# TECHNOLOGY, MATHEMATICS, AND CULTURES

**DePaul Center for Urban Education**

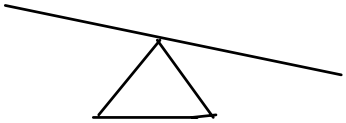
**A Guide for Teachers to use to:**
**> Explore Field Museum Exhibits**
**> Discover Technology in Your School**
**> Organize Your Own Exhibit**

## Part 1: Explore Field Museum Exhibits

Look in any exhibit at Field Museum that presents a culture.

Look for an example of any of the following kinds of simple machines. (They may not look like machines, but they are--a machine is "any device that provides a mechanical advantage--that is, allows a limited amount of effort to do useful work in lifting or moving a load." (Random House Encyclopedia)

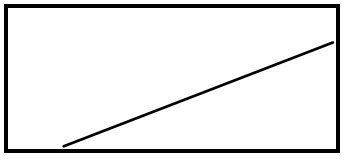
### The lever



This kind of machine magnifies effort so it is easier to move a load.
You will not necessarily see the fulcrum (the pivot). This is the first class of levers.

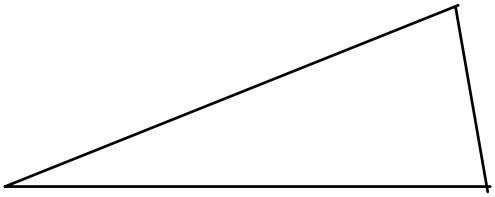
What work does the lever help people do?

### The inclined plane



This kind of machine is a ramp. The Ancient Egyptians probably used ramps to move the stones to build the pyramids.

What do people move with this inclined plane?



**The wedge**

A wedge is two inclined planes together. These are used to concentrate force.

What work do people use the wedge to do?

What kinds of mathematics have people applied to make these tools?
For example, they may not have used degrees, but each of these tools involves angles.

People invented mathematics just as they invented physics. What kinds of science and math principles do you see that these people knew--even though they did not have textbooks as we do today?

## Part 2: Discover Technology in Your Own School

INCLINED PLANES

Have your students identify examples of the inclined plane in your own school. (Start with the staircase.)

Make a list of the applications of the inclined plane. Depending upon the math level of your students, have them estimate the angle of the inclined planes they identify and the amount of weight these inclined planes enable people to move.

WEDGES

Have your students look in the classroom itself for examples of wedges. Then interview the school engineer, the lunchroom manager, and other members of the school staff. Ask them what wedges they use in their work.

WHEELS

Examine the school to identify various wheels. Some will be in clear view, such as wheels on carts. Others will be hidden, such as the wheels in gears. Is the wheel the most important invention? Discuss that question with your students after they find many examples.

## Part 3: Organize Your Own Exhibit

At today's workshop, you will receive several pieces of "hardware," each of which exemplifies technology. Have students organize an exhibit dealing with each of these items--and other items they collect. For example, set up a section about the inclined plane, including examples from your school and the screw that we are providing today. (How is the screw an inclined plane? Look closely at it to figure that out.)

On the next page are questions and statements you can include in the exhibit. The most important questions and statements, however, are the ones your students write. Encourage them to make an exhibit that explains how simple machines work--and how they enable people to do work with less time and effort. This is just the beginning of a project you can expand as far as the students' interest and imaginations can go. As they organize the exhibit, they will develop research, writing, and critical and creative thinking skills.

| kind of tool | questions/statements |
|---|---|
| **lever** | How is your arm like a lever?<br><br>Is a screwdriver a lever or an inclined plane? |
| **screw** | How is a screw like a wedge?<br><br>When you use a screwdriver, which tools are you using:<br><br>wedge inclined plane lever |
| **clothes pin** | A clothes pin is a combination of two inclined planes. They apply pressure because they are joined together by a clamp.<br><br>What are some other ways people fasten things together?<br><br>Which of them also involve inclined planes? |
| **pulley** | Pulleys are wheels that help move things. When you pull on a cord on a pulley, the energy you use is multiplied because you are pulling on twice as long a cord as if you were pulling directly on the cord.<br><br>Set up experiments in which you see how much easier it is to lift a weight with one pulley, two pulleys, and even more pulleys. |
| **screw and lever** | You have an item in the exhibit that is both a screw and a lever. Which is it? |
| **velcro** | How does velcro work? What are some ways to use this invention? |