PUZZLERS

#52 | FORECAST FACTORY

Puzzle

Design and build a simple weather instrument that can measure wind speed, rainfall, or temperature, and use collected data to make short-term weather predictions for your area.

Standards & Connections

- NGSS: 3-5-ETS1, MS-ETS1, MS-ESS2-5
- CCSS ELA: RST.6-8.3, WHST.6-8.2
- CCSS Math: SP.B.4, SP.C.5

Background:

Weather influences nearly every aspect of daily life, from how communities plan events to how farmers protect their crops. Agricultural producers rely on accurate weather data to guide decisions about planting, irrigation, pest management, and harvest timing. According to the USDA, weather variability is one of the leading causes of crop loss annually, and improved forecasting tools can help reduce risk and support more resilient food systems.

Meteorologists and farmers use instruments such as anemometers (for measuring wind), rain gauges (for measuring precipitation), and thermometers (for measuring temperature) to monitor conditions and detect trends. Even simple, low-cost tools can reveal patterns that support better decision-making. In this puzzler, students explore how weather data is gathered and how those measurements can be used to forecast short-term changes that impact agriculture.

Suggested Materials:

Paper cups, straws, tape, pencils, rulers, string, thermometers, plastic bottles, stopwatches, measuring cups

1-hour Activity Flow:

Depending on the tool students build, additional time may be needed between creation and data collection (e.g., waiting for rainfall). This activity is structured so that students plan and build in one session and then test and explain their work during a follow-up opportunity.

IDENTIFY

Share the background information and introduce the puzzler. Establish constraints such as time, materials, and available testing locations.

Ask: Why is weather data important to farmers? What conditions could you measure with simple tools?

IMAGINE

Students generate ideas for weather instruments that could gather meaningful data. Encourage wide-ranging brainstorming before narrowing to feasible solutions.

Ask: What materials could measure rainfall or wind speed? How can we create a design that is simple, durable, and accurate?

DESIGN

Students generate ideas for weather instruments that could gather meaningful data. Encourage wide-ranging brainstorming before narrowing to feasible solutions.

Ask: How will you test your tool? What do you expect your instrument to show about the weather?

CREATE

Students build their prototypes based on their design plan. Remind them of time constraints and encourage iterative thinking.

Ask: Does your tool measure consistently? How can you improve its design?

TEST & IMPROVE

Students test their tools when appropriate (on the same day for wind/temperature tools; later for rainfall tools). They compare their measurements against a trusted local weather source such as a weather app, school station, or NOAA report.

Ask: How accurate is your data compared to a professional source? What improvements could make your tool more reliable?

SHARE

Students present their weather instruments and describe how their data could support agricultural decisions such as watering schedules, frost protection, or planning for storms.

Ask: What was your biggest takeaway about weather and agriculture? What would you change if you were to build your tool again?

Extension Activities:

⊛ Explore how farmers in different climates or countries use weather data in their operations. Compare their strategies with those used in your region.

⊛ Use NOAA or USDA resources to examine recent weather trends and discuss how they may impact local agriculture.

⊛ Investigate modern precision agriculture tools such as soil moisture sensors or automated weather stations. How do these tools build on the simple instruments students created?

- NOAA Weather Education Center: https://www.noaa.gov/education
- USDA Climate Hubs: https://www.climatehubs.usda.gov/
- National Weather Service JetStream Weather School: https://www.weather.gov/jetstream/
- FAO: Weather and Agriculture Overview: https://www.fao.org