Name _____ Class K. Burkett ____Date _____

Skills Worksheet **CONNECTION TO SOCIAL STUDIES**

Cross-Disciplinary

Incandescent Light Bulbs

Read the following paragraphs, and complete the exercises below.

In 1752, Ben Franklin with his kite experiment demonstrated that lightning is related to electricity. Experiments to understand electricity continued, and many electric devices were invented. In 1879, Thomas Edison invented a system of electric lighting that would eventually bring electric lights into homes. The key to Edison's electric lighting system was the incandescent light bulb.

Incandescent light bulbs are glass bulbs from which all air has been pumped out. The air is replaced with chemically inactive gas, like nitrogen. The glow from an incandescent light bulb comes from the filament, a little wire, which is often visible, inside bulbs. Today, the common material for filaments is tungsten. When electricity flows through the filament of an incandescent bulb, the tungsten wire gets hot enough to glow and give off light. Atoms of tungsten evaporate from the white-hot filament. The escaped tungsten atoms collect on the glass and darken it. Over time, the filament grows thin and eventually breaks.

HALOGEN BULBS

A variation of the incandescent light bulb is the halogen bulb. Gases inside halogen bulbs are chemically active. Each time a tungsten atom leaves the filament, halogen molecules inside the glass pick it up and return it to the filament. Redepositing the tungsten atoms back on the filament allows the filament to last longer. These halogen molecules can do this job only if the glass of the bulb is allowed to get extremely hot—much hotter than incandescent bulbs get.

EXERCISES

1. Which type of light bulb, ordinary incandescent or halogen, would last longer? Explain your answer.

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2. What causes the tungsten atoms to evaporate from the filament?

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Electric Eels

Read the following paragraphs, and complete the exercises below.

Electric eels are found in the Amazon, Orinoco, and other muddy rivers in the tropical regions of South America. They grow as large as 2.75 m (9 ft) long and weigh up to 22 kg (49 lb). Electric eels are one of the few animals that can make, store, and discharge electricity. Electric eels use this electricity to navigate, communicate, stun or kill their prey, and defend themselves.

ELECTROPLAQUES

You can understand how an eel generates electricity by imagining its body as a series of batteries. An eel's body contains an organ that produces electricity. This organ is made up of 5,000 to 6,000 special muscle cells called electroplaques. The electroplaques are lined up like cells in a dry battery. Each electroplaque produces only a small voltage. However, eels can activate all of their electroplaques at the same time and produce a much higher voltage. When electric eels discharge electricity, the current flows either from head to tail or in the opposite direction. The more electroplaques that are activated, the greater the discharge.

Electric eels have more than one level of discharge. They generally discharge about 25 to 75 V, but when they discharge from all the electroplaque cells at the same time, they can jolt the receiver with as much as 500 to 650 V of electricity.

EXERCISES

1. Would the size of an electric eel influence the amount of volts that it could discharge? Explain your answer.

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2. How does the highest discharge of an electric eel compare with the voltage that comes out of a normal wall socket?

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3. Would it be dangerous for a human to be in the water near an electric eel that discharged a jolt of electricity to stun a large fish? Explain your answer.

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