

Lesson Plan
TESI 2005
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Lessons are geared towards mathematics since I will be teaching 7-8 math in the 2005-2006 school year. There are numerous potential cross-curricular applications that spring to mind:

Science

- *materials used in automobile production
- *availability and price of materials
- *which materials are grown and which are mined
- *physical properties of materials which make them suited for the purpose for which they are used – possible substitutes for these materials should they become scarce or over priced
- *environmental aspects of automobile industry with a focus on innovations at the Rouge River plant;
- *recycling of automobile parts

Social Studies

- *history of the automobile industry and its influence on Detroit
- * the evolution of the automobile
- * the introduction of the assembly line

Language Arts

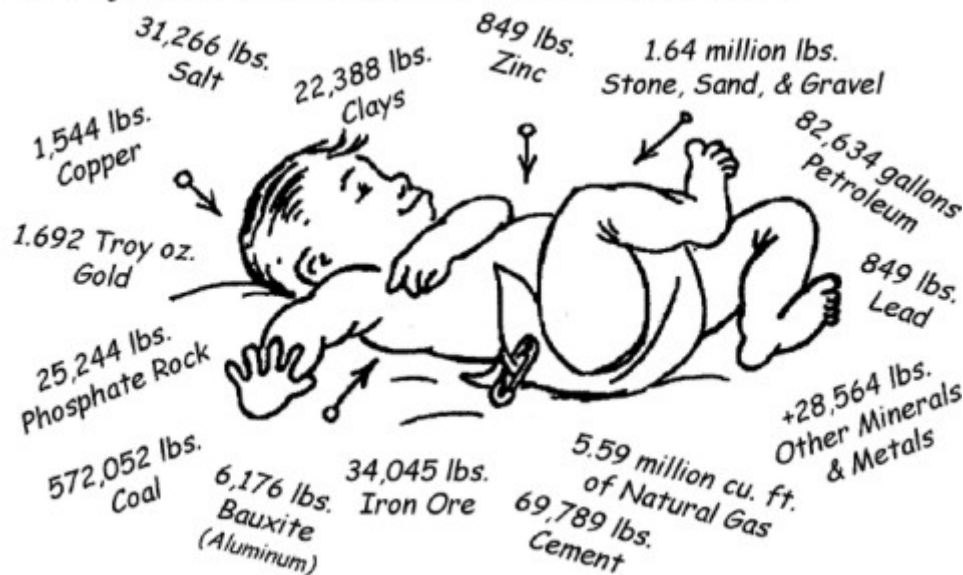
- *debating unionization of auto workers,
- *writing an auto worker's journal
- *Writing a research paper

The aforementioned are just a few components that I hope to “sell” to my team members at school. The goal is to tie lessons to a field trip to the Ford Rouge River Factory. The tour, closed to the public in 1980, only re-opened to the public in 2004 and tickets are now possible to procure. Keep in mind that the culminating activity will be the tour itself. There are several lessons involved and the timing of each is rather open-ended to accommodate both seventh and eighth grades and the included special education students.

Materials: Lessons will make use of group-sized white boards or 18”x24” newsprint sheets, colored pencils, dry erase markers, calculators, pencils, rulers, erasers, and protractors.

Lesson one will be to give the students a copy of the baby that is shown below.

Every American Born Will Need . . .



3.6 million pounds of minerals, metals, and fuels in their lifetime

© 2005, Mineral Information Institute, Golden, Colo, USA

3.6 million tons of minerals, metals and fuels in a lifetime

The math lesson will be focused on unit conversions using dimensional analysis. Students are issued conversion charts in their math folders at the beginning of the school year. These will include pounds to kilograms, gallons to liters, cubic feet to cubic meters, and Troy ounces to kilograms. Since there are fifteen minerals, the whole class will do three together. Each group will then be assigned two minerals to convert into the metric system. They will present their findings to the class and explain the work they have done on the large white board that has been issued to their group. Homework assignment will be to investigate the possible uses of their assigned mineral – I really want them to know how each mineral is related to the automobile industry, so the “carrot” will be extra credit if they can find its use in this particular industry.

