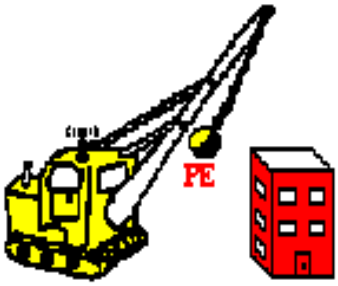
Work to Energy Transformation

Read from **Lesson 2** of the **Work, Energy and Power** chapter at **The Physics Classroom:**

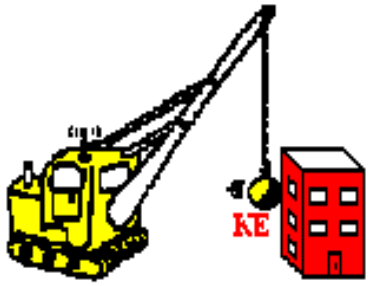
http://www.physicsclassroom.com/Class/energy/u5l2b.html
http://www.physicsclassroom.com/Class/energy/u5l2bb.html

MOP Connection: Work and Energy: Assignments WE9 and WE10

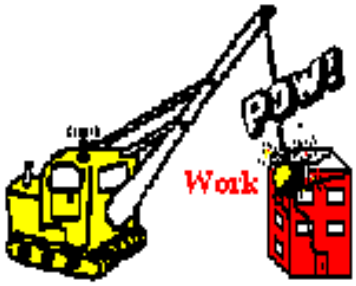
1. A wrecking ball is raised to its highest point (State A), possessing 6000 J of PE relative to its lowest location (State B). The wrecking ball strikes a building and comes to a resting position (State C). Determine the kinetic energy of the ball at state B. _____ Determine the work done on the ball in going from State B to State C. _____



State A

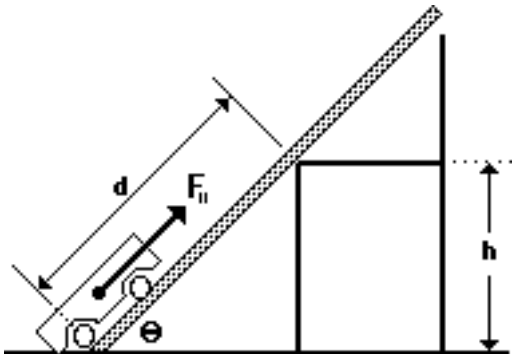


State B



State C

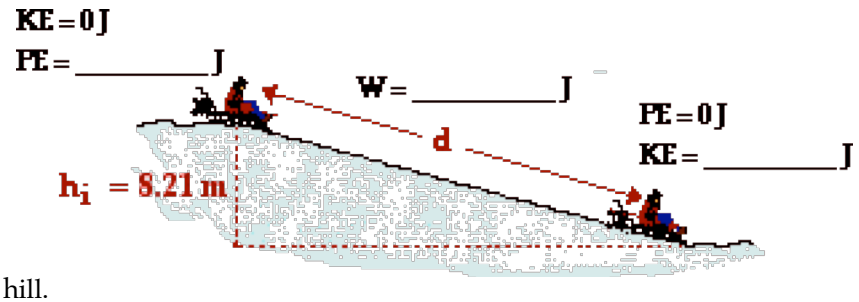
2. In a physics lab, a 3.0-kg cart is pulled at a constant speed along an inclined plane (with a force parallel to the plane) to a height of 0.500 m. The angle of incline was altered in each consecutive trial. It was found that each angle required the same amount of work to elevate the cart to the same height. Fill in the following table. (**HINT**: $F_{app} = F_{parallel} = m \bullet g \bullet \sin \theta$.)



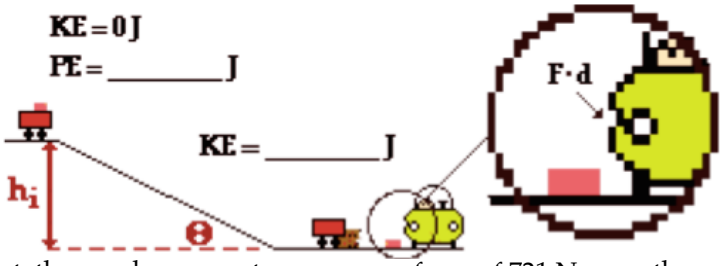
	θ (°)	h (m)	ΔPE (J)	$F_{parallel}$ (N)	d (m)	Work (J)
a.	15	0.500 m				
b.	20	0.500 m				
c.	25	0.500 m				
d.	35	0.500 m				
e.	45	0.500 m				

