

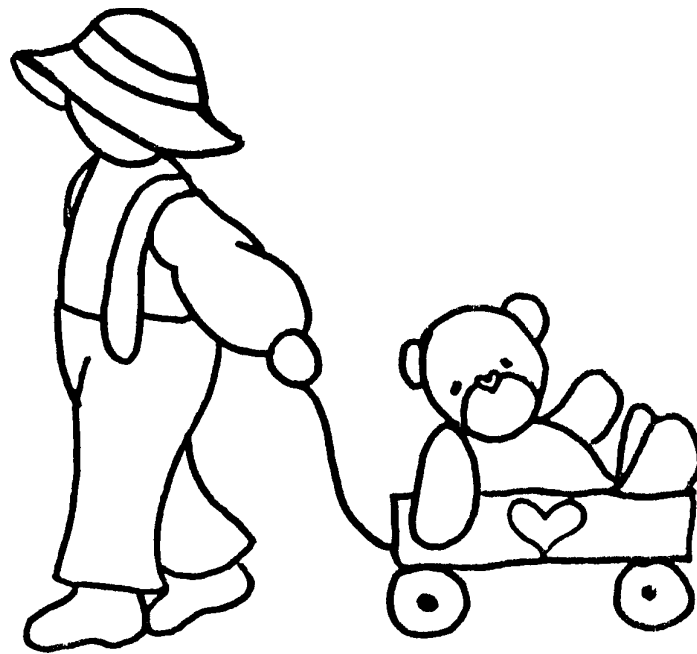


Applied Science

Our Technological World



THIRD GRADE BUILT ENVIRONMENT



**3 WEEKS
LESSON PLANS AND
ACTIVITIES**

APPLIED SCIENCE OVERVIEW OF THIRD GRADE

SCIENCE AND MATH

WEEK 1.

PRE: *Comparing objects mathematically.*

LAB: *Predicting and measuring objects.*

POST: *Comparing and contrasting objects.*

WEEK 2.

PRE: *Discovering lab equipment.*

LAB: *Measuring volume using a graduated cylinder.*

POST: *Comparing volume, mass, and weight.*

WEEK 3.

PRE: *Investigating a "new" discovery.*

LAB: *Experimenting with peanuts.*

POST: *Comparing inventors and scientists.*



PHYSICS

WEEK 4.

PRE: *Exploring magnetism.*

LAB: *Discovering magnetic force.*

POST: *Comparing objects that are magnetic and non-magnetic.*

WEEK 5.

PRE: *Comparing static and current electricity.*

LAB: *Exploring the origin of static electricity.*

POST: *Investigating lightning.*

TECHNOLOGY

WEEK 6.

PRE: *Exploring DC and AC current.*

LAB: *Comparing series and parallel circuits.*

POST: *Discovering how machines operate using electricity.*

WEEK 7.

PRE: *Investigating how you pay your energy bill.*

LAB: *Exploring small appliances.*

POST: *Evaluating electrical safety.*

BUILT ENVIRONMENT

WEEK 8.

PRE: *Comparing different modes of transportation.*

LAB: *Designing a train route to service a community.*

POST: *Investigating different types of trains.*

APPLIED SCIENCE - BUILT ENVIRONMENT (3)

PRE LAB

Students use a worksheet to explore transportation.

OBJECTIVES:

1. Exploring how electric energy has changed our society.
2. Comparing different modes of transportation.

VOCABULARY:

diesel
electric
electromagnetic
gas
transportation

MATERIALS:

worksheet



BACKGROUND:

The use of electricity has changed the face of the Earth. Electricity not only has made living easier, but is important to power different types of transportation. Many students do not realize how difficult it was to create a machine that moves on its own.

Transportation is a way to move objects from one location to another. Road, rail, water, air or pipelines are common means used today. The list below shows different forms of transportation and how they are powered.

TYPE	FUEL
carriage	horse, hay
airplane, truck	diesel
glider	air
train	diesel, electric, steam
cable car, trolley car	electricity
car	diesel, gas

PROCEDURE:

1. Go over different modes of transportation. In the lab, students will look closely at the development of trains and how they are powered.
2. Have students write a paragraph on the different types of transportation used in the past or used today.
3. There are many vehicles that are powered by electric motors supplied with electricity from distant generating stations. These vehicles include streetcars, electric trolleys, railway, rapid transit lines, and electrified main-line railroads.
4. Have students make a list of the different types of transportation on the board and then name the type of fuel that makes them move.

