Weather Widget is tied to our Smithsonian Science for Makerspaces, and this lesson plan booklet is geared for and written to guide teachers and students in using this education tool provided by the Smithsonian Science Education Center.

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Produced by Ryan Seymour
## Weather Widget

<table>
<thead>
<tr>
<th></th>
<th>Student Objectives</th>
<th>Disciplinary Core Ideas</th>
<th>Science and Engineering Practices</th>
<th>Crosscutting Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observe It! Make It! Design It! Test It!</td>
<td>Analyze patterns in weather data tables to predict future weather events. Identify ways that weather can be hazardous and ways to reduce its impact.</td>
<td>Scientists record patterns of the weather across different time and areas so that they can make predictions of what kind of weather might happen next (3-ESS2-1)</td>
<td>Computational Thinking, Analyzing and Interpreting Data</td>
<td>Patterns, Interdependence of Science, Engineering and Technology, Science is a Human Endeavor</td>
</tr>
<tr>
<td><strong>Class periods:</strong> 1-2</td>
<td><strong>Preparation time:</strong> 40 minutes</td>
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<tr>
<td><strong>Vocabulary:</strong> weather predict range meteorologist</td>
<td></td>
<td>A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1)</td>
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</tbody>
</table>
WEATHER WIDGET

Introduction

Smithsonian Science for Makerspaces: Weather Widget engages students in developing predictions of future weather events based on patterns found in data. Using computational thinking and data analysis, students will investigate how different locations can have different weather effects and will design solutions to problems caused by unique weather conditions.

Vocabulary Words: meteorologist, predict, range, weather

Observe It

The teacher will share the following passage with students:

Ada is a researcher. She will travel to two cities that are in different countries. Ada will go to the Smithsonian Environmental Research Center in Edgewater, USA She will also go to the Smithsonian Tropical Research Institute, in Panama City, Panama.

While at those places Ada will study and help the local wildlife.

Ada wonders what the weather will be like on her trip. She will travel to both cities in April, but how can we predict the weather for Ada?

Meteorologists are scientists who study and try to understand the weather. They look at a lot of weather data such as temperature, wind speeds, and storms. Meteorologists use computers that try to predict future weather by reviewing weather data from earlier years.
The computer model is not exact, but it helps meteorologists create a range of possible weather, from the coldest temperature to the warmest temperature. This computer model also helps us plan for future weather storms, like rain or lightning. Meteorologists use many different ways to let us know we need to plan for the weather, like TV, newspapers, and the Internet.

Let’s help Ada plan for her trip to Edgewater and Panama City. We will create a weather model for Ada’s trip to predict the temperature and the number of storms.

Discussion Questions:

1. What do you think the April weather will be like for Ada’s trip to Panama City? How about Edgewater?

2. How can Ada protect herself from bad weather like rainstorms or thunderstorms?

3. Have you seen a weather prediction today? Where did you see it?

SMITHSONIAN CONNECTIONS:

The Smithsonian Environmental Research Center offers free educational resources and school visit programs for students interested in how climate affects wildlife. [https://serc.si.edu](https://serc.si.edu)
Make It

The teacher will:

1. Separate the class into groups of three or four students each.

2. Print one copy of the Weather Widget: Directions worksheet and the Edgewater and Panama City Possible Weather worksheets for each student group.

3. Print one copy of the Weather Widget: Design It! worksheet and the Weather Widget: Test It! worksheet for each student.

4. Provide each student group with the following materials:
   - 1 8 1/2 X 11 inch cardboard sheet
   - 1 Paper towel cardboard core
   - 1 Roll masking tape
   - Scissors
   - 1 Marble
   - 1 Dice

Student groups will:

Use the Weather Widget: Directions sheet to work through making their weather widget.

Making Tips

Students should design their widget so that all five bottom cups can be reached by a falling marble. If they can’t engineer a way to do this, they can add additional drop points or redesign their bumper layout if needed.

Design It

1. Each student will need the Weather Widget Design It! worksheet.

2. Student groups will need the Weather Range worksheets for Edgewater and Panama City.

3. Student groups will review the Weather Range worksheets for both cities. Then students will complete questions on Design It! worksheet.
4. Combine class together to share answers to discussion questions on Design It! worksheet.

**Test It**

1. Student groups will re-review the Weather Range worksheets. Then individual students will make weather predictions for Ada’s trip to both cities. Students will record their predictions on the Test It! worksheet.

2. Using their Weather Widgets, and the Weather Range worksheets, students will find five weather values that represent Ada’s actual travel weather conditions. Student groups should read the directions box at the top of the Weather Range worksheets to learn how to get a weather value.

