WACKY WEATHER

Illinois Extension
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

OBJECTIVES

LEARN HOW TO MEASURE WEATHER CONDITIONS.
UNDERSTAND THE DIFFERENCE BETWEEN WEATHER AND CLIMATE.

GUIDING QUESTIONS

1. WHAT TOOLS ARE USED TO MEASURE WEATHER?
2. ARE WEATHER AND CLIMATE THE SAME THING?

MATERIALS

1 PLASTIC WATER BOTTLE
RULER
5 3OZ. PAPER CUPS
2 STRAWS
STRAIGHT PIN
PENCIL
PIECE OF CARDSTOCK
COPY PAPER

TAPE (NOT PROVIDED)
PAPER PUNCH (OPTIONAL)

FACTS

- SCIENTISTS CALLED METEROLOGISTS USE INSTRUMENTS TO RECORD WEATHER INFORMATION.
  - PRECIPITATION IS MEASURED BY RAIN GAUGES.
  - PRECIPITATION CAN COME IN A VARYIETY OF FORMS, RAIN, SLEET, SNOW, ETC.
  - WIND IS MEASURED USING AN ANEMOMETER AND RANKED BY SPEED WITH THE BEAUFORT SCALE.
  - WIND IS THE HORIZONTAL MOVEMENT OF AIR.
- WEATHER AND CLIMATE ARE 2 DIFFERENT THINGS.
  - WEATHER IS THE STATE OF THE ATOMSPHERE AT A SPECIFIC TIME.
  - CLIMATE IS THE AVERAGE CONDITIONS FOR AN AREA OVER A PERIOD OF TIME.
- CLIMATE CHANGE IS A CHANGE IN GLOBAL OR REGIONAL CLIMATE PATTERNS.

INTEREST APPROACH-ENGAGEMENT

AS YOU OBSERVE:

- TALK ABOUT THE CURRENT CONDITIONS.
- WHAT DIFFERENT WORDS CAN YOU THINK OF TO DESCRIBE THE WEATHER?
- WHAT ARE SOME OLD SAYINGS ABOUT THE WEATHER? "IN LIKE A LAMB, OUT LIKE A LION." "RED SKY IN MORNING SAILOR TAKE WARNING."

ACTIVITY 1: MAKE A RAIN GAUGE

- TAKE AN EMPTY WATER BOTTLE AND CAREFULLY CUT THE TOP THIRD OF THE BOTTLE OFF.
- TAPE THE CUT EDGES. **BE CAREFUL! EDGES OF THE BOTTLE CAN BE SHARP.**
- TURN THE TOP PART UPSIDE DOWN AND PUT IT IN THE TOP OF THE OTHER PART OF THE BOTTLE. THE TOP PART SHOULD LOOK LIKE A FUNNEL IN THE BOTTLE. TAPE TOGETHER.
- WITH A RULER, MEASURE FROM THE BOTTOM OF THE BOTTLE MARK. USING A PERMENANT MARKER MARK INCREMENTS OF A 1/4 INCH UP THE BOTTLE, MAKING THE INCH LINES BIGGER. (SEE PHOTOS)
- BURY THE BOTTOM PART OF THE BOTTLE OUTSIDE IN AN AREA AWAY FROM TREES OR OTHER OBSTRUCTIONS.
- LEAVE THE TOP STICKING OUT OF THE GROUND.
- CHECK EACH DAY FOR ANY PRECIPITATION. RECORD YOUR FINDINGS IN YOUR JOURNAL. POUR OUT ANY RAIN COLLECTED.
- **TO MAKE YOUR JOURNAL:** FOLD THE CARDSTOCK AND COPY PAPER IN HALF "HAMBURGER STYLE" OR WIDTH-WISE. STAPLE TOGETHER ALONG THE FOLDED SIDE, OR MAKE HOLES ALONG THE FOLDED SIDE AND TIE WITH STRING OR YARN.

ACTIVITY 2:MAKE AN ANEMOMETER

- TAKE ONE OF THE DIXIE CUPS AND PUNCH FOUR EQUALLY SPACED HOLES ABOUT A QUARTER INCH BELOW THE RIM.
- TAKE THE OTHER FOUR CUPS AND PUNCH 2 HOLES ABOUT A HALF INCH DOWN AND 1 INCH APART.
- TAKE THE CUP WITH THE 4 HOLES AND PUSH A STRAW THROUGH THE CUP, ONE SIDE TO THE OPPOSITE SIDE.
- REPEAT STEP WITH THE 2ND STRAW AND THE REMAINING 2 HOLES ON THE CUP.
- THREAD ONE OF THE CUPS WITH 2 HOLES ONTO THE END OF THE STRAW.
- REPEAT WITH THE REMAINING CUPS MAKING SURE THAT ALL OF THE CUPS ARE FACING THE SAME DIRECTION.
- PUSH A HOLE IN THE BOTTOM OF THE CENTER CUP WITH THE POINT OF THE PENCIL.
- PUSH THE ERASER END OF THE PENCIL THROUGH THE BOTTOM HOLE IN THE CENTER CUP. TAKE THE PIN AND PUSH IT INTO THE STRAWS WHERE THEY CROSS AND INTO THE ERASER. DON'T PUSH TOO FAR OR IT MIGHT NOT SPIN.
- YOUR ANEMOMTER IS NOW READY TO GO! TEST IT OUT BE SPINNING IT WITH YOUR HAND.
- TAKE IT OUTSIDE OR USE IT WITH A FAN.

