

GETTING THERE: TRANSPORTATION LESSONS

Overview **1. Transportation Today** **2. Where are we?** **3. Where have we been?** **more...**

Lesson Title

Transportation Today (Exploring Modern Transportation)

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Lesson Overview

This lesson will provide materials and activities to focus on researching, analyzing, and drawing conclusions about the current methods of transportation we use and the factors influencing transportation decisions.

Curriculum Subjects

- Math

Estimated Duration

3-4 hours

Grades

Suitable for grades 5-8

Curriculum Goals

[National Council of Teachers of Mathematics Data Analysis and Probability Standard](http://standards.nctm.org/document/appendix/data.htm) (<http://standards.nctm.org/document/appendix/data.htm>):

- design investigations to address a question and consider how data-collection methods affect the nature of the data set;
- collect data using observations, surveys, and experiments;
- represent data using tables and graphs such as line plots, bar graphs, and line graphs;
- recognize the differences in representing categorical and numerical data.

Objectives

Students will be able to...

- Create a database containing records with multiple fields of information
- Create and use charts and graphs to draw conclusions about data

NETS Standards

3. Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information. Students:

- a. plan strategies to guide inquiry.

- b. locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
- c. evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
- d. process data and report results.

4. Critical Thinking, Problem Solving, and Decision Making

- c. collect and analyze data to identify solutions and/or make informed decisions.

6. Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations. Students:

- a. understand and use technology systems.
- b. select and use applications effectively and productively.
- c. troubleshoot systems and applications.
- d. transfer current knowledge to learning of new technologies.

Prerequisites

Before engaging in this lesson, students must know or be able to...

- Use a web browser
- Locate informational websites on the Internet

Lesson Procedure

Introductory – Preparatory activities:

To introduce this unit surrounding the theme of *transportation*, start by having students each set up an inquiry/reflection journal. This could be in a notebook, composition book, or as a document file on a computer (Microsoft Word, OpenOffice, or Google Docs, for example.) Start by having students look up the definition of "transportation" online (www.merriam-webster.com) Students should write this definition as the first entry in their journal.

Then allow students time to explore [Wikipedia](http://en.wikipedia.org/wiki/Transport) (en.wikipedia.org/wiki/Transport) and the Smithsonian Institution's "[America on the Move](http://americanhistory.si.edu/onthemove/themes/story_48_1.html)" (americanhistory.si.edu/onthemove/themes/story_48_1.html) to read in more detail about transport. Finally, watch/listen to The Transportation Song by Peter Weatherall:



Information presentation and information processing (analysis/synthesis) activities:

Activity 1: Create a Database

In this activity, we will be working in jigsaw teams to create a **database** of information about modes of transportation in the past and present. A **database** is what it sounds like: a base (or storage place) of data or information. We will be using a database called Microsoft Access (or OpenOffice Base) to store and retrieve facts about different modes of transportation throughout history.

For this activity, we will be working in jigsaw teams. We will first brainstorm about different modes of transportation we know about. Using this brainstorm, we will need to think about what types of facts are important for analyzing and categorizing these transportation modes.

Students will then break into small groups and each group will research one mode of transportation. Each small group (3-4 students) will be working together to locate important information and create database entries that will be shared with the whole class in the next activity.

Since we will be looking for the same types of information to compare and contrast different modes of transportation throughout history, we must all agree on which facts we will be recording about each type. Each of these facts will be a **field** of information in the database. To determine these fields, we should think about what questions we will be trying to answer using the database:

- Are the most common transportation modes used for *passengers (people)* the same as the common modes for transporting *freight or cargo (goods)*? Why?
- What are the most popular modes of transportation today?
- When were each of these transportation modes first invented?
- What did we use for transportation before these popular modern modes?
- Do you think the old way or new way of transportation is better? Why?
- Which modes of transportation do you think we will continue to use? Which do you think we will stop using? Why?

