Science Learning Packet

Grade 6:
Weather Patterns, Lesson 10

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.
Weather Patterns

Chapter 1: Understanding Rainfall
Chapter 2: Investigating Temperature
Chapter 3: Exploring Wind and Pressure
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 in a series of district-aligned lessons 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 Chapter 3 of the unit. **Accompanying lesson videos will be aired on SPS TV and posted the SPS webpage under Grade 6**, however this packet can be used with or without the accompanying video.

This investigation packet is part of a series of district-aligned lessons for **Weather Patterns**, a 6th grade life science unit **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 lessons in the unit. **Accompanying lesson videos are posted on 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.** To find the correct lesson videos go to **SPS Science webpage**, scroll to your grade level, find the unit you are looking for, and select the video that matches the lesson you are completing that day.

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,

The JAMS Gr Science Team & Seattle Public Schools Science Department
Lesson 3.1 Investigating Wind

WARM-UP: Take a minute to think about wind...

What is wind? Do you think it could impact the severity of storms? How?

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Vocabulary So Far:

AIR PARCEL: An amount of air that moves as a unit
CLOUD: Liquid water droplets suspended in the air
CONDENSATION: The process by which a gas changes into a liquid
ENERGY: The ability to make things move or change
EVAPORATION: to move from one object to another or one place to another
TEMPERATURE: A measure of how hot or cold something is; a measure of the average kinetic energy of the molecules of a thing
TRANSFER: To move from one object to another or one place to another
TROPOSPHERE: the layer of the atmosphere closest to Earth, where weather happens
WATER VAPOR: Water as a gas
WEATHER: Conditions such as rain, clouds, wind at a particular time and place
Goal for the lesson: Define wind and investigate the impact wind has on air parcels and how that could affect the amount of rainfall. We will do this by evaluating some models of wind and exploring the SIM.

First, let’s take a look at this data provided by Dr. Kenji. We now have a new column in the data table. What is it telling us? What patterns do you notice?

<table>
<thead>
<tr>
<th>Weather Event</th>
<th>Local Surface Water</th>
<th>Amount of Rain</th>
<th>High Temperature Before the Storm</th>
<th>Wind Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storm 1 (before lake)</td>
<td>low</td>
<td>mild, 6 cm (2.4 in)</td>
<td>very high, 39°C (102°F)</td>
<td>light</td>
</tr>
<tr>
<td>Storm 2 (after lake)</td>
<td>high</td>
<td>moderate, 12.7 cm (5 in)</td>
<td>high, 27°C (81°F)</td>
<td>strong</td>
</tr>
<tr>
<td>Storm 3 (after lake)</td>
<td>high</td>
<td>severe, 20.3 cm (8 in)</td>
<td>very high, 40°C (104°F)</td>
<td>light</td>
</tr>
<tr>
<td>Storm 4 (after lake, July of this year)</td>
<td>high</td>
<td>very severe, 30.5 cm (12 in)</td>
<td>very high, 39°C (102°F)</td>
<td>very strong</td>
</tr>
</tbody>
</table>

There was high surface water between Storms 3 and 4. But there was more rain in the most recent storm. Why? There were also very high temperatures.

Now let’s think about what happens when the wind blows. Have you ever blown up a balloon, then instead of tying the end in a knot, you let it go? What happened? Did it float? Did it just fall to the ground? Did it race around the room, bumping into walls and bouncing off furniture until finally falling to the ground after all the air was gone?
The molecules that make up air are moving around in the balloon and pushing against rubber. When you are holding the balloon closed, the air is trapped inside, when you release the balloon, flies away due to the change in pressure. If you blow up the balloon and hold onto it while letting the air out, you can feel the air molecules on your hand. When you feel wind, you feel the molecules that make up air hit your body.

Pressure relates to how much something pushes on something else. Air molecules have weight and can apply pressure on different surfaces. The air molecules applied a pressure against the rubber of the balloon, creating a high pressure inside the balloon and a low pressure in the surrounding air. When you released the air that was trapped inside the balloon, the molecules moved quickly to the outside, resulting in wind.

In our atmosphere, the air pressure is caused by the weight of all of the air molecules pushing against the surface of Earth. In some areas the air pressure is high, and in some areas the air pressure is low.

**wind:** the movement of air in a particular direction

Let’s look at some images to help further our understanding.
• balloon = air parcel
• space between the fans = large region or area on Earth
• fans = wind coming from various directions into a large region of Earth

Describe what is happening in the model and how it connects to the real world.

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How do you think wind might impact the amount of rain a cloud produces?

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Exploring the SIM

Use the Weather Patterns Sim to gather evidence that will help you answer the Investigation Question: How can wind affect the cooling of an air parcel?

- Set the sliders for Sunlight to Surface and Surface Water to level 3.
- Set Pressure at Parcel and Pressure around Parcel to create wind that blows toward the parcel.
- Press RUN, and then ANALYZE.
- Complete the first row of the table below.
- Repeat the process to create a parcel with no wind.
- Complete the second row of the table below.

<table>
<thead>
<tr>
<th></th>
<th>Parcel height</th>
<th>Air parcel final temperature</th>
<th>Energy released</th>
<th>Amount of rain (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parcel 1 wind</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parcel 2 no wind</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Look at the data, does the wind affect the amount of rain? How?

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Fill in the blanks to finish the key concepts for this lesson.

Key Concept

Air moving from areas of _______ pressure to areas of ______ pressure is wind.

Key Concept

Air parcels can be pushed up into the troposphere by ____________.
Did you get it? Look at the data table from the beginning of the lesson. Explain why storm 4 was so much more severe than storm 3 (why it had more rainfall).

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Key Concept- Air moving from areas of high pressure to areas of low pressure is wind.

Key Concept- Air parcels can be pushed up into the troposphere by wind.

Lesson 3.1 Wrap-Up

- Wind is air moving from areas of high pressure to low pressure.
- Wind can push air parcels up into the troposphere.
- The higher an air parcel rises, the greater the change in temperature, leading to a greater amount of rainfall.

Up Next: Lesson 3.2

- Analyzing data about storms
- Reading to gather evidence
- Preparing for the discussion