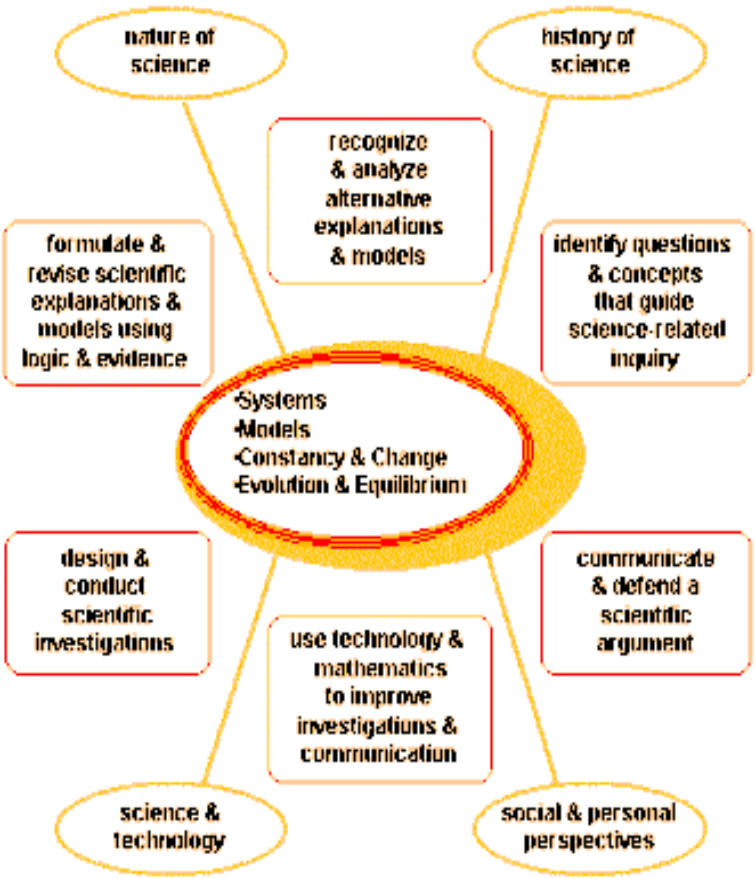
Mississippi Steamboat

LEARNING AREA: Scientific Concepts and Application
EDUCATIONAL LEVEL: Middle School, grades 6-8
CONTENT STANDARD: Physical Systems
Standard:
A student shall demonstrate an understanding of the fundamental laws and concepts of the physical world including properties of matter, physical and chemical changes, transfer of energy, and force and motion by:

1. formulating questions to be answered based on systematic observation;
2. designing and conducting investigations and field studies;
3. analyzing data to support or refute hypotheses by identifying patterns in data; and comparing results to known scientific theories, current models, or personal experience; and considering multiple interpretations of data;
4. describing how a premise is supported by scientific concepts, principles, theories, or laws; and
5. creating a model to illustrate a contemporary or historical concept, principle, theory, or law.

LARGE PROCESSES/CONCEPTS:



NEXT STEP: Assessment Task

ASSESSMENT TASK:

Mississippi Steamboat

Description:
The great steamships of the past century had complicated engines involving many moving gears, pistons, and metal shafts. But they depended upon a simple scientific principle: steam produced in a strong enclosure can develop a great deal of pressure. This steam pressure can be controlled and used to move pistons inside an engine. Or, it can be used in a much less complicated type of engine – a steam jet engine. This easy-to-build steamboat uses the simpler steam jet type of engine.

Products/Evidence of Learning:
Create a steamboat following the directions.

1. Alter the speed/efficiency of the steamboat by modifying the heat source or the engine.
2. Build another milk carton steamboat having its stem jet aimed parallel to the water at the stern of the boat, compare efficiency to original steamboat.
3. Write a formal report identifying the strengths and weaknesses of the steam engine component.
4. Identify why this is an important means of transportation.