Based on these questions, we should create a table that contains the following fields:

1. Mode of transportation
2. Type (passenger, freight, or both)
3. Current popularity (**passenger km** for passengers or **ton km** for freight)
4. Year invented



Application activities:

Activity 2: Create a Spreadsheet

In this activity, we will use **spreadsheet** software to analyze numbers about modes of transportation and compare types of transportation around the world. A spreadsheet is a table containing **cells** of data. Each cell can contain one of a variety of types of information – text, numbers, currency, dates or times, etc. However, spreadsheets are most useful for working with numbers. We can use them to do long or fancy calculations and to create visual charts and graphs of the data.

For this activity, we will compare modes of transportation around the world by using a spreadsheet program such as Microsoft Excel, Google Spreadsheets, or OpenOffice Calc. Open a new blank spreadsheet in your spreadsheet software and start by entering the following data from the [Wikipedia "Mode of Transport" entry](#):

	A	B	C	D	E
1		EU	USA	Japan	World
2	GDP (PPP) per capita (€)	19,000	28,600	22,300	5,500
3	Private Car	10,100	22,700	6,200	2,700
4	Bus/Coach	1,050	870	740	1,200
5	Railway	750	78	2,900	320
6	Air (domestic except World)	860	2,800	580	480

In this table, GDP (PPP) stands for "Gross Domestic Product Per Capita" – this means the amount of money per person in the country. This number is listed in Euros, the measure of money in Europe. One Euro is a little bit more than one American Dollar. The numbers next to each mode of transportation represent "Passenger km per capita" which means the number of kilometers traveled per person using that type of transportation.

Using this information, students will create bar or column charts from the data to compare, at a glance, the transportation use of different countries.



Activity 3: Geographic Telecollaboration

In this activity, students will communicate with digital penpals in another country via the [ePals](#) website/email service. Students will write at least three letters:

1) In the first letter, students will describe what daily life in their community is like. Students will explain what goods and services are available, what residences are like, and what types of jobs people have (as well as how they get to those jobs.)

2) In the second letter, students will brainstorm ideas and predictions about how transportation will change in the future and why. In addition, each student should ask for his/her ePal's feedback about their thoughts -- whether the student in the other country agrees, and why or why not?

3) The last letter will be written at the end of this lesson after Part III. The foreign student will also share his/her ideas with the U.S. student; each student provides feedback on the other student's ideas for how to improve transportation, based on their own experiences as well as the shared learning and resources that have occurred..

Closure/review activities:

We can use the database to quickly analyze information that will help us answer these questions and make predictions about the future. To do this, we will use a **query** to **filter** the information in the database and narrow it down to what we are looking for. "Query" is another word for "question" – we will be asking the database questions about what information it contains.

As a reminder, students will answer these questions using the database, and record their answers in a journal (either paper or --

preferably -- electronic such as a Google Doc):

- Are the most common transportation modes used for *passengers (people)* the same as the common modes for transporting *freight or cargo (goods)*? Why?
- What are the most popular modes of transportation today?
- When were each of these transportation modes first invented?
- What did we use for transportation before these popular modern modes?
- Do you think the old way or new way of transportation is better? Why?
- Which modes of transportation do you think we will continue to use? Which do you think we will stop using? Why?

Likewise, students will look at their spreadsheet column charts to answer the following questions:

- Which country uses cars the most? How much more than other parts of the world?
- Which country uses airplanes the most?

Extension and Lead-in to Next Lesson :

Use Google Earth to find each location in the chart you made and look at them as satellite photos. How are they similar? How are they different?

Finally, access a photo database (the National Geographic magazine database, Google Images, or Flickr) to locate photos of locations in the different places in the table (Europe, the United States, Japan, and other locations in the world, such as Russia or Africa.)

Using this new information, students should answer these questions in their journals:

- Why do you think European countries use much more buses and trains (railway) than the United States?
- Why are cars much less popular and trains much more popular in Japan than in the United States?

