

Grade 6 Science Summary

AY 2017-2018 – Term 1

Chapter 3

The Big Idea: How does energy cause change?

Lesson 3.1 Types of energy

Essential Question: What is energy?

Success Criteria:

- Energy is the ability to cause change.

Essential Question: What are the different forms of energy?

Success Criteria:

- Kinetic energy is the energy an object has because it is in motion.
- Kinetic energy depends on mass. If something has less mass it has less kinetic energy than something with more mass.
- Electric energy is a form of kinetic energy that an electric current carries.
- Potential energy is stored energy that depends on the interaction of objects, particles, or atoms.
- Gravitational Potential Energy is a potential energy stored in an object due to its height above Earth's surface.
- The further an object is from Earth's surface, the more Gravitational Potential Energy it has.
- Chemical energy is the energy that is stored in and released from the bonds between atoms.
- Nuclear energy is energy stored in and released from the nucleus of an atom.
- Mechanical Energy is the sum of potential energy and kinetic energy in a system of objects.
- Thermal energy is the sum of kinetic energy and potential energy in the particles that make up an object.
- Geothermal energy is the thermal energy from the particles in Earth's interior.
- Sound energy is an energy carried by sound waves.
- Sound energy travels in the air.
- Seismic Energy is the energy transferred by waves moving through the ground.
- Radiant energy is the energy carried by electromagnetic waves.
- The sun's energy is transmitted to Earth by electromagnetic waves.

Essential Question: How is energy used?

Success Criteria:

- Energy is used to move cars, heat homes, produce light, move muscles, catch prey, and cook food.

Lesson 3.2 Energy Transformations and Work

Essential Question: What is the law of conservation of energy?

Success Criteria:

- Energy transformation is the conversion of one form of energy to another.
- The Law of Conservation of Energy says that energy cannot be created or destroyed; it can be transformed from one form to another.

Essential Question: In what ways can energy be transformed?

Success Criteria:

- Energy is transformed from one kind into another.
- Energy is also transferred when it moves from one object to another.
- **EXAMPLES:**
 - The *electric energy* in the wiring of a heat lamp is transformed into *thermal energy*

- When the blades of wind turbines rotate they turn a generator that changes the *kinetic energy* of the moving blades into *electric energy*.
- Hydroelectric energy plants convert the *gravitational potential energy* of water into *electric energy*.
- Burning fossil fuels breaks the bonds of its atoms apart changing *chemical energy* into *thermal energy*.

Essential Question: How are energy and work related?

Success Criteria:

- Work is the transfer of energy that occurs when a force makes an object move in the direction of the force while the force acts on the object.
- Work depends on the amount of force applied to an object.
- Work also depends on the distance the object moves.
- CALCULATING WORK

$$\text{work (in joules)} = \text{force (in newtons)} \times \text{distance (in meters)}$$

$$w = Fd$$
- Doing work on an object transfers energy to the object.

Lesson 3.3 Machines

Essential Question: What are simple machines?

Success Criteria:

- Simple machines are machines that do work using one movement.
- Simple machines do not change the amount of work required to do a task, they only change the way work is done.
- EXAMPLES OF SIMPLE MACHINES
 - An inclined plane is a flat, sloped surface.
 - A screw is an inclined plane wrapped around a cylinder.
 - A wedge is an inclined plane that moves.
 - A lever is a simple machine that pivots around a fixed point.
 - A wheel and axle is a shaft attached to a wheel of a larger diameter so that both rotate together.
 - A pulley is a grooved wheel with a rope or cable wrapped around it.
- A complex machine is two or more simple machines working together.
- Efficiency is the ratio of output work to input work.
- Efficiency is the measure of how much work put into the machine is changed into useful output work.
- EFFECIENCY EQUATION

$$\text{efficiency (in \%)} = \frac{\text{output work (in J)}}{\text{input work (in J)}} \times 100\% = \frac{W_{out}}{W_{in}} \times 100\%$$

Essential Question: In what ways can machines make work easier.

Success Criteria:

- Machines make work easier by changing the size of the force required, the distance over which the object moves, or the direction of the input and output forces.