Overview:

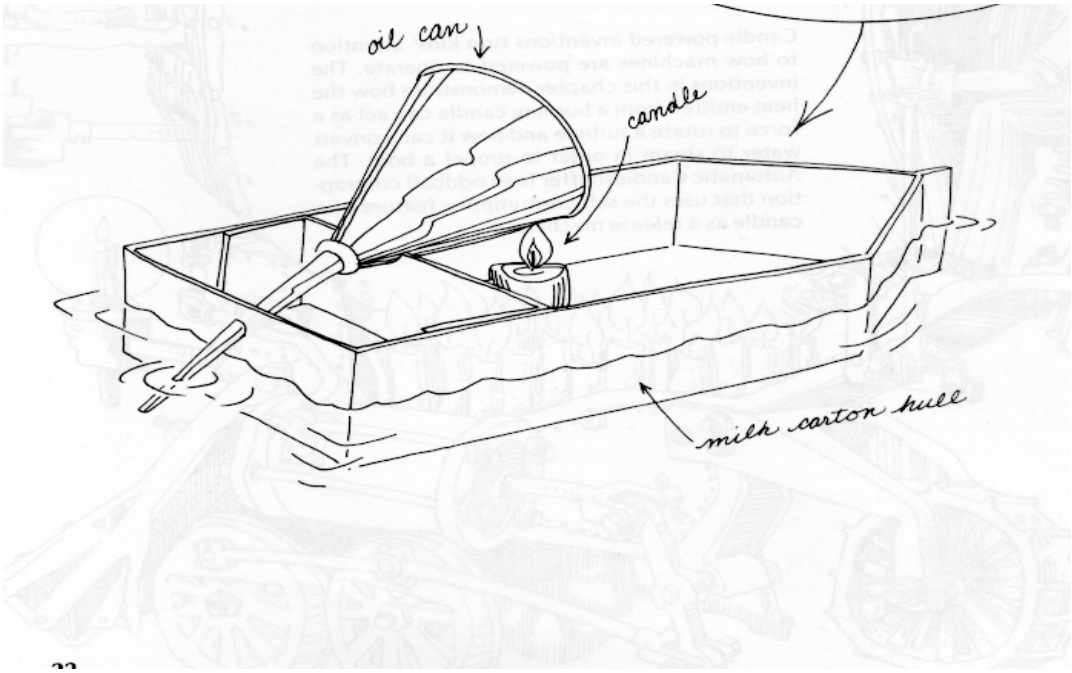
MATERIALS:
Knife or scissors
Quart or half-gallon milk carton
Small oil can ***(the standard, old-fashioned type shown in the drawing below)***
Nail or ice pick
Glue
Short candle
Matches

ASSESSMENT TASK---

Mississippi Steamboat

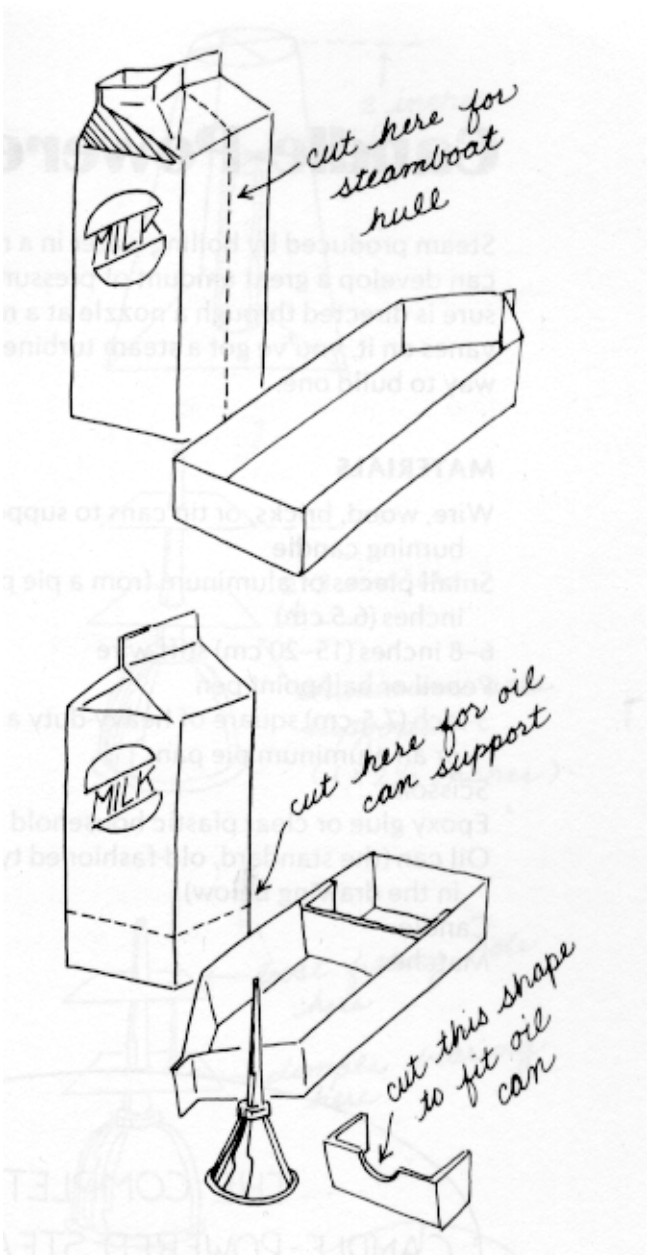
Construction of Steamboat:

