

K-12 Transportation Activities: Roads, Rails, Ships & Planes (as of 01-08-13)

Title	Target Grade			Topic								Source
	K-2	3-4	5-6	General	Cars & Roads	Rail	Maritime Shipping	Planes	Freight Cargo	Bike	Mass Transit	
1. In the Driver's seat (PLT)			X	X	X							Center
2. Science that Saves: Crash (NSTA SciTchr)			X	X	X							Center
3. MDOT TRAC: Motion & Transp. Engineer			X	X	X							Online
4. Shipping & Receiving Ports		X	X	X			X		X			Center
5. Wheels & Things: Transporting			X	X					X			Online
6. Ship the Chip			X	X					X			Online
7. On the Move		X	X	X								Center
8. Second Skins		X	X	X								Center
9. Chairlift Challenge			X	X								Online
10. Critical Load			X	X								Online
11. Moving People, Products, Ideas			X	X								Online
12. MDOT TRAC: Bridge Builder			X	X								Online
13. MDOT TRAC: City Planning			X	X								Online
14. Travel Math (worksheets-Paddle to Sea)			X	X								Center
15. Brain Saver	X	X	X		X					X		Center
16. Five Points Traffic Jam		X	X		X					X		Center
17. Road Construction (NE After School Club)	X	X	X		X							Center
18. It's a Drag: Designing Aerodynamic Cars		X	X		X							Center
19. MDOT TRAC: Hwy Development & Envi			X		X							Online
20. MDOT TRAC: Physics of HWY Safety			X		X							Online
21. MDOT TRAC: Magnetic Levitation			X		X							Online
22. MDOT TRAC: Roadway Design & Construction			X		X							Online
23. EiE Designing Maglev Systems		X	X			X			X			Online
24. Shipping Lingo	X	X					X		X			Center
25. What Happened to Edmund Fitzgerald?		X	X				X		X			Center
26. What Floats Your Boat?			X				X		X			Center
27. How Locks Work		X	X				X					Center
28. Plot the Path into the Harbor		X	X				X					Center

29. Blast Off		X	X					SPACE				Center
30. Glider Design	X							X				Center
31. Paper Airplanes & Gliders		X	X					X				Center
32. Forces of Flight: Glider		X						X				Center
33. Candy Car Puffer		X	X		X							Center
34. Design the Best Sail		X	X				X					Center
35. Safety: Engineering Ramps (NSTA S&C)	X	X			X							Center

Transportation Lesson Plans & Activities

Family Engineering Book Long Activities (40 min activities)

- Brain Saver (K-6)– design a helmet to prevent brain injury in crashes---from biking, motorcycles, hockey, skiing, etc.
- Five Points Traffic Jam (Gr. 4-6) – design an intersection that is safe for pedestrians, bicyclists, and vehicles
- It’s a Drag (Gr. 4-6) – design a car that is aerodynamic
- Second Skins (Gr. 4-6) – design a package that protects item and uses resources efficiently
- Blast Off (Gr. 3-6) – design a rocket to go to outer space

Family Science Activities (Joan has lesson)

- Building Paper Airplanes and Hoop Gliders (Gr. 4-6)
- Glider K-2 – design a glider that goes furthest
- Candy Puffer (Gr. 3-6) – design a car that goes furthest with a big blow from the student
- Design the best sail (Gr. 4-6) – design effective sails for wind-powered vehicles

National Science Teachers’ Association (NSTA) Journals

- A Science that Saves Lives: Crash Science addresses the leading cause of death of teens in the U.S. (Jan 2013 Science Teacher p. 32) (Gr. 5-6)
- The Science of Safety: Students explore engineering with model cars and ramps (Dec. 2012 Science & Children p. 41) (K-4)

Maritime Lessons (*Whitefish Pt Activity Guide* and *Paddle to the Sea*)

- How Locks Work (Paddle to Sea p.103) (Gr. 4-6) – design a lock system
- Plot the Path (Whitefish Lesson Notebook) (Gr. 3-6) – Aids to navigation, best route into the harbor
- What Floats Your Boat (Maritime Lessons p.55) .– Students learn principles of Buoyancy and use them to create a boat that hold the most cargo
- Great Lakes Shipping & Receiving Ports (Maritime Lessons p.45) (Gr. 3-6) – students move the natural resources from their shipping port to receiving port and determine what it is made into.
- Harbor Navigation Game & What Does A Ship Captain Need? & Shipping Lingo & Parts of a Ship (K-4) (Maritime Lessons p.29, 34, 50, 52)
- What Happened to the Edmund Fitzgerald? (Maritime Lessons p.21) (Gr. 4-6) – Aids to Navigation, ship routes, cargoes

General

- Travel Math – Scale, perimeter, distance, rate, time (these are worksheets, so would need to be combined with an activity)