Lesson two will focus on parts and products that can be observed when examining an automobile. Students will examine an automobile at home and record their observations. They will be given a worksheet to guide them in their observations/recordings. They will investigate the interior, exterior and the engine of the car. Help from family members will be encouraged. If this does not work well, I will use my van and do this part of the project in the school parking lot.

There are over 13,000 individual parts in a typical auto the students could not possibly record them all; however, with so many choices they can easily fill out the homework sheet with which they have been provided. They may want to concentrate on parts that are made from different products that are familiar to them such as glass, steel, and plastic.

Worksheet might include the following: Name, date, make of vehicle, model of vehicle, year of manufacture, and color. Students should be able to identify at least four automobile parts for each of the interior, exterior and engine of the car and name the products from which they were made.

When students come back to school with their worksheets filled out and signed by a parent, we will construct a whole class chart on the board eliminating duplicated information. The goal of the discussion will be to derive the knowledge that, "If it can't be grown, it has to be mined." This will most likely be an entirely new concept for my students (most of whom have never even see food being grown); hopefully, the connection to the mining industry will be easier to make after the first-day-of-school Power Point presentation I show to them of my summer adventures in the wilds of the Upper Peninsula.

Lesson three will include graphing activities which will use the data from the automobile worksheet. When the students return their completed worksheets with their parent signature we will record the information on the board as a whole class. We will also record how many operable vehicles belong to each household. The object of this lesson will be to construct bar graphs to display the information. Again, the students will work in groups of four. The bonus question will be to find the average number of vehicles per household. Students will need to make their graphs on 18"x24" newsprint paper for this exercise since the data will be used again in the next lesson.


Assessment possibility: Since each of the seventh and eighth grade math classes will have gathered data, the assessment will be for the groups to consolidate the data from the seventh grade and construct a graph and then to do the same for the eighth grade. In order to do this they will be given copies of graphs done in other classes. Since the students will have had experience with this type of data display, help from outside their group should not be needed. If help is needed, points will be deducted from their group score. Graphs will again be constructed on newsprint so they can be presented in the following class session.

Lesson Four is preparation for the field trip to the Rouge River plant: After a short KWL session to assess the prior knowledge of the students they will watch the two power point presentations that I have downloaded from the Rouge River website. We will then fill out Job Safety Analysis sheets with the tour in mind. This will be accomplished in groups of four. Group sharing will be at the end of this time. The next task will be to calculate the cost of the trip. Bus fees (\$50 per bus per hour – each bus holding 48 people), tour fees (\$7.50 per student and adult, teachers are admitted free), chaperone fees (one adult for each ten students) will need to be taken into consideration. In addition, only 75 people can be taken on any one tour. Tours leave every thirty minutes. Additional cost may be incurred due to the fact that the

plant is 27 miles from our school, making the round trip 54 miles – gas prices will have to be taken into consideration.


Cool stuff:

Assessing and activating prior knowledge: Show Power Point presentations from Rouge River website www.hfmgv.org/rouge



Next Slide

The Rouge: An Overview
Bring the Ford Rouge Factory Tour into your classroom! Use this presentation to engage your students through the examination of a variety of images that focus on the past, present, and future of the Rouge.



Begin: ▶



Henry Ford's Innovations at the Rouge

The Rouge was about more than simply production. It was also about innovation. Here are three of the many that made the Rouge a magnet for those wanting to learn how to improve their own industries.



G lass Making



Paper Mill



W orkers with D isabilities

Lesson Five is a work in progress which will be implemented after the field trip. I hope to procure the production figures for the Rouge River plant for 2004, the number of workers who work on the line, and the average time it takes for a truck to move from the beginning of the line to the end. Also, I hope to obtain the figures for how much of certain material the plant uses each year – ie. steel. With such figures the students can calculate a daily and a monthly average for production as well as a daily and monthly average material use. So far these statistics have eluded me, but I will continue to “mine” for them.