Show sample calculations below:

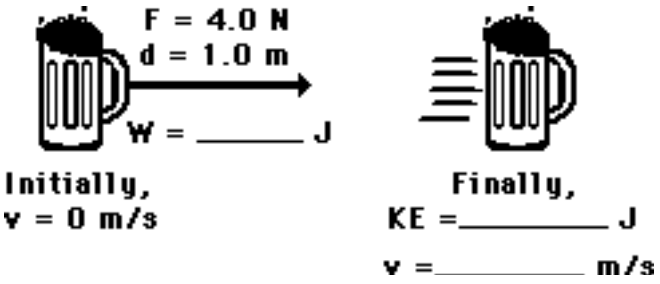
3. A 56.9 kg sledder descends an 8.21-meter high hill, encountering a friction force of 11.7 N. Fill in the blanks and determine the speed of the sledder after traveling the 31.7 meters to the bottom of the hill.



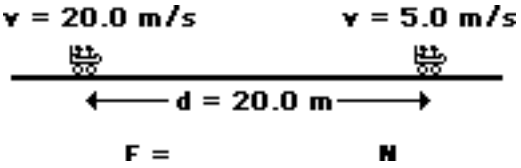
4. A 0.750-kg peach can is at rest in a shopping cart at the edge of a hill. A strong wind sets it into motion, sending down a 6.32-meter high hill. The cart hits a tree stump. But the peach can, being in motion, continues in motion until it finally collides with a car. Upon impact, the peach can exerts an average force of 721 N upon the car body. Fill in the blanks and determine the depth of the dent.



5. Pete Zaria applies a 4.0-N force to a 1.0-kg mug of root beer to accelerate it over a distance of 1.0-meter along the counter top. Determine the work done by Pete on the mug and the mug's final kinetic energy and final velocity. **PSYW**

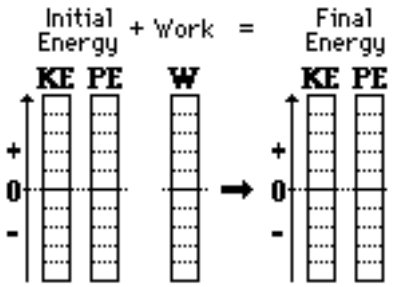


6. A 600-kg roller coaster car (includes passenger mass) is moving at 20.0 m/s. The hydraulic braking system in the track applies an external force to slow the car to a speed of 5.0 m/s over a distance of 20.0 meters. Determine the force that acts upon the car. **PSYW**

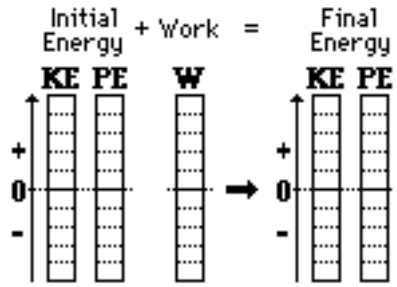


7. Construct work-energy bar charts for problems #5 and #6.

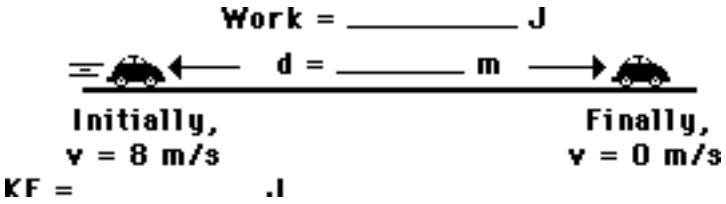
Problem #5



Problem #6



8. Vera is driving her 1000-kg car at a speed of 8.0 m/s. When Vera slams on the brakes, the ground exerts a 8000-N frictional force to bring the car to a stop.



Determine the initial kinetic energy of the car, the work done by friction on the car, and the stopping distance of the car. **PSYW**

9. If Vera's speed (in Question #9) were increased to 24.0 m/s, then what would be the new stopping distance? _____ In other words, how many times greater is the stopping distance if the speed is tripled? _____ Explain.