

MAKER JOURNAL

Name: _____

Date: _____

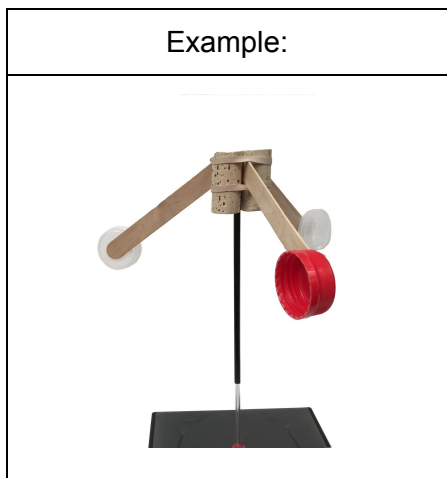
Project/Unit: Design a Weather Instrument

Lesson: Design Challenge, Ideate

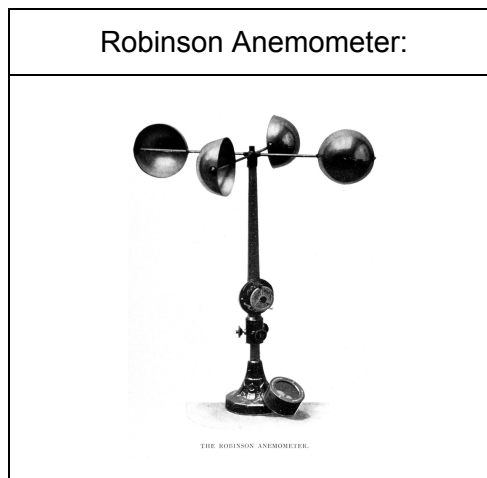
Anemometer (spinning style)

How it works	Anemometers are used to determine wind speed. One way to measure wind speed is to record how fast the wind will make something spin.
Criteria & Constraints	Spins freely Has method for counting number of rotations
Tips	Ensure the spinning part is light enough to move with minimal wind. Create a sturdy base support.
Material Suggestions	Light wind-catching objects (spoon/cup/cap) Pivot point - 2 straws of different diameters or pipette and straw/stick

Example:



Robinson Anemometer:


Draw your anemometer design:
What materials will you need?
How will you measure distance or rotations?

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Lesson: Design Challenge, Test

Anemometer (spinning style)

Count the number of full rotations for your anemometer for exactly one minute. Record the spins per minute, where, and when you took this reading. Consult a local weather station, weather.com, or other source, to find the recorded wind speed for that location at that time. Collect many readings at different times and on different days.

Date/Time/Location	Spins per Minute	Official Wind Speed Recorded
Sept. 1/1:30/San Jose, CA	48	10 mph

Compare how your data changes, and how the official data changes. Is your instrument accurate, and reliable?

Can you improve your instrument? How?

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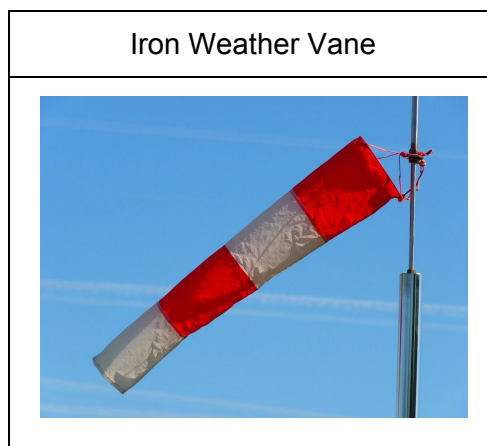
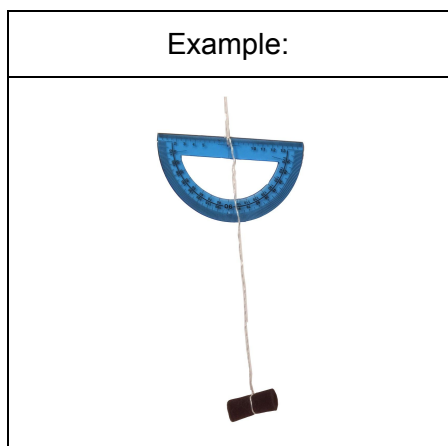
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Anemometer (protractor style)

How it works	Anemometers are used to determine wind speed. One way to measure wind speed is measure how high the wind pushes a hanging object.
Criteria & Constraints	Light enough to move with minimal wind. Has markings for measuring movement.
Tips	Beware spinning objects in the wind, you'll want movement in one direction.
Material Suggestions	Light wind-catching objects.



<i>Draw your anemometer design:</i>	<i>What materials will you need?</i>
	<i>How will you measure wind speed?</i>

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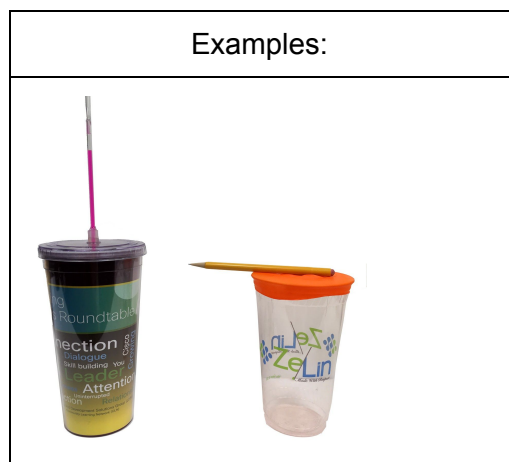
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Barometer