Standards addressed include elements from all of the following:

Strand I

Patterns, Relationships and Functions

Overview:

Patterns, relationships and functions comprise one of the most important themes in the study of mathematics. Mathematical thinking begins with the recognition of similarities among objects or events, proceeds to generalization and abstraction, and culminates in the ability to understand, explain and make predictions. Contexts that exhibit structure and regularity provide rich opportunities for describing the physical world, studying mathematics and solving problems.

Strand II

Geometry and Measurement

Overview:

We live in a three-dimensional world. In order to interpret and make sense of that world, students need both analytical and spatial abilities. Geometry and measurement, which involve notions of shape, size, position, and dimension, are used extensively to describe and understand the world around us.

Strand III

Data Analysis and Statistics

Overview:

We live in a sea of information. In order not to drown in the data that inundate our lives every day, we must be able to process and transform data into useful knowledge. The ability to interpret data and to make predictions and decisions based on data is an essential basic skill for every individual.

Strand IV

Number Sense and Numeration

Overview:

Number sense is to mathematics what vocabulary is to language. Students must learn to quantify and measure, concretely at first and increasingly more abstractly as they mature. They also must develop an understanding of numeration systems and of the structure of such systems. They must learn to estimate mathematical quantities and to represent and communicate mathematical ideas in the language of mathematics.

Strand V

Numerical and Algebraic Operations and Analytical Thinking

Overview:

The ability to represent quantitative situations with algebraic symbolism, numerical operations and algebraic thinking is essential to solving problems in significant contexts and applications. The concepts of number and variable and their symbolic representation and manipulation are central to the understanding of arithmetic and its generalization in algebra. The contemporary applications of mathematics in virtually every field of work and study rely on algebraic and analytic thinking and communication as fundamental tools.

Teacher Background in addition to Rouge River Power Point presentations:

THE ROUGE: A TIMELINE

1903	Ford Motor Company founded
1906	Ford Motor Company becomes America's largest car manufacturer producing 8729 cars
1908	Ford introduces the Model T
1908	William C. Durant forms General Motors
1910	Ford opens the Highland Park Plant
1913	Ford engineers introduce a moving assembly line for auto production
1915	Ford introduces the \$5 day wage for hourly workers
1915	Henry Ford purchases 2,000 acres of marshland along the Rouge River in Dearborn
1917	Construction of Rouge Plant begins
1918	First products of the Rouge are Eagle Boats for the US Navy
1921	Fordson tractor production begins at Rouge Plant
1924	First public tours of the Rouge Plant
1925	Walter P. Chrysler reorganizes Maxwell Motor Corp. into Chrysler Corp.
1926	Ford adopts 40 hour work week
1927	Model T production ends after more than 15 million are produced
1927	Ford loses first place in sales to Chevrolet
1927	Model A production begins at Rouge
1928	Tractor production discontinued at the Rouge
1928	Ford regains first place in sales
1929	Total Rouge employment climbs to 103,000
1932	First V-8 Ford car produced at Rouge
1937	Union organizers stage massive "sit-in" strikes at General Motors' plants in Flint
1937	Ford Service men attack union organizers in what becomes known at <u>The Battle of the Overpass</u>
1941	Ford signs contract with United Auto Workers, the last major auto company to do so

1942	World War II halts civilian car production
1943-45	War production at the Rouge contributes to Detroit's reputation as "The Arsenal of Democracy"
1945	Ford civilian truck and auto production resumes
1946	75,000 employed at the Rouge
1949	Ford introduces the first all new cars built at the Rouge since World War II
1953	60,000 employed at the Rouge
1953	The first Ford Thunderbird rolls off the line at the Rouge
1965	Ford Mustang begins production at the Rouge
1965	New yearly record for Rouge Plant Tours set with 239,669 visitors
1971	All time yearly record for Rouge Plant tours set with 243,175 visitors
1980	Rouge Plant tours end
1997	UAW and Ford Motor Company sign Rouge Viability Agreement to revitalize the Rouge
1999	Six workers are killed in an explosion at the Rouge Power House
2004	New F150 truck production begins at the Rouge in a newly constructed, state-of-the-art manufacturing facility
2004	Ford Rouge Factory Tours resume