Roads & Highways

- Road Construction (Gr. 2-6) – build a road with the least environmental impact, cost efficient, takes you to the places you need to go

Family Engineering Openers (short 3 min activities) – These are set up in lunch room for all participants to do

- Against the Wind – compare aerodynamic cars characteristics of cars

- Boxing Beans – compare packaging shapes for transport and shelving and consumer attractiveness
- School Bus Puzzle – choose best order to pick up students on bus route

Project Learning Tree Activities

- **In the Driver's Seat** - Gr. 5-8 (Project Learning Tree Activity #85; p.325)
Students learn about gasoline, then explore fuel conservation and energy efficiency by simulating the distance they can travel on a set amount of gas using different vehicles with different fuel efficiencies.
- **On the Move** - Gr. 4-8; variation for K-2 (Project Learning Tree Activity #53; p.185)
Student will examine transportation systems which are vital to their community

Activities on the Web

1. WHEELS AND THINGS: TRANSPORTING GOODS

Students examine the role of transportation in getting goods to market by designing suitable packaging and preparing an export report. Students should understand that transport is a service that is an essential component in the exchange of goods and services

http://www.curriculum.edu.au/verve/resources/wheels_and_things_-_transporting_goods.pdf

2. **Chair Lift Challenge Lesson** focuses on unique challenges in transportation engineering, such as devising a method for skiers or hikers to get to the top of a mountain. Students work in teams to design a "chair lift" out of everyday items that can transport a ping pong ball in a chair of their own design from the bottom of a "valley" to the top of a "mountain" along a clothes line or wire without the ball falling out. Students design their chairlift and chair on paper, execute their design, test it, reflect on the challenge, and share their experiences with the class. <http://www.teacherstryscience.org/lp/chair-lift-challenge>
3. **Ship the Chip Lesson** focuses on engineering package designs that meet the needs of safely shipping a product. Students work in teams of "engineers" to design a package using standard materials that will safely ship a single chip through the mail to the school address. <http://www.teacherstryscience.org/lp/ship-chip>
4. **Critical Load Students** learn about how to test structures for maximum load by designing prototypes of buildings out of cards. Topics examined include problem solving, teamwork, and the engineering design process. Students work first individually to build a structure, then combine materials in student teams to design the strongest structure, evaluate the load capacity and critical load, and discuss why the strongest design worked best. Students also learn about famous failed and successful building structures. http://www.tryengineering.org/lesson_detail.php?lesson=8
5. **The Attraction is Obvious: Designing Maglev Systems** (Transportation Engineering & Magnetism) EiE (Gr. 3-6) - In this unit, student understanding will rise to new heights as they explore transportation engineering, magnetism, and the technological innovation of the Magnetic Levitation train. Following the lead of the storybook characters--who need to attract customers to a family-owned toy store before the business fails--students engineer a way to design a levitating vehicle system that will carry packages without them touching the ground. <http://legacy.mos.org/eie/maglev.php>
6. **Forces Of Flight: Let's Make A Flying Wing Glider – Gr. 3-4**
Students will identify forces of flight, and how a wing develops lift. Students will make a glider from foam core, adjust it for best flight, and so that it will turn. (Family Science Lesson Fall 2012)

7. **ON THE ROAD AGAIN: MOVING PEOPLE, PRODUCTS, IDEAS**

In this lesson students learn to identify modes of transportation and communication for moving people, products, and ideas from place to place. Students also learn the advantages and disadvantages of different modes of transportation. This lesson investigates ways in which global interdependence is altering traditional trade patterns, and encourages students to speculate on future world economic development.

<http://www.ite.org/councils/education/recruitment/activities/TFS03.pdf>

8. **MDOT TRAC (Transportation and Civil Engineering Modules (these would need to be adapted for this program format) (Gr. 7-12)**

http://www.michigan.gov/mdot/0,1607,7-151-9623_38029_38059_41397---,00.html

Bridge Builder - Building Math Skills

Algebra, geometry and physics are applied to the design and construction of bridges.

City Planning- Building Fun in Social Studies

Use SIMCITY to show concepts of design, problem solving, critical thinking and group decision making.

Highway Development and the Environment

Social studies and the sciences come together as students consider the environmental issues an science involved with highway planning.

The Physics of Highway Safety

Magnetic Levitation

Students put magnetic levitation cars through their paces while learning Newton's First and Second Laws of Motion.

Motion and the Transportation Engineer - Physics

Momentum and impulse are brought to life for high school or middle school science classes.

Roadway Design and Construction

Showcases the wide range of disciplines (including math, social studies and technology) involved in taking a road from design to construction.

Traffic Technology - Physics and Computers

Linear motion, basic circuits and Boolean logic for high school students.