ADDITIONAL ACTIVITIES AND CONCEPTS

- CALCULATE THE AMOUNT OF PRECIPITATION BY WEEK OR MONTH. COMPARE IT TO DATA FROM NATIONAL WEATHER SERVICE TO SEE HOW YOUR AREA COMPARES.
- USING CLUES FROM NATURE AND THE BEAUFORT SCALE, GUESS THE WIND SPEED THEN USE ANEMOMTER TO CALCULATE THE SPEED. HOW CLOSE ARE THE NUMBERS? WHAT COULD AFFECT THE DIFFERENCE BETWEEN TECHNIQUES?
- COLLECT DATA FOR A WEEK OR MONTH AND THEN CREATE A GRAPH OR PIECE OF ARTWORK THAT USES THE DATA. (SEE PHOTOS)

THESE ACTIVITIES ARE DESIGNED TO BE CARRIED OUT BY CHILDREN WORKING WITH A PARENT, GUARDIAN, OR OTHER APPROPRIATE ADULT. THE ADULT INVOLVED IS FULLY RESPONSIBLE FOR ENSURING THAT THE ACTIVITIES ARE CARRIED OUT SAFELY.

LESSON PLAN CREATED BY WENDY FERGUSON, PROGRAM COORDINATOR

BEAUFORT SCALE

Beaufort Number	Name	Knots	MPH	Effects Observed Far From Land	Effects Observed On Land
0	Calm	Under 1	Under 1	Sea like mirror.	Calm; smoke rises vertically.
1	Light Air	1-3	1-3	Ripples with appearances of scales; no foam crests.	Direction of wind shown by smoke drift, but not by wind vanes.
2	Light Breeze	4-6	4-7	Small wavelets; crests of glassy appearance, not breaking.	Wind felt on face; leaves rustle; ordinary vane moved by wind.
3	Gentle Breeze	7-10	8-12	Large wavelets; crests begin to break; scattered whitecaps.	Leaves and small twigs in constant motion; wind extends light flag.
4	Moderate Breeze	11-16	13-18	Small waves, becoming longer; numerous whitecaps.	Raises dust and loose paper, small branches are moved.
5	Fresh Breeze	17-21	19-24	Moderate waves, taking longer form; many whitecaps; some spray.	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	Strong Breeze	22-27	25-31	Larger waves forming; whitecaps everywhere; more spray.	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	Near Gale	28-33	32-38	Sea heaps up; white foam from breaking waves begins to be blown in streaks.	Whole trees in motion; inconvenience felt in walking against the wind.
8	Gale	34-40	39-46	Moderately high waves of greater length; edges of crests begin to break into spindrift; foam is blown in well-marked streaks.	Breaks twigs off trees; generally impedes progress.
9	Strong Gale	41-47	47-54	High waves; sea begins to roll; dense streaks of foam; spray may reduce visibility.	Slight structural damage occurs (chimney pots and slate removed).
10	Storm	48-55	55-63	Very high waves with overhanging crests; sea takes white appearance as foam is blown in very dense streaks; rolling is heavy and visibility reduced.	Seldom experienced inland; trees uprooted; considerable structural damage occurs.
11	Violent Storm	56-63	64-72	Exceptionally high waves; sea covered with white foam patches; visibility still more reduced.	Very rarely experienced; accompanied by widespread damage.
12	Hurricane	64 and over	73 and over	Air filled with foam; sea completely white with driving spray; visibility reduced.	

Calculating Wind Speed

To calculate the velocity at which your anemometer spins, determine the number of revolutions per minute (RPM). Next, calculate the circumference (in feet) of the circle made by the rotating paper cups. Multiply your RPM value by the circumference of the circle and you will have an approximation of the velocity of at which your anemometer spins (in feet per minute). Your anemometer doesn't need to be pointed in the wind for use.

Note: Some forces are being ignored including drag and friction for this elementary illustration, so the velocity at which your anemometer spins is not the same as wind speed.

Calculating revolutions per minute (RPM)

Mark one cup with a red dot. Set a timer for 30 seconds and start counting the number of times the red dot passes you. Take that number and multipy by 2 to calculate RPM.

Calculating the circumference of a circle:

Measure the radius of the circle, you can do this by measuring from the pin to the edge of the cup. Take that measurement and plug it into this formula:

$C=2\pi r$

You can also use this simple online calculator: https://www.piday.org/calculators/circumference-calculator/

Example:

RPM = 10

Circumference = 5"

10 x 5 = 50 mph

RPM x C = approx. wind speed