3. After getting five weather conditions from testing their Weather Widgets, individual students will record their results on the Test It! worksheet.

4. Individual students will also complete the discussion questions on the Test It! worksheet.

5. Combine class together to share answers to discussion questions on Test It! worksheet.

**Additional Discussion Topics:**

What are similarities and differences in how groups decided their weather predictions?

Were there any surprising and unexpected weather results they got from the widget?

Teacher should highlight that real weather events are based on conditions in the atmosphere and not a random selection.

**Additional Resources:**

*See next page*
Weather Widget: Directions

1. • Cut the cardboard roll in half along the long side.
   • With a marker or pencil, mark lines on one half of the roll, 1 inch apart.

2. • Cut along the marked lines, so you have five U-shaped cup pieces
   • Tape the five pieces in a row along the bottom of the cardboard sheet.

3. • On the other half of the roll, with a marker or pencil, mark lines 1/2 inch apart.
   • Cut along the marked lines, so you have 10 skinny U-shaped strips.

4. • Design a pattern with the 10 skinny strips so they will bump a marble into one of the five cups at the bottom of the cardboard sheet.
   • Tape the skinny strips to the cardboard sheet.

5. • Decide on a drop point for your marble. Mark it with an X on the cardboard sheet.
   • Tilt your widget upward.
   • Drop the marble from the drop point.
   • Retry 20 times.
6

- Can the marble land in each of the bottom cups?
- If not, try to redesign your bumper pattern.
  Or you can add a second marble drop spot.
Edgewater, USA
Possible Weather in April

Directions:
Step 1: Roll a dice. Go to the row of the same number.
Step 2: Drop a marble on your widget. Match cup number and row number to find the weather.
Circle the weather result.
Step 3: Get five weather results.

<table>
<thead>
<tr>
<th>Row</th>
<th>CUP 1</th>
<th>CUP 2</th>
<th>CUP 3</th>
<th>CUP 4</th>
<th>CUP 5</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>65°F</td>
<td>51°F</td>
<td>48°F</td>
<td>70°F</td>
<td>51°F</td>
</tr>
<tr>
<td>2</td>
<td>71°F</td>
<td>60°F</td>
<td>49°F</td>
<td>43°F</td>
<td>54°F</td>
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<tr>
<td>3</td>
<td>57°F</td>
<td>77°F</td>
<td>87°F</td>
<td>86°F</td>
<td>67°F</td>
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<td>4</td>
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<td>48°F</td>
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<tr>
<td>5</td>
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<td>68°F</td>
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</tr>
<tr>
<td>6</td>
<td>69°F</td>
<td>63°F</td>
<td>75°F</td>
<td>56°F</td>
<td>70°F</td>
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</table>
Panama City, Panama
Possible Weather in April

Directions:
Step 1: Roll a dice. Go to the row of the same number.
Step 2: Drop a marble on your widget. Match cup number and row number to find the weather.
Step 3: Get five weather results. Circle the weather result.

<table>
<thead>
<tr>
<th>ROW</th>
<th>CUP (1)</th>
<th>CUP (2)</th>
<th>CUP (3)</th>
<th>CUP (4)</th>
<th>CUP (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>89°F</td>
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</table>
STUDENT ACTIVITIES

WEATHER WIDGET
Weather Widget: Design It!

Name

---

Look at the weather for Edgewater, USA.

What was the coldest temperature?

What was the hottest temperature?

How many times did it rain or storm?

Look at the weather for Panama City, Panama.

What was the coldest temperature?

What was the hottest temperature?

How many times did it rain or storm?

---

Discussion Questions:

1. How is the weather different between the two cities?

2. What should Ada pack in her suitcase for her trip to Edgewater?

3. What should she pack in her suitcase for her trip to Panama City?
Weather Widget: Test It!

Name

<table>
<thead>
<tr>
<th>Ada’s 5-Day Trip to Edgewater</th>
<th>Ada’s 5-Day Trip to Panama City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coldest Temperature</td>
<td>Coldest Temperature</td>
</tr>
<tr>
<td>Prediction</td>
<td>Widget</td>
</tr>
<tr>
<td>Hottest Temperature</td>
<td>Hottest Temperature</td>
</tr>
<tr>
<td>Prediction</td>
<td>Widget</td>
</tr>
<tr>
<td>Number of Storms</td>
<td>Number of Storms</td>
</tr>
<tr>
<td>Prediction</td>
<td>Widget</td>
</tr>
</tbody>
</table>

Discussion Questions:

1. Were any of your predictions close? How could you get better predictions?

2. How does predicting the weather help Ada plan for her trip?