APPLIED SCIENCE - BUILT ENVIRONMENT (3) PRE

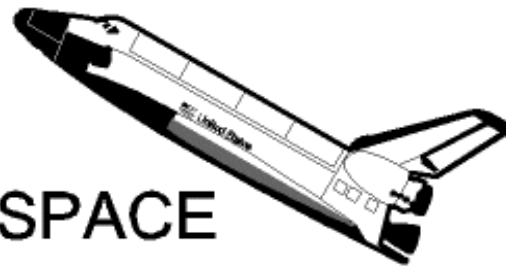
WATER



LAND



AIR



SPACE

APPLIED SCIENCE - BUILT ENVIRONMENT (3)

LAB

Students design a train through a city.

OBJECTIVES:

1. Discovering how trains work.
2. Designing a train route to service a community.

VOCABULARY:

caboose
coach
locomotive
pollution
train
urban planning

MATERIALS:

lab sheet
train sets



BACKGROUND:

The development of railways marks a great step in the progress of human civilization. During the 19th century, railways provided a reliable, low-cost, high volume system of land transportation. The self guiding system and the low rolling friction allowed a locomotive of relatively modest horsepower to pull a long train of cars.

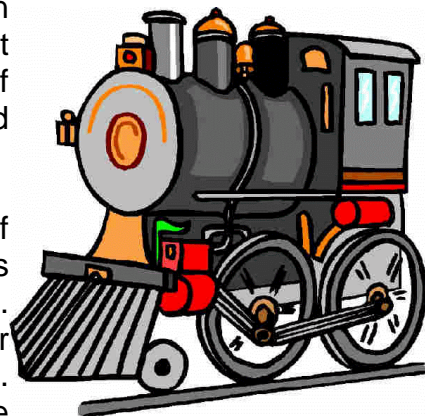
Cities evolved around the railways. The first trains were steam driven. The steam driven "Iron Horse," train was important in the development of our country. In the United States the first company to build a railroad for passenger service was the Baltimore and Ohio Railroad. They laid the first stone for a railroad on July 4, 1828. The tiny Tom Thumb steam engine puffed successfully along the tracks pulling the first passenger train. More than 40,000 steam engines were built between 1829 and 1949. The last commercially-built steam engine for a U.S. company was built by the Baldwin plant in Lima, Ohio. Most of the major railroad companies retired their steam engines in the mid 1960's. Today steam engines are found in museums and special events.

Different ways to move trains became cheaper and more efficient including coal, petroleum, and electricity. Today's trains are fueled mainly by diesel and electricity. Trains are the most inexpensive ways to move large items (i.e. new cars) to their destination. Many of the early towns were planned around the train station.

PROCEDURE:

1. In this lab, students will look at a model of an electric train. Many students may never have seen one put together, so this lab may take longer than expected. If students bring in their trains from home, it is easy to extend this lab.

2. Compare the different trains. Describe each of the major pieces and their function. The locomotive is where the energy comes from. It pulls all the other cars. The early trains used coal or wood to create steam for power. Most of today's locomotives are electric or diesel. Coach refers to the cars between the locomotive and the caboose.



3. Depending on the classroom layout, assemble tracks before the class meets. If students are interested, they can assemble the tracks before the lab. Follow the directions in the box. Make sure all the pieces are connected or the electric circuit will not be completed. An oval pattern works best the first time. If your students want to make more complicated structures, this can be done as an extension of the lab.

4. Have all students take a turn making the train go. This way they can get a feel for the speed that a train gets, even on a little set. On the lab sheet there are two activities, one for the students to design their own tracks through a community, and the other to answer questions about the activity. Designing tracks through a city to be efficient yet pleasing is called "urban planning". Making technology fit into society is not always easy.

APPLIED SCIENCE - BUILT ENVIRONMENT (3)

PROBLEM: Can you design a railway system that can service a community?

