

Transportation and Friction

by Therese Hayes, Detroit Public Schools

Target Grade: 5th

Subject: Science

Lesson Overview: The two types of Intermodal land transportation, rail and trucking will be examined in this lesson, along with the role that friction plays in transportation.

Sources Consulted:

How Trains Work by Craig Freudenrich, Ph.D.

<http://science.howstuffworks.com/transport/engines-equipment/train1.htm>

How can a 5,000-pound truck tow 10,000 pounds?

by Josh Clark <http://www.howstuffworks.com/auto-parts/towing/towing-capacity/information/truck-tow-ten-thousand-pounds.htm>

“How Truck Brakes Work” by Chris Marlowe <http://www.howstuffworks.com/auto-parts/brakes/brake-types/truck-brakes4.htm>

Non-fiction booklist:

- What is Friction? by Lisa Trumbauer
- Friction: Wheels and Brakes by Hachette Children's Books
- Trucks by Katie Daynes
- Drag! Friction and Resistance (Time for Kids Nonfiction Readers: Level 5.6)

Learning Objective:

At the end of this lesson, students will be able to:

- Compare and contrast rail and truck transportation
- Describe how friction affects rail and truck transportation

Michigan Science Benchmarks Addressed: Identify the force that pulls objects toward the Earth. 5.7.3 SC; Forces and Motion **5.11.1** | **5.11.2** | **5.11.3**

Materials & Quantities:

How Trains Work by Craig Freudenrich, Ph.D.

projector,

laptops (6- 30)

pencil (30)

paper (30)

poster board (5)

Crayons, markers (1 pack per group 5)

science journals

New Vocabulary:

intermodal transportation, friction, freight, rail, force

Focus Questions:

1. Which type (truck or rail) transportation has the most friction? Why?
2. Which causes the least friction? Why?

Classroom Activities

1. Review friction
 - Ask: "What is friction?"
 - Ask the student to give examples of times when friction is used.
 - Ask what would happen if friction was non-existent.
2. Guide the whole class discussion to ensure that students have grasped the concept that friction is a force that exists and is evidenced by the resistance that one surface or object comes in contact with another. Further, friction exists and is necessary in every aspect of our lives.
3. Introduce rail transportation
 - Read and discuss pertinent portions of "How Trains Work" by Craig Freudenrich, Ph.D.
 - Present, Read and discuss 5 Green Methods of Transporting Goods by Dave Roos.
 - Allow the students to have time to research the topic on their own.
4. Have the students discuss and write notes.
5. Review and discuss the student's summaries.
6. Have students conduct further research on the Internet.
7. Direct the students attention to the various books that are available

Day Two

1. Present, read and discuss "How can a 5,000-pound truck tow 10,000 pounds?" by Josh Clark
2. "How Truck Brakes Work" by Chris Marlowe
3. Have the students discuss and write notes.
4. Review and discuss the student's summaries.
5. Have students go on the Internet to further research.
6. Direct the students attention to the various books that are available

Day Three

1. Briefly review the first and second day lessons
2. Explain and discuss the criteria for the presentations
3. Explain and discuss the rubric for the presentation
4. Allow that students ample time to work on the presentations

Assessment:

- Students will complete a Venn diagram that compares the truck and rail transportation
- Each group will put together a mini-presentation on a topic relating to friction and rail or friction and trucking.
- The learners will present in groups. They will identify and describe the land transportation they chose.
- They will also describe the role that friction plays in the transportation that they chose.

Rubric

The presentation was specific to the topic. -5 points

Information is presented in a logical sequence-5

Presentation appropriately cites at least two references-5 points

Introduction is attention getting -5 points

Scientific terms are appropriate -20 points

Presentation contains scientifically accurate material-30 points

There is evidence of comparing and contrasting the two types of transportation.-10 points

There is an obvious conclusion summarizing the presentation.-10 points

Visual Aids were used effectively.-10 points

Total 100 points.

90-100 A

80-89 B

70-79 C

60-69 D

0-59 F

