in the proficient category have been met.
- Brings materials from home not listed in Task 2.

3 Proficient:

- Brings materials from home for construction of the vehicle.
- Adds more arrows to the diagram.
- Begins the construction of the vehicle.

2 Progressing:

- Two out of the criteria for a proficient score are met.
- More work is needed.

1 Not meeting the standard(s):

- Fewer than two criteria for a proficient score are met.

TRI-COUNTY CHARTER SCHOOL PARTNERSHIP
Performance Assessment

Task 3: Test Run

Demonstrate how your vehicle moves. Test your vehicle to make sure it will work on the floor. Be prepared to identify all the forces acting on the vehicle.

TRI-COUNTY CHARTER SCHOOL PARTNERSHIP
Performance Assessment

Task 3: Scoring Guide

4 Exemplary:

- Criteria in the proficient category have been met.
- The vehicle does move on the first test trial.

3 Proficient:

- Demonstrates how the vehicle moves.
- Identifies all forces acting on the vehicle.

2 Progressing:

- One out of the criteria for a proficient score is met.
- More work is needed.

1 Not meeting the standard(s):

- No criterion for a proficient score is met.

Task 4: Presentation Time

You and your colleagues are ready to present your newly constructed vehicle to the Charles Automotive Industries. Besides the vehicle, the CEO wants a one-two page typed report reflecting on the following points:

- Name of the vehicle.
- Names of the engineers and their captain.
- Materials used to construct vehicle.
- Brief summary about the trials and errors of this project.
- Discuss at least three features you included in the design of the vehicle that led to an improvement in its performance.
- Discuss the most significant source of friction in your vehicle.
- Discuss the most successful way to overcome the friction.
- Describe the features of your vehicle that led to its success or that kept it from succeeding.

TRI-COUNTY CHARTER SCHOOL PARTNERSHIP
Performance Assessment

Task 4: Scoring Guide

4 Exemplary:

- Criteria in the proficient category have been met.
- The vehicle travels more than one meter on the first trial.

3 Proficient:

- The oral presentation is logical and organized.
- Every team member has a speaking part.
- Eye contact is made frequently and correctly with audience.
- Discusses the features of the vehicle.
- The vehicle is powered through Newton's Third Law of Motion.
- The written presentation is focused and organized.
- Name of the vehicle is present in the report.
- Names of the team members are present in the report.
- Discusses the materials used to construct the vehicle.
- A brief summary of trials and errors of the project is present in the report.
- A description of the vehicle's features that led to an improvement in its performance is present in the report.
- A description of the vehicle's most significant source of friction is explained in the report.
- Describes the most successful way to overcome the friction in the report.
- A detailed reflection on the vehicle's success or failure is present in the report.

2 Progressing:

- Eight out of the criteria for a proficient score are met.
- More work is needed.

1 Not meeting the standard(s):

- Fewer than eight of the criteria for a proficient score are met.