Physics A: Conservation of Energy

Scene #	Description	Narration
1	A roller coaster is drawn on a white background. A simple blue rectangular roller coaster car is at the beginning of the roller coaster. At the beginning of the coaster underneath the car the narrator writes in red TE=0.	One helpful way to understand the law of conservation of energy is think of how it applies to roller coasters. So imagine this roller coaster we have in front of us right here. We start here at the loading station, where we don't have any height if this dotted line represents the ground. We don't have any height and we are not moving. So we don't have any velocity. Thus, our total energy is zero. We don't have any energy.
	Going up the first hill the narrator writes in red the word “work”.	So in order for this roller coaster to be fun at all, we're going to need to put some energy into the system. So that's done by putting work in on this hill. That's usually done by a motor that carries the car up to the top of the hill. And all that work that goes in gives the system total energy in the form of gravitational potential energy. Gravitational potential energy is energy that is due entirely to the object's height above ground.
	At the top of the first hill he writes in red TE=GPE. Underneath that hill as he explains GPE he draws a line and rights h by the line in red. Half way down the hill the narrator writes in red TE=GPE + KE	So now we're at the top of this hill, we have tons of gravitational potential energy, but we're not moving. So all of our energy is just in the form of gravitational potential energy. But as we start moving down this hill here, we do have some gravitational potential energy still because we still have some height, but we've converted some of our gravitational potential energy into kinetic energy.
	At the bottom of the hill the narrator writes in red TE=KE.	Kinetic energy is energy from velocity. And as we gain velocity by going down this hill, eventually we reach the bottom of the hill and our total energy is entirely comprised of kinetic energy, that's energy just due to the object's velocity.
	At the top of the loop he writes TE= GPE + KE	As we enter this loop here, we get to the top of the loop. And again, we now have a mixture of energy. We have some gravitational potential

		energy due to this height here, as well as some kinetic energy due to our velocity going through the loop.
	Exiting the loop he writes TE=KE	Exiting the loop, we get to the bottom here. And again, our total energy is entirely going to be in the form of kinetic energy, just from our velocity.
	At the top of the last hill he writes TE=GPE+KE.	And we get to the top of this last hill where again, we're going to have a mixture of gravitational potential energy and kinetic energy.
	At the bottom of the hill the narrator writes –work.	And as we reach the bottom of the hill and the brakes are applied, the brakes do negative work-- that is to say they take kinetic energy, they take mechanical energy out of the system, and that energy is just dissipated as heat into the air. And then we're left with, again, no height and no velocity so people can get back on the cart for the next ride.