How it works	Barometers measure subtle atmospheric pressure changes caused by weather. Your barometer will need a sealed container with air (and maybe liquid) inside. As the air pressure outside the sealed container changes, either the liquid level in a narrow connect spout will change, or a flexible top on your sealed container will flex inwards or outwards.
Criteria & Constraints	Change in liquid level, flex in sealed top when increase/decrease in air pressure. Method for marking change (lines on vertical tube to show where liquid rises)
Material Suggestions	Very thin pipette (1mL) Sealable container



<i>Draw your barometer design:</i>	<i>What materials will you need?</i>
	<i>How will you measure changes?</i>

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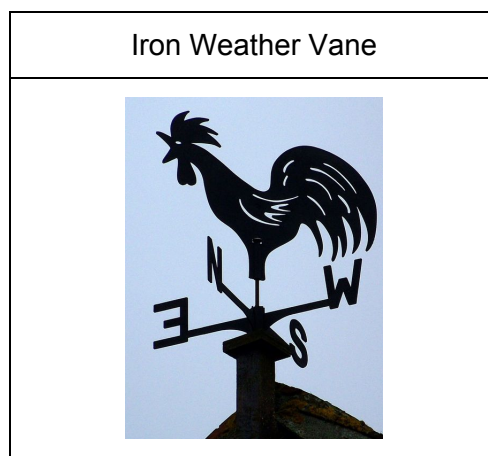
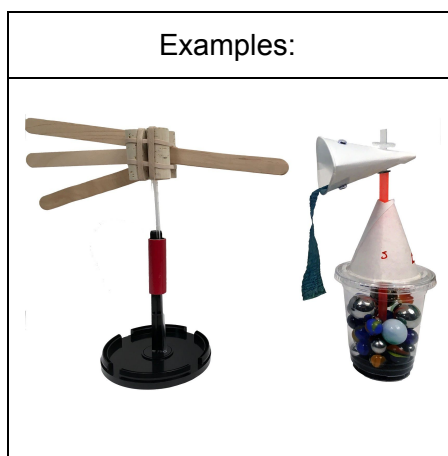
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Weather Vane and/or Wind Sock

How it works	As wind blows against a weather vane, it will turn with the wind to indicate direction.
Criteria & Constraints	The instrument must turn to show the direction of the wind. Cardinal directions (north, south, east, west) are labeled. It must spin freely.
Tips	Use a compass to properly position north on the instrument to true north.
Material Suggestions	A weighted base to keep from tipping over A pivot point such as 2 different size straws overlapped



<i>Draw your weather vane design:</i>	<i>What materials will you need?</i>
	<i>How will you record the direction of the wind?</i>

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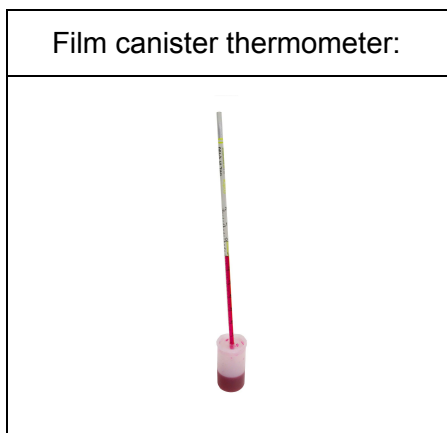
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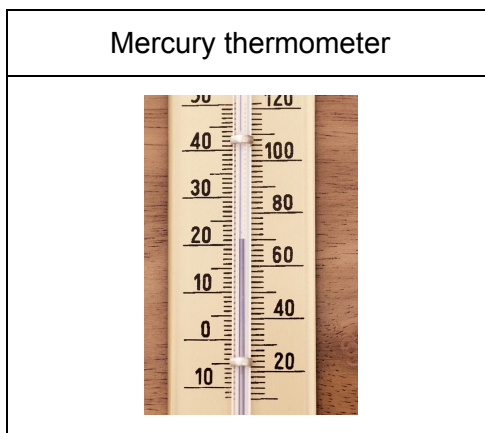
Thermometer

How it works	Liquids take up less space when they are cold, and more space as they get warmer. The liquid in the tube of a thermometer rises when it gets warmer because it needs more space.
Criteria & Constraints	Liquid rises/falls with increase/decrease in temperature.
Tips	The tube should be connected to the container of your thermometer with no gaps. Some glue, tape, or putty can help fill any small spaces.
Material Suggestions	Very thin pipette (1mL) Sealable container

Film canister thermometer:



Mercury thermometer


Draw your thermometer design:
What materials will you need?
How will you measure when liquid rises or drops?

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Thermometer

How is the air temperature affecting your weather instrument? Record the thermometer reading, where, and when you took this reading. Consult a local weather station, weather.com, or other source, to find the recorded temperature for that location at that time. Collect many readings at different times and on different days.

Date/Time/Location	Thermometer Reading	Official Temperature Recorded
Sept. 1/1:30/San Jose, CA	5 cm	62° F

Compare how your data changes, and how the official data changes. Is your instrument accurate, and reliable?

Can you improve your instrument? How?

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Rain Gauge (also called udometer)

How it works	A rain gauge catches and measures precipitation (rain) over a set period of time.
Criteria & Constraints	Catch and measure rain
Tips	Consider how to keep track of period of time when rain is caught.
Material Suggestions	Waterproof cup/container Sturdy base to support and keep the gauge standing upright

Example:



Example:


Draw your rain gauge design:
What materials will you need?
How will you measure the amount of rain collected?

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Rain Gauge

How much precipitation is collected by your weather instrument? Record the reading, where, and when you took this reading. Consult a local weather station, weather.com, or other source, to find the recorded barometric pressure for that location at that time. Collect many readings at different times and on different days.

Date/Time/Location	Rain Gauge Reading	Official Precipitation Recorded
Sept. 1/1:30/San Jose, CA	2 cm	.5"

Compare how your data changes, and how the official data changes. Is your instrument accurate, and reliable?

Can you improve your instrument? How?
