Popcorn Relay Race

The purpose of this activity is to help students visualize the intangible concept of energy, (the 1st and 2nd Laws of Thermodynamics) using a concrete process, a relay using popcorn.

1st Law of Thermodynamics –

The 1st Law is often called the *Law of Conservation of Energy*. This Law states energy cannot be created or destroyed, it just changes forms. Thus, the total amount of energy available in the Universe is constant.

2nd Law of Thermodynamics –

Energy transfers from useful to less useful forms. Energy flows in one irreversible direction. It cannot be recycled or reused. As, energy transfers, eat is lost. This law also predicts *entropy*, the measure of disorder in a system. Because, heat is lost when energy is transferred, entropy always increases with time. Eventually, because of the 2nd Law of Thermodynamics, energy in the Universe is becoming less useful over time.

In this activity, students run a relay race using 5 people. The tallest person with the biggest hands (holds the most energy) is first while the shortest person with the smallest hands is last.

1. Fill the hands of the tallest person with popcorn representing energy. Drop the popcorn into a tray, then count the kernels.
2. Run across the yard with open hands and then return. Drop the popcorn into a tray and count the kernels before the next person picks it up to run.
3. Repeat this process , with all members, transferring the kernels and counting them upon return.
4. Each time the popcorn is carried, some is lost because just like when energy transfers, it is impossible to run with popcorn without dropping some.

Student (tallest)	*Sun*	*Producer*	*Herbivore*	*1st carnivore*	*2nd carnivore (shorest)*

Analysis Questions

1. What does the popcorn represent? _____
2. What does the handing off the popcorn represent?
3. What does the running represent?
4. What law is simulated when the popcorn is handed of to the nearest member of the food web?
5. What would happen to the next organism if the popcorn was not handed of?
6. What law is simulated when popcorn falls either as you run or as you hand off the popcorn to next trophic level?
7. What does the popcorn on the ground represent?
8. Within a food web , how much energy is actually transferred from one trophic level to another?
9. Based on the simulation and your understanding of the laws of energy , why is it so important to protect the producers?
10. What is the source of the gasoline that is going in the tank?
11. Why is gasoline referred to as a non-renewable resource?
12. Explain why conventional cars are only 25-30% efficient, using only ¼ of ach gallon of each to actually run the car. where does the other energy go?