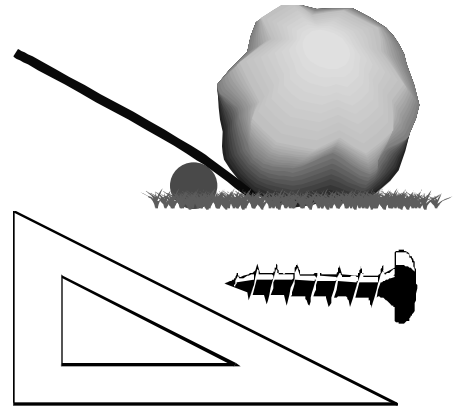


Graphs, Charts, and Tables
A study of Simple Machines
for 7th grade students.



Graphs, charts and tables are always appropriate when any type of data collection is involved. Students must be responsible for their construction. They choose which type based on what the data is to show.

Science TEKS

7th Grade - Charts, Graphs, and Tables / Force and Motion -

- (7.2) (E) the student is expected to construct simple graphs, tables, maps, and charts to organize, examine, and evaluate information.
- (7.6) The student knows that there is a relationship between force and motion. The student is expected to:
- (A) demonstrate basic relationships between forces and motion using simple machines including pulleys and levers;
 - (B) demonstrate that an object will remain at rest or move at a constant speed and in a straight line if it is not being subjected to an unbalanced force; and
 - (C) relate forces to basic processes in living organisms including the flow of blood and the emergence of seedlings.

Math TEKS

7th Grade - Probability and Statistics

- (11) The student understands that the way a set of data is displayed influences its interpretation. The student is expected to:
- (A) select and use an appropriate representation for presenting collected data and justify the selection; and
 - (B) make inferences and convincing arguments based on an analysis of given or collected data.

Materials to be used by teacher:

Digital Camera - if available

Materials for each group of 3 students:

Paper, Pencils, Hall Pass

Procedure:

1. Have students divided up into groups of 2 or 3. Students will go on a “scavenger hunt” to document as many different types of simple machines they can find in the school. Students should be allowed to go outside, into the halls, into bathrooms, and into the office if possible.
2. Students return to classroom and make a **TABLE** of the items by distinguishing between inclined planes, wedges, screws, levers, pulleys, and wheel & axle and the numbers found of each type.
3. Students should create a **CHART** of pictures that shows all of the items they found. If digital camera is available, it can be used by groups to document simple machines in place of drawing them.
4. Students decide which type of **GRAPH** would be appropriate for displaying their data.
5. Students will write at least 5 sentences comparing their data with one other group’s data.

Definitions of Simple Machines

Inclined Plane

Ramps, sloping roads, chisels, hatchets, plows, air hammers, carpenters planes---all of these are examples of the fourth basic machine: The inclined plane and its active twin brother the wedge. In the broadest sense, the wedge includes all devices for cutting and piercing---everything from a kitchen knife to the 'Flying Wedge' of football, a play so effective in splitting the opponents' formation it was outlawed.

Wedge

The wedge is the active twin of the inclined plane. It does useful work by moving. In contrast, the inclined plane always remains stationary. This simple machine consists of a pair of inclined planes set face-to-face that can sustain relative sliding or rolling motion. By moving one plane relative to the other, a wedge is capable of building up enormous force in a direction perpendicular to that of the moving wedge. Force multiplication varies inversely with the size of the wedge angle; a sharp wedge (small inclined angle) yields a large force. With adequate friction at the interfaces, the wedge becomes a separating, holding and stopping device with countless mechanical applications.

Screw

It can be looked at as a twisted wedge that derives its power not from percussion but from being turned by a lever. In other words, it is a cylinder with an inclined plane wrapped around it. The most famous screws of antiquity were those of Archimedes...one of them designed to raise water and another enabled him to drag a fully loaded three masted ship onto dry land!

Lever

With a tool, like a hand shovel, however, you should win the battle. Any tool that pries something loose is a lever. A lever is an arm that "pivots" (or turns) against a "fulcrum" (or point). Think of the claw end of a hammer that you use to pry nails loose. It's a lever. It's a curved arm that rests against a point on a surface. As you rotate the curved arm, it pries the nail loose from the surface. And that's hard work!

Wheel & Axle

Another kind of lever, the wheel and axle, moves objects across distances. The wheel, the round end, turns the axle, the cylindrical post, causing movement. On a wagon, for example, the bucket rests on top of the axle. As the wheel rotates the axle, the wagon moves. On a truck, for example, the cargo hold rests on top of several axles. As the wheels rotate the axles, the truck moves.

Pulley

Instead of an axle, the wheel could also rotate a rope or cord. This variation of the wheel and axle is the pulley. In a pulley, a cord wraps around a wheel. As the wheel rotates, the cord moves in either direction. Now, attach a hook to the cord, and you can use the wheel's rotation to raise and lower objects. On a flagpole, for example, a rope is attached to a pulley. On the rope, there are usually two hooks. The cord rotates around the pulley and lowers the hooks where you can attach the flag. Then, rotate the cord and the flag raises high on the pole.

