Science Learning Packet

Grade 7: Matter and Energy in Ecosystems, Lesson 9

science learning activities for SPS students during the COVID-19 school closure.

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While Seattle Public Schools endeavors to only post documents optimized for accessibility, due to the nature and complexity of some documents, an accessible version of the document may not be available. In these limited circumstances, the District will provide equally effective alternate access.

Due to the COVID-19 closure, teachers were asked to provide packets of home activities. This is not intended to take the place of regular classroom instruction but will help supplement student learning and provide opportunities for student learning while they are absent from school. Assignments are not required or graded. Because of the unprecedented nature of this health crisis and the District’s swift closure, some home activities may not be accessible.

If you have difficulty accessing the material or have any questions, please contact your student’s teacher.
Matter and Energy in Ecosystems

Name _____________________________________________________

School ____________________________________________________

Class Period ________________________________________________

Teacher ____________________________________________________

Matter & Energy in Ecosystems, Lesson 9 Student Packet, SPS Science, 4-2020
Hello Families,

We hope you and your family are well and safe during this time. During this unprecedented out-of-school time, the SPS middle school science team will be offering instructional opportunities for students that align with the district’s adopted middle school science instructional materials.

This investigation packet is part of a series of district-aligned lessons for middle school science developed by AmplifyScience and adopted by SPS in 2019. While Amplify Science lessons are designed to be done in the classroom with peers, there are some activities that students can complete at home.

In this packet you will find activities to accompany the lesson videos being aired this week through Seattle’s Public television programming on SPS TV (local channel 26). The videos and packets are also posted to the, SPS Science webpage under their corresponding grade level. These lesson videos, developed in collaboration between SPS teachers, Denver Public Schools teachers, and Amplify Science, feature teachers going through the information in the lessons. The work in this packet is intended to be completed alongside the viewing of the video of the corresponding videos.

Closed captioning for the videos is available many home languages if this helpful to your family.

- Click CC (bottom right of video)
- Click Setting (the gear next to CC)
- Click Subtitles/CC
- Click Auto-translate
- Choose your language

For students who have access to the internet and the following devices and browsers may wish to log-in to their AmplifyScience account from home are welcome to do so. Chrome and Safari are the recommended browsers to use for full functionality of the Amplify digital tools and features.

Sincerely,
Lesson 9 Matter and Energy in Ecosystems

Entry:

Read the email from Dr. Corry:

To: Student Ecologists  
From: Dr. Bryan Corry  
Subject: One More Assignment

Great work, student ecologists! The Econauts had not realized that a change in the population of decomposers could have such a dramatic effect on the other organisms in the biodome. Before they plan their next biodome, they have one more question— they want to know what happened to the carbon that used to be in the air of the biodome.

We know that the decrease in the decomposer population caused the carbon dioxide in the air of the biodome to decrease, but the Econauts need to know what happened to all that carbon. This is your last mission for the Biodome Investigation Team, so we’re hoping you give it your best.

Bryan  
Dr. Bryan Corry, Head Ecologist  
Biodome Investigation Team

What do you think happened to the carbon that used to be in the air of the biodome?

We have been thinking about carbon in one type of **closed ecosystem**—the biodome—but this article focuses on how carbon moves through the whole Earth system. In the biodome, you found that the amount of carbon dioxide was decreasing.
In the Earth system, scientists have actually noticed that carbon dioxide in the atmosphere is increasing. Reading about carbon in the whole Earth system will help us figure out what happened to carbon in the biodome.

Name: ___________________________  Period: _______  Date: __________________

**Reading: “Carbon in the Global Ecosystem”**

Scientists around the world who study Earth’s atmosphere have discovered something dramatic and alarming: an increase in the amount of carbon dioxide in our atmosphere. They are finding that the increase in carbon dioxide in our atmosphere may have worldwide effects on our climate and our oceans, which can threaten life all over the planet.

Coal is one type of fossil fuel.

This graph shows how quickly carbon dioxide increased in Earth’s atmosphere during a 50-year period.
Where is the carbon that makes up all that carbon dioxide coming from? Carbon is an element that makes up a lot of the matter on Earth. New carbon can’t be created, so the extra carbon in our atmosphere had to come from somewhere—it must have decreased in some other part of the Earth system. But where? Humans pure carbon into the atmosphere when we burn fuels like coal, oil, and gas that are found deep underground. These are called fossil fuels.

These fossil fuels make the modern human lifestyle possible. Most of the time, when we use a cell phone, drive a car, heat our homes, or turn on the lights, we are using energy that comes from burning fossil fuels. We currently depend on these fuels to power our lives, but burning them releases large amounts of carbon dioxide into the air—and that increase in carbon dioxide might jeopardize life as we know it.

**Fossil Fuels**

Coal, oil, and gas are called “fossil fuels” for a reason: they are the carbon-rich matter left behind by plants and animals that died millions of years ago. These plants and animals were buried deep
underground before they could decompose, so decomposers never broke down the dead matter. Over millions of years, the remains of the plants and animals turned into carbon-rich fossil fuels—coal, oil, and gas. The carbon that was in the plants and animals when they died is still there; it’s just part of the fossil fuels. When we burn fossil fuels in cars, factories, or power plants, carbon that has been stored in the ground for millions of years is released into the air as carbon dioxide.

**The Carbon Cycle**

Earth is a closed ecosystem. There are many different regional ecosystems on Earth, but they all share one atmosphere and one ocean. Very little matter escapes from Earth into space, and almost none enters. Since almost no carbon enters or leaves Earth’s system, and carbon isn’t being produced or used up, the amount of carbon in the system does not change. If carbon is increasing in one part of Earth’s system, it must be decreasing somewhere else.
Although carbon rarely leaves Earth’s system, carbon moves in a cycle within Earth’s ecosystem. This cycle is powered by energy. Carbon cycles from biotic matter to abiotic matter and back again. This means that carbon spends time in the air, in the ocean, in the soil, and in organisms as it moves continuously through the ecosystem. Powered by energy from sunlight, photosynthesis moves carbon from the air and water into living things. At the same time, cellular respiration moves carbon from living things to the air and water. This continuous, consistent pattern of movement is called the carbon cycle, and it is essential to the survival of life on Earth.

The Carbon Cycle: The arrows in this diagram show the pathways that carbon follows as it moves around the ecosystem. The black arrows show the pathways that exist naturally in the ecosystem. The large red arrow shows how humans can increase the amount of carbon in the atmosphere by burning dead matter like fossil fuels.

However, human activities are altering the way carbon moves through the global ecosystem.

As people around the world burn more and more fossil fuels, a great deal of carbon from deep underground is moving into the atmosphere. Carbon in one part of the system (abiotic matter) is increasing, and as a result, carbon in another part of the system is decreasing—in this case, biotic matter, which includes dead matter. Since the entire Earth shares the same atmosphere, changes in levels of carbon dioxide affect ecosystems all over the planet.

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**Impacting Planet Earth**

All the extra carbon dioxide in the atmosphere is having many negative effects on the global ecosystem, and especially on the climate of our planet. Adding carbon dioxide to the atmosphere changes climate and weather patterns around the globe in ways that make it harder for many organisms to survive. Increased carbon dioxide causes global temperatures to rise, makes ocean water more acidic, and changes weather patterns. These changes may increase the chances of extreme weather events like hurricanes and droughts, which affect humans directly as well as the ecosystems and farms we depend on. By increasing the amount of carbon dioxide in the atmosphere, we are gambling with our very way of life.