1. Slice the milk carton lengthwise about 2 inches (about 5 cm) from one side. (measure from the back of the carton, the unopened side.) ** Use the 2-inch (5-cm) side of the carton as a hull of your steamboat.
2. Cut about 2 inches (5 cm) from the bottom of the unused portion of the cut milk carton. Fit this piece in place near the stern of your steamboat to form a support for its oil can engine.
3. Cut a semicircular notch at the top of the engine support to accommodate the neck of the oil can.
4. Use a nail or ice pick to bore a small hole in the center of the lowest part of the stern of your boat.
5. Now, slowly force the stem of the oil can through this hole from the inside of the boat until about 1-inch (2.5 cm) of the stem protrudes through the stern.
6. Place and glue the engine support in place so that it firmly holds the oil can as shown. Place the candle under the oil can boiler, and you're ready to get under way!
7. A child's swimming pool would be a good place for the steamboat's maiden voyage. Half fill the oil can with water and position it in the boat. Place the boat on the water, light the candle, and be patient while the oil can boiler builds up a head of steam. Bon voyage!



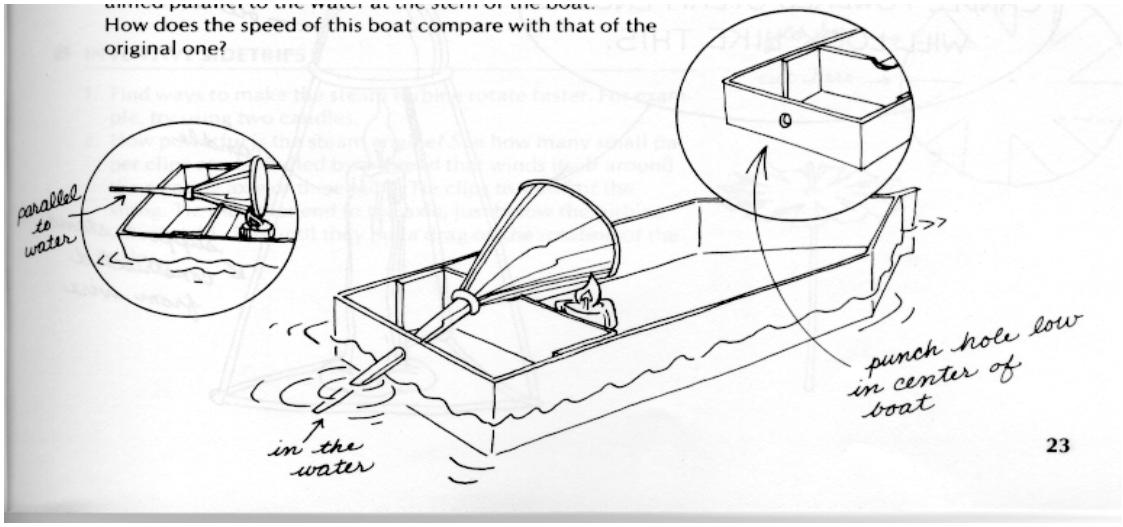
ASSESSMENT TASK---

Mississippi Steamboat



ASSESSMENT TASK---

Mississippi Steamboat



CHECKLIST:

STUDENT	TEACHER	
_____	_____	Constructed a candle-powered steamboat following written and oral directions
_____	_____	Shows that direct observations were sufficiently made
_____	_____	Identifies problems to their steamboat
_____	_____	Identifies solutions to the problems of their steamboat
_____	_____	Relates findings to new situation or large group findings
_____	_____	Identifies appropriate areas for further investigations
_____	_____	Demonstrates sufficient direct observations.
_____	_____	Accurately details and records observations relating the efficiency and design of their tugboat.
_____	_____	Writes a formal report identifying the strengths and weaknesses of the steam engine component.
_____	_____	Identifies why this is an important means of transportation.