Activating Strategy: How did ancient people build massive structures such as the pyramids in Egypt and Stonehenge?

If we did not have the large machines that we have today for building, would we still be able to make these large structures? Why?
Essential Question: How do simple machines make life easier for us?

Standard:
S8P3c. Demonstrate the effect of simple machines (lever, inclined plane, pulley, wedge, screw, and wheel and axle) on work.
Use the Simple Machines Notes Sheet during the lesson.

Be sure to draw illustrations for each concept shown on the notes sheet.
Work is when an applied force causes an object to move in the direction of the force.
Suppose you try to push a brick wall over. Is this considered work? Why or why not?
No. Work is done only when an object **moves in the same direction** of the force that is being applied.

With your seat partner, list two examples of work and two examples of NO work.
http://www.classzone.com/books/ml_science_share/vis_sim/mfm05_pg113_work/mfm05_pg113_work.html

What did you notice in the simulation?
Work = Force x distance

W = F x d
A machine is a device that makes work easier by changing the size or direction of a force.

Look at the list below and identify which are considered machines:

• Can opener
• Doorknob
• Brake
• Knife
Machines

✦ There are simple machines and complex machines
✦ Complex machines have 2 or more simple machines
✦ There are six (6) types of simple machines: inclined plane, wedge, screw, lever, pulley, and wheel and axle
Inclined Plane
Inclined Plane

- Straight, slanted surface
- Makes work easier because it is easier to move something to a higher or lower place
With your seat partner, identify at least 3-4 examples of an inclined plane.
Inclined Planes

Steps

Bathtub

Sloping Roads

Ramp
Inclined Planes

Other examples:

http://www.mikids.com/SMachinesInclinedPlanes.htm

Playground slide, ski jump, animal ramp, wheelchair ramp, etc.
Add these and any other examples of inclined planes to your Simple Machines Graphic Organizer.
Wedge
Wedge

- Inclined plane that moves
- Two inclined planes joined back to back
- Wider or thicker at one end than at the other
- Makes work easier because when moved, a wedge cuts, splits, or pries apart objects (including air and water)
With your seat partner, identify 3-4 examples of a wedge
Wedge

Axe

Zipper

Knife

Boat

Stern

Bottle Opener
Wedge

Other examples:

http://www.mikids.com/SMachinesWedges.htm

Door stop, forklift “forks”, teeth
Add these and any other examples of a wedge to your Simple Machines Graphic Organizer.
Screw
Screw

- Inclined plane wrapped around a cylinder with a wedge at the tip
- Makes work easier because it applies lots of force with little effort
- Makes work easier because it is used to hold things together
Think, Pair, Share

✶ Identify 3-4 examples of screws
✶ Do more threads on a screw make work easier or harder? Why?
✶ Why might a screw be called a complex machine?
Screws

- Swivel stool
- Drill bits
- Cork screw
- Jar lid
Screw

❖ More threads on a screw make it easier to turn, but it takes longer

❖ A screw might be called a complex machine because it has both an inclined plane and a wedge at its tip
Add these and any other examples of a screw to your Simple Machines Graphic Organizer.
Lever
Lever

- Made up of a bar that pivots at a fixed point called a fulcrum
- Force applied to a lever is called the effort
- Object moved is the load
- Three classes of levers
Levers-First Class

In a first class lever the fulcrum is in the middle and the load and effort is on either side.
With your seat partner, list 3-4 examples of a First Class Lever.
Levers – First Class

Seesaw

Hammer’s claws

Shovel

Scissors
Add these and any other examples of a first class lever to your Simple Machines Graphic Organizer.
In a second class lever the fulcrum is at the end, with the load in the middle.
With your seat partner, list 3-4 examples of a Second Class Lever.
Levers – Second Class

Wheelbarrow

Stapler

Nut cracker
Add these and any other examples of a second class lever to your Simple Machines Graphic Organizer.
Levers-Third Class

In a third class lever the fulcrum is again at the end, but the effort is in the middle.
With your seat partner, list 3-4 examples of a Third Class Lever.
Levers – Third Class

- Fishing Pole
- Broom
- Tongs
- Tweezers
Add these and any other examples of a third class lever to your Simple Machines Graphic Organizer.
Other examples of levers:

http://www.mikids.com/SMachinesLevers.htm

Critical Thinking: What is the relationship between the location of the fulcrum in a lever and effort?

The closer the fulcrum is to the load, the less effort you will need
Types of Levers

Task Rotation

[see resources]
Wheel and Axle
Wheel and Axle

- Consists of two circular objects of different sizes
- A wheel is connected to a post (axle)
- Wheel is larger than the axle
- Makes work easier because it applies more force or lifts a heavy load with less effort
With your seat partner, list 3-4 examples of a Wheel and Axle.
Wheel and Axle

Door knob

Wrench and bolt

Well crank

Steering wheel
Add these and any other examples of a Wheel and Axle to your Simple Machines Graphic Organizer.
Pulley
Pulley

- Wheel and axle with a groove around the outside
- A pulley needs a rope, chain or belt around the groove to make it do work
- Pulley systems can consist of one or more fixed pulleys, one or more moveable pulleys, or both fixed and movable pulleys.
- Makes work easier by changing the direction of the force or multiplying the effort used
With your seat partner, list 3-4 examples of a Pulley.
Pulley

Ski Lift

Flag Pole

Clothesline

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Add these and any other examples of a Pulley to your Simple Machines Graphic Organizer.
Complex Machines

Simple Machines can be put together in different ways to make complex machines
Optional Activities

- Simple Machine Scavenger Hunt
- Simple Machines Category Cards
- What Would You Use? Handout
- Rube Goldberg Projects
- Pinball Wizard Simple Machines
- Target Practice Simple Machine
The relationship between Wile E. Coyote and the Road Runner is an eternal battle of need versus speed, aggravation versus acceleration. The luckless Wile E. Coyote comes up with increasingly elaborate and seemingly foolproof schemes to snare Road Runner who, oblivious to the danger, always eludes the pathetic coyote’s painstaking plans.

Use your graphic organizer and knowledge about simple machines to write a short story describing Wile E. Coyote’s use of the six types of simple machines to try and catch Road Runner. Be sure to include all six types of simple machines. They can be used separately, or combined for a more elaborate plan.

http://www.youtube.com/watch?v=8H41zbqrwVo