

INSTRUCTIONS FOR TEACHERS

Pulley Systems

1. Fill all three buckets with the same amount of golf balls
2. Have each student pull the rope on each bucket and point out to them the different forces that need to be applied
3. To demonstrate the different lengths of rope required to lift the weight, have a student grab all three ropes with one hand and pull them. They should see that all three buckets raise different amounts

Paddle Wheel

1. Place six or seven golf balls in the input trough (may have to hold the wheel in place doing so)
2. Have a student turn the wheel slowly so that a ball feeds into each blade of the wheel. They should notice:
 - a. The vertical distance they are lifting the balls as well as the horizontal distance
 - b. The force they have to apply to the handle (which the teacher can point out is actually creating a moment about the axle of the wheel)
 - c. The continuous motion that is created by using a wheel

Archimedes' Screw

1. Hold the screw at about a 20 degree incline and have a student place one golf ball in the lower end
2. If the higher end of the screw is in the teacher's right hand, rotate the screw away from the teacher; otherwise rotate towards the teacher
3. After one rotation, another golf ball can be placed in the lower end. This can be repeated to add as many golf balls as needed
4. After five rotations, pause and show the students the underside of the screw. This should show the progress that's been made. Then continue rotating until all the balls come out the higher end
5. The students should notice:
 - a. The continuous motion that is created by using a screw
 - b. The horizontal and vertical displacements created
 - c. More viscous fluids/particulates can be accommodated as opposed to the paddle wheel, but at a trade-off of speed
 - d. An inclined plane is essentially what is moving the golf balls up the gradient