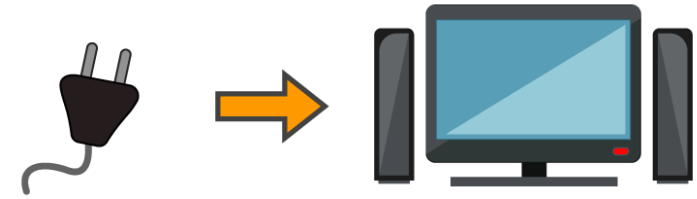
Name: _____ Period: _____ Date: _____

Energy Conservation Guided Notes – Student Edition

Energy Changes

When energy is passed from one object to another, unchanged, it is called an energy _____. For example, when you sit by the fireplace, the heat is transferred from the fire to your body by _____, making you feel _____.

In many situations, however, the type of energy changes _____, sometimes multiple times. This is called an energy _____. For example, when you turn on your computer or TV, the electrical energy from the grid is transformed into _____, light, and _____ energy.



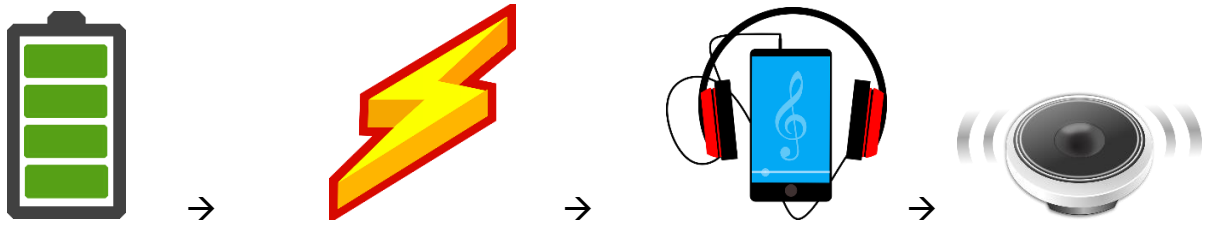
Energy Chains

We can trace the _____, of energy transformations back to its original _____ and summarize it as a simple flow diagram called an _____ _____. Energy chains may only show _____ transformation from one type of energy into another, or they may show _____, transformations. The example below shows an energy chain for music that is being listened to on a device which has multiple energy changes occurring at once:

The chemical energy is stored in the battery of the device. This is then transformed into electrical energy as it moves along the wires and into kinetic energy as the speakers vibrate. The vibrations create regions of high and low pressure which is called sound energy.

This can be summarized as:

_____ → _____ _____ → _____ _____ → _____ _____



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The Law of Conservation of Energy

When energy is either transformed or transferred the amount of energy present before and after remains the _____. This is known as the law of _____ of energy. This law states that:

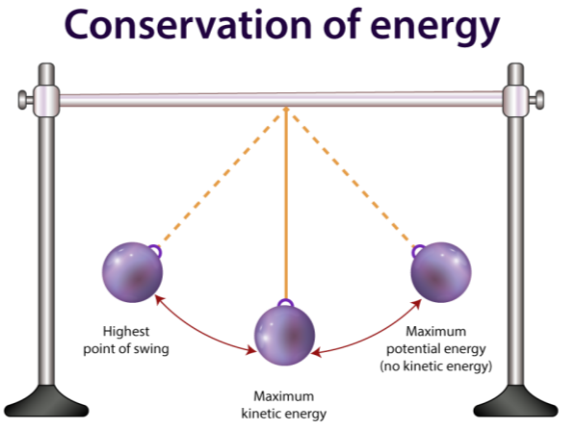
In a closed system, energy is not created or destroyed, but is transformed from one form to another.

This law tells us that:

1. All energy comes from somewhere i.e., it must have a _____ and is never created out of _____. All energy chains usually start with some form of _____energy such as the nuclear energy from the reactions in the sun.
2. Energy cannot _____. Instead, the energy changes into other _____ forms and eventually transforms into _____ energy, which is sometimes an unusable form, especially when it is heat energy generated by _____.

Example:

The pendulum in the diagram to the right, demonstrates the law of energy conservation. At the highest point in its swing-path, there is maximum _____ _____energy and no _____ _____. This can be observed when the pendulum briefly pauses at the top of its swing, before changing _____.



As the pendulum begins to swing backwards, the _____ _____energy is transformed into _____ _____. The amount of kinetic energy reaches its maximum at the _____ point on its path and gravitational potential energy will be at its _____. The conversion back to gravitational potential energy occurs again as it continues to swing _____.

This transformation between kinetic energy and gravitational potential energy continues to occur and the total mechanical energy (the _____ energy and _____ energy combined) remains _____. Eventually, the pendulum will slowly stop swinging. Since with each swing, a small amount of energy is converted to _____ energy.

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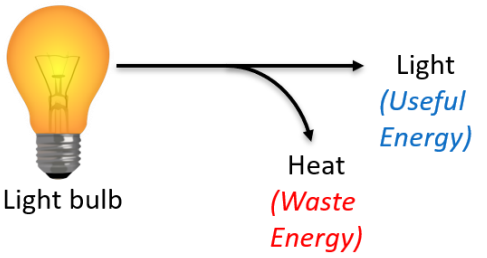
Energy Efficiency

The law of energy conservation is used when calculating how _____an appliance or device is at _____ one type of energy into another. The amount of energy supplied to the appliance from the mains electricity, or appliance's battery is called the energy _____. This is the energy which the appliance transforms into _____ forms such as heat and light etc. Once this transformation has occurred, the energy is then called the energy _____. According to the law of energy conservation:

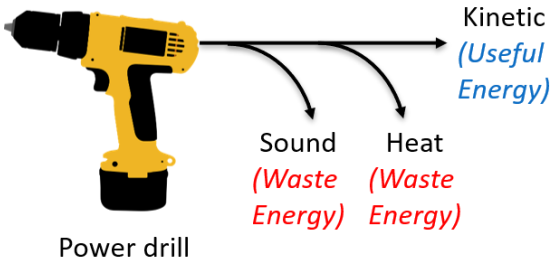
Energy Input = Energy Output

However, not all the energy which is put into an appliance is _____ energy. Some of it is _____ during the transformation as it becomes an unusable form e.g., heat produced by _____. This is referred to as _____ energy. We can summarize this relationship using the following equation:



Energy Output = Useful Energy + Waste Energy

To work out the efficiency of an appliance or device we can use the equation:



Efficiency (%) = Useful Energy x 100

Energy Input

Example problem:

A light bulb uses 100 joules of electrical energy each second and wastes 90J of this energy as heat. Find the energy efficiency of this bulb.

- Step One: *Work out the amount of useful energy.*

  Energy input = energy output = _____

  Waste energy = _____

  Useful energy = _____

- Step Two: *Calculate the energy efficiency.*

  Energy efficiency = _____

  Energy efficiency = _____

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