Assessment / Evaluation

- [Database Rubric](http://rubistar.4teachers.org/index.php?screen=ShowRubric&rubric_id=1904427&): http://rubistar.4teachers.org/index.php?screen=ShowRubric&rubric_id=1904427&
- [Transportation by Location Chart Rubric](http://rubistar.4teachers.org/index.php?screen=ShowRubric&rubric_id=1904424&): http://rubistar.4teachers.org/index.php?screen=ShowRubric&rubric_id=1904424&
- [Inquiry Journal Rubric](http://rubistar.4teachers.org/index.php?screen=ShowRubric&rubric_id=1904428&): http://rubistar.4teachers.org/index.php?screen=ShowRubric&rubric_id=1904428&

Accommodations / Differentiation

- **Cognitive Difficulties:** Allow students to work in pairs for all assignments. If necessary, provide step-by-step instruction sheets with visuals.
- **Physical Difficulties:** Use speech-to-text dictation software and/or [mouse alternatives](#) and data entry devices to enter data in the database and spreadsheet.
- **Sensory Difficulties:** Use enclosed video resources. Hearing-impaired students can use closed-captioning on the videos and/or may be supplied with step-by-step written instructions or transcripts to video tutorials. Visually-impaired students may work with a partner or aide and use speech-to-text dictation software such as [Dragon Naturally Speaking](#) to enter data in the database and spreadsheet.
- **At-Risk Students:** Allow students to work in pairs for all assignments. Provide self-assessment/meta-cognition tools such as a checklist or step-by-step instructions.
- **GATE Students:** After locating and entering assigned transportation data in jigsaw teams, students may: (a) find and enter additional data for other transportation modes; (b) create a small PowerPoint project containing the information in the database and appropriate accompanying multimedia; (c) write an e-mail letter to an expert on their mode of transportation to ask further questions they are curious about.

Materials, Resources, and Equipment

Required hardware/software:

- Computers with Internet connection (at least one for every 2 students)
- Database software (Microsoft Access or the free [OpenOffice.org](#) Base)
- Spreadsheet software (Microsoft Excel, Google Docs or others online, or the free [OpenOffice.org](#) Calc)

Video resources:

- [Transportation Song](http://www.youtube.com/watch?v=2c68qD_NExQ): http://www.youtube.com/watch?v=2c68qD_NExQ
- [Smithsonian Institution "America on the Move"](http://americanhistory.si.edu/onthemove/themes/story_48_1.html): http://americanhistory.si.edu/onthemove/themes/story_48_1.html
- [Create a Table in Access 2007](http://www.youtube.com/watch?v=q0jAoX2-Eog): <http://www.youtube.com/watch?v=q0jAoX2-Eog>
- [Create a Column Chart in Excel 2007](http://www.youtube.com/watch?v=_SnsklZ0No): http://www.youtube.com/watch?v=_SnsklZ0No
- [Sort Fields in Access](http://www.youtube.com/watch?v=wQUbo6O1vFo): <http://www.youtube.com/watch?v=wQUbo6O1vFo>
- [Filter Fields in Access](http://www.youtube.com/watch?v=zVbLAeBTvZE): <http://www.youtube.com/watch?v=zVbLAeBTvZE>
- [Create a Query in Access](http://www.youtube.com/watch?v=Vy4h4RsiK-4): <http://www.youtube.com/watch?v=Vy4h4RsiK-4>

Sample products:

- [Access Database](http://gudenius.weebly.com/uploads/3/8/2/1/3821767/transportation_history.accdb): http://gudenius.weebly.com/uploads/3/8/2/1/3821767/transportation_history.accdb
- [Transportation Excel Spreadsheet & Chart](http://gudenius.weebly.com/uploads/3/8/2/1/3821767/transportation_modes_around_the_world.xlsx): http://gudenius.weebly.com/uploads/3/8/2/1/3821767/transportation_modes_around_the_world.xlsx

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