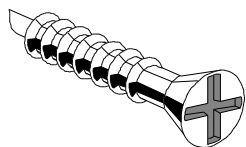
Chart of Simple Machines in our School

Inclined Plane



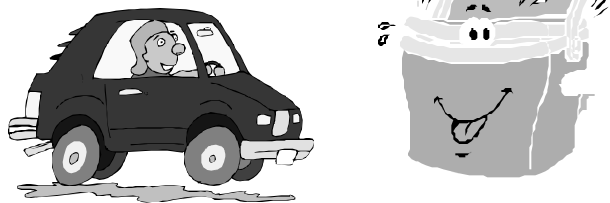
Ramps for Wheelchairs
(One at each entrance of our building - 5)

Screw



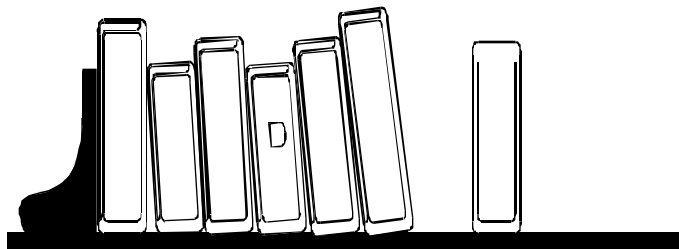
In the doors, holding up pictures,
in the desks, in the plug panels...
everywhere! At least 100!

Wheel and Axle



Cars in the parking lot - (30 x2 axles =) 60
Cooler in Gym for away games, has wheels - 1

Wedge

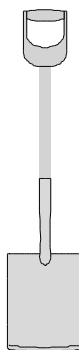


Book Ends in Library (20)

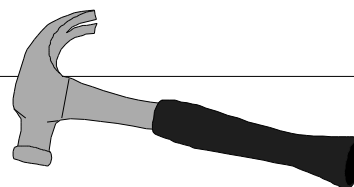


Door Stops (8)

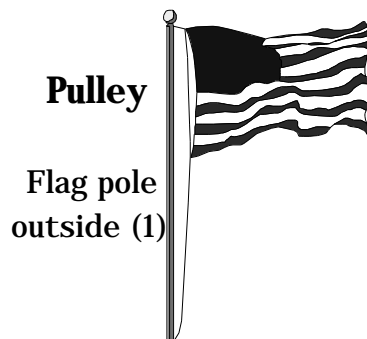
Lever



Shovel, as it lifts up dirt
when the custodian is
gardening. Hammer, as it
removed a nail .



Pulley

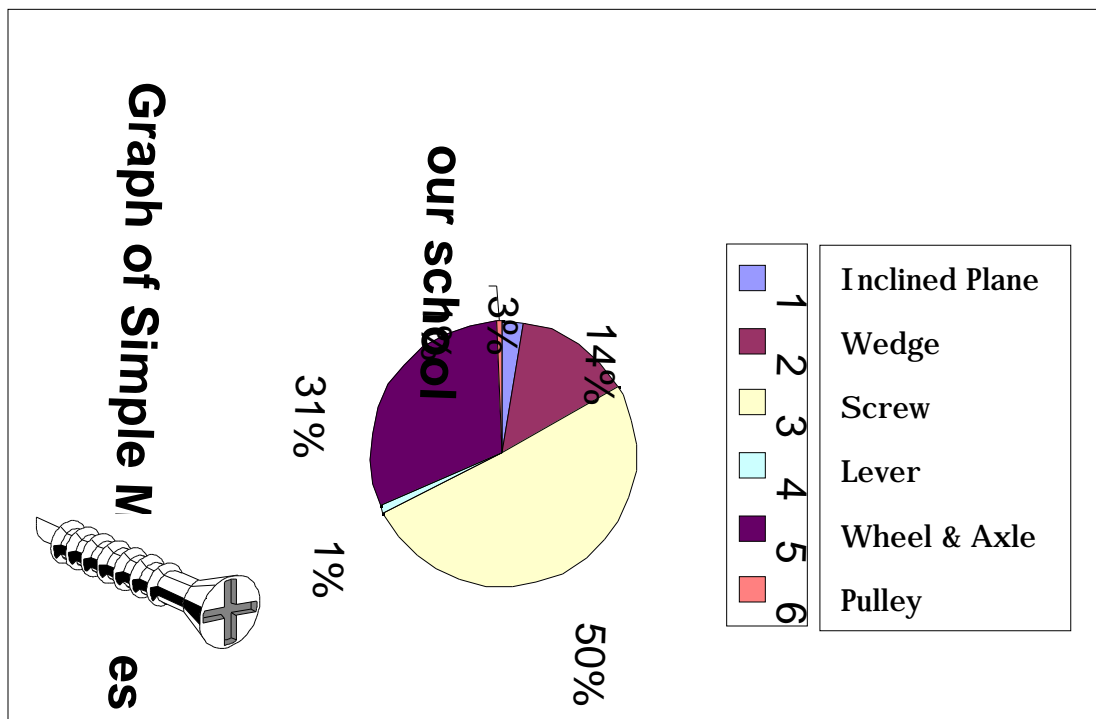


Flag pole
outside (1)

Simple Machines!

Table of Simple Machines
found at our School

Type of Simple Machine	Number found
Inclined Plane	5
Wedge	28
Screw	100
Lever	2
Wheel & Axle	61
Pulley	1



From this graph you can see that the most common type of Simple Machine found by our group was the screw. When we compared our data with another group, they showed less wheel & axles, because they did not look outside. Cars took up most of that category for our group. Other than that, they had screw's as the most common like we did, and only had a few inclined planes and wedges. Also, they didn't find any pulleys.