PROGRAM GOALS

The field trip experience is designed to introduce students to the history and science of auto manufacturing. During this program students will:

- ❑ **Participate in two state-of-the-art multi-sensory film experiences that chronicle the history and future of automobile manufacturing.**
- ❑ **Visit the observation deck for a panoramic view of the 10- acre living roof on top of the Dearborn Truck Plant final assembly building and learn about other environmentally inspired innovations.**
- ❑ **View a world-class Ford assembly line via an elevated walk-way for an up-close look at how Ford F-150 pickup trucks are built.**
- ❑ **Walk through a gallery of legendary vehicles produced at the Rouge including the Ford Model A, Thunderbird, Mustang and the new F-150.**

PROGRAM LENGTH AND SEQUENCE

- **Bus trip** from Henry Ford Museum to Ford Rouge Factory Tour Visitor Center: **15 minutes**
- **Legacy Theater** – rare historic footage of Ford Motor Company and the Rouge plant: **13 minutes**
- **Art of Manufacturing Theater** – multi-sensory look at modern vehicle production: **14 minutes**
- **Observation Deck** – 80-foot-high overlook with focus on environmental features: **variable 5–15 minutes**
- **Elevated Walkway in Dearborn Truck Plant** – 1/3-mile walkway with informational computer interactive displays and an overlook of the final truck assembly process: **variable 30–45 minutes**
- **Legacy Gallery** – historic-vehicle gallery and accessible new Ford F-150 truck: **variable 5–15 minutes**
- **Bus trip** from Ford Rouge Factory Tour Visitor Center to Henry Ford Museum: **15 minutes**

LOGISTICS

All Ford Rouge Factory Tour participants depart from The Henry Ford, 20900 Oakwood Boulevard, Dearborn, Michigan. There is no public parking at the Ford Rouge Factory Tour Visitor Center.

School groups that arrive at The Henry Ford on their own bus transportation will remain on their buses to travel to the Visitor Center site after picking up their timed tickets at the clock tower. Extremely limited school bus parking will be available close to the Visitor Center for buses waiting for touring school groups.

School groups that travel in separate, private vehicles to The Henry Ford will travel together on the Ford Rouge Factory Tour buses to the Visitor Center site after picking up their timed tickets at the Clock tower. Buses return to The Henry Ford every 30 minutes, the last bus returns to The Henry Ford at approximately 5:15 pm daily.

The bus loading zone is outside of the Anderson Theater, between the clock tower and IMAX® Theatre entrances at Henry Ford Museum.

Fees must be paid in full a minimum of two weeks in advance of your visit. Tickets are nontransferable and nonrefundable. Tickets should be picked up at the Clock

tower cashier station at Henry Ford Museum on the day of your trip to Ford Rouge Factory Tour. Program Capacity is 75 participants every 30 minutes.

Tours depart every half hour, seven days per week starting at 9:30am. Timed tickets are required for all guests to manage theater and bus seating. The Ford Rouge Factory Tour is open from 9:30am – 5:00pm; closed Thanksgiving Day and Christmas Day.

Departure times are based on bus departure from The Henry Ford main campus. School groups should arrive 30 minutes before their ticketed departure time. Timed departures are available for:

9:30am	11:00am	12:30pm	2:00pm
10:00am	11:30am	1:00pm	2:30pm
10:30am	12:00pm	1:30pm	

The Ford Rouge Factory Tour Visitor Center is handicapped accessible. Each theater can accommodate up to four wheel-chair users per show.

Cameras or video recording equipment allowed only in Legacy Gallery and Observation Deck. Photography of any kind is strictly prohibited in the theaters and Dearborn Truck Plant. Actual vehicle production will vary on a daily basis, it is based on vehicle production needs and it is controlled by Ford Motor Company.

Because of limited vending and dining facilities at the Ford Rouge Factory Tour Visitor Center, it is recommended that students eat or purchase their lunches at The Henry Ford.

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