PREDICTION: _____

PROCEDURE:

MATERIALS: train set

Look at the train set that is set up. When it is your turn as the engineer, think about the following questions. Then return to your seat and answer them.

1. Describe the design of the tracks? _____

2. Name the parts of the train? _____

3. If the curves of the track are not designed correctly, what will happen and why?

BELOW IS THE COMMUNITY OF NORTH CITY, THEY WANT TO PUT A RAILWAY THROUGH THEIR COMMUNITY TO HELP SERVICE THE BIG FACTORIES. DESIGN A SYSTEM FOR THE TRACKS. (Remember, you can make tunnels, bridges, whatever you feel can be made.)



CONCLUSION: _____

APPLIED SCIENCE - BUILT ENVIRONMENT (3)

POST LAB

Students write a story about traveling by train in the early 1900's.

OBJECTIVES:

1. Investigating different types of trains.
2. Comparing steam, diesel electric, and electric locomotives.

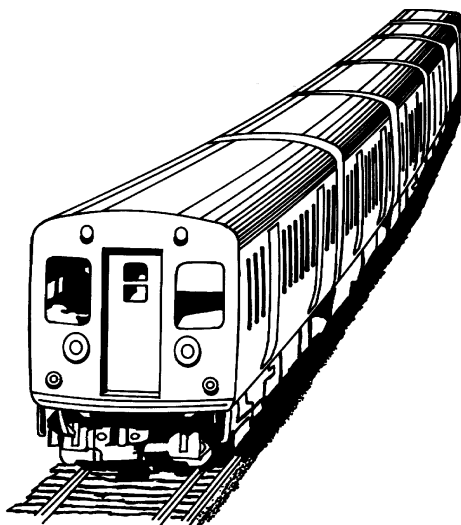
VOCABULARY:

diesel
electric
locomotive
steam

MATERIALS:

Internet
worksheet

BACKGROUND:



The railway mode of land transportation consists of one or more tracks, each having two parallel steel rails which move freight and passengers. Cars are pulled or pushed by a locomotive. On May 10, 1869, the first transcontinental route was created when the Union Pacific Railroad Company met Central Pacific. It was a big step in the development of the west. This event represented, for the first time, the means for items to be quickly moved between the east and west coast.

There are three types of fueling railway systems: electric, steam, and diesel electric. The steam and electric were common in the early days. The diesel electric is common today; but there is a push toward electric, which is non-polluting.

Steam engine - Carries own water supply for steam generation and can use either coal, oil or wood for heating the boiler.

Electric - Locomotive is not self sufficient - electric current is picked up from either an overhead conductor wire or a third rail mounted alongside the running rail. This is the most economical and efficient means of transportation, providing the traffic justifies the capital expenditure. Electric is quieter and non-polluting.

Diesel electric - Electricity is generated by diesel generators on the locomotive. Imagine being a child and riding on one of these trains!

PROCEDURE:

1. Tell students about the "Ophan Train." You can find more information by doing

an Internet search on "Orphan Trains." There are several sites with stories of the different children's experience.

The Orphan Train movement began in 1854 and continued until 1930. During this 75 year time span, somewhere between 150,000 and 200,000 orphaned, abandoned, and homeless children were sent "west" from New York on trains to find new families. There were two main organizations that "shipped" children west to new homes. They were: 1) The Children's Aid Society run by Rev.Charles Loring Brace, and 2) The New York Foundling Hospital, operated by the Sisters of Charity.

It was hoped by these organizations, that by sending these "orphans" out west to find new "families" they would have a better chance of leading a happy and productive life, than if left to fend for themselves on the streets of New York. Both of these charitable organizations are still in operation today. The first Kansas-bound Orphan Train arrived in the state in 1867, and the last Kansas train arrived in 1930 (the same year the Orphan Train movement officially ceased operations). During that time, it is estimated that between 5,000 and 6,000 children were placed in Kansas homes. Some of these children were adopted by their new Kansas families, but many were not.

2. Ask the students to travel in the shoes of these children. Have them write a paragraph on what it felt like to be on a train for the first time and leaving a world behind and traveling to a new experience.

Remember the trains in 1854 were steam, and the ones in 1930 were probably diesel.

TRAVELING BY TRAIN

