Weather Planning Chart (c) Impact Science Education 2018

Anchor Phenomenon: What causes different kinds of weather?

Lesson #	Lesson Title	# Days	Storyline	Main Activity	Vocabulary	Materials
1	What Causes Weather	1	Begin suggesting the connection between the Sun's energy and weather phenomena on Earth.	Students brainstorm different kinds of weather and guess at what might cause differences in weather (concept map). Generate Qs.	none	Chart paper, markers
2	A Terrarium	1	Intro idea of the developing and using models, and understanding the water cycle	Look at terrariums and how the water cycle works inside of them; have the students build their own	none	jars -- 2 for the teacher and 1 per group, a lid for each jar, water, soil, Sphagnum or sheet moss, soaked in water, rocks or sand/gravel, plants: 1 or 2 small varieties,hand shovels or spoons, newspaper
3	101 Uses for Water	1	Water has different phases. Water changes form, but never goes away. The amount is constant.	Think of 101 uses for a glass of water. Think about where our water comes from and all the forms it can take -- and that it never goes away. (optional: visit local watershed or water treatment plant)	none	A glass of water
4	Water Cycle Game	1	The water cycle is driven by energy from the Sun and the force of gravity.	Play a game to simulate water moving through random paths in an ecosystem	cycle water cycle model (review) evaporate condense transpire water vapor	14 Water Cycle Game Spinners, 14 Station signs, Student Worksheets
5	Evaporation	1	Begin understanding evaporation; various factors like temperature and salinity effect the rate at which liquid water changes into water vapor.	Students compare evaporation rates to see how they change with temperature, wind, and sunlight	none	Droppers (4 per group), small beakers or cups (4 per group), petri Dishes (3 per group), stopwatches (1 per group), wax pencil or masking tape, saltwater, room temp water, ice water, hot water, heat lamp (1 per group), student worksheets
6	Condensation Challenge (1-2 days)	2	Understanding condensation, why it occurs, and how it relates to evaporation. It is the reverse of evaporation.	Day 1: brainstorming where condensation comes from and thinking about how it is the reverse of evaporation Day 2-3: (optional) Groups design water still. As a class, compare designs, carry out 2 or 3 designs and compare	condensation	Cold soda can or glass of ice water, so students can observe condensation forming, room temperature can or glass of water as a control, 2 medium beakers 2 digital balances ice cubes to fill one beaker hot water to fill one beaker For Day 2-3 design challenge (optional) tubs of water with salt and mud mixed in (2 or 3), heat lamps (2 or 3, or go outside if sunny), measuring devices for a few mL, building supplies (eg. cups, popsicle sticks, cardboard), ice/ice packs, student worksheets

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7	Precipitation	1	Connecting evaporation, condensation, and precipitation in the water cycle Reinforce that water vapor in the air is invisible	Understand a model of precipitation and how it relates to the terrarium we built in lesson 2	precipitation	1 cookie sheet, ice or ice pack, hot plate, 1 beaker of water, 5g salt, 2 ring stands to hold the cookie sheet at an angle, 1 tray
8	Weather Instruments (1-2 days)	2	Apply knowledge of the water cycle to weather and weather forecasting and the tools that are used to do so.	Explore different weather measurement tool in order to learn how they work.	forecast humidity	Commercially available versions of: Anemometer, Wind Vane, Screened Thermometer, Hygrometer, Rain Gauge, Psychrometer Or the materials needed to build these weather tools.
9	Surface Heating (2 days)	2	Understand how different surfaces heat and cool differently and why this occurs (uneven heating)	Compare heating and cooling of soil and water under heat lamp (and sod and sand if available) OR: take students outside to study dif't surfaces	none	For demo or per group: dirt, water, (optional: sand, saltwater, sod or sprouted grass seed), plastic trays, thermometers or probes
10	Full of Air	1	Understand that air is a fluid and like other fluids, it takes up space, it expands/contracts and exerts air pressure	Observe two teacher demos which demonstrate the way that air takes up space.	air pressure expand contract/compress	plastic syringes (no needle) -- 1 per student or 1 per pair air cannon toy for teacher (optional) For Balloon in a Bottle demo: 2 identical balloons per class and some extras, 2 plastic bottles with narrow mouth For Cartesian diver (1 per group, optional): plastic bottle with lid and water, dropper, small metal nut or washer For Paper in a Cup demo: clear plastic cup, large beaker, water, crumpled-up piece of paper
11	Density and INTERIM ASSESSMENT	1	The density of air affects weather. Warm air rises above cooler air.	Watch hot air balloon video. Think about how heating and cooling balloons affects their volume and therefore their density	density	Hot Air Balloon video for Opener (find); projection system to show video
12	Make a Cloud	1	Clouds form when air pressure falls.	Students will do an activity to help create water vapor in a bottle to simulate a cloud.	none	For Make a Cloud -- 1 per group and one for the teacher (recommended) 2 L plastic bottle with tightly closing lid -- 1 per group and one for the teacher, warm water, matches, dark construction paper or other dark surface for contrast

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13	Build a Barometer (1-2 days)	2	Changes in air pressure can cause different types of weather and be used to forecast coming storms.	Investigate two designs for building a barometer and discuss possible ways to improve the designs.	barometer	(1 set of each for teacher, plus enough for students to redesign and build if doing 2 day) ruler, tall drinking glass, clear drinking straw, modeling clay, clear tape, food coloring; wide mouth jar, balloon, rubber band, plastic drinking straw
14	Wind	1	The changing temperatures and densities of air masses cause the movement of air and affect the weather. Air moves from areas of high pressure to low pressure.	Do a card sort and put together a sequence of events that lead to the movement of air masses, and therefore wind, and possible precipitation. Create a model to demonstrate understanding of weather phenomena by drawing a frame by frame cartoon.	air mass	Air Masses handout (1 per pair), scissors, envelope, way to project or draw the needed diagrams for students, unlined paper and color pens or pencils for students to make their cartoons (optional)
15	Forecasting the Weather/Review	1	Practice making weather forecasts while understanding that these are only probabalistic. There is always uncertainty in weather forecasts.	Review worksheet	none	video clip of local weather forecast (optional)
16	Extreme Weather (2 days)	2	Apply their previous knowledge of weather to larger weather patterns (eg hurricanes), in order to see what happens to those weather patterns on a larger scale.	Each student group or pair will research one type of extreme weather.	none	Access to computers for research; materials or computers for making presentations
	Review	1				
	Assessment	1				
	Total # days	**23**				