Grade 8

Ch. 8 Lesson 4

Earth and Space Science

Page #	Question	Answer(s)	Links/Sources	Student Resources
297	In which direction would the wind vane measuring the prevailing westerlies point?	*Wind vanes point into the wind so the wind vane in question would be pointing west.		
297	How would you describe the weather outside?	*Answers will vary depending on students' location. Sample answer: The weather is windy and cool. Note: The weather includes temperature, precipitation, cloud cover, wind, humidity, and barometric pressure. Students should include at least one or two of these in their descriptions.		
297	What is the metric unit for temperature:	*Degrees Celsius.		
297	What is the metric unit for wind speed?	*Kilometers per hour (km/h)		
297	Why do you think it is hard to predict severe weather?	Sample answer: Because atmospheric conditions can change quickly and without notice.		
297	How do you use information in weather forecasts:	Sample answer: The information helps me decide what clothes to wear, it tells me whether or not a storm is coming, and what the temperature will be.		
297	What professions rely on accurate weather forecasts.	Sample answer: Pilots, ship captains, truckers, people who drive as part of their business, building contractors, police departments and fire departments among others.		
297	Where could you find weather information that is the most accurate?	From the National Weather Service webpage, news outlet weather websites, and local radio and TV stations.	https://www.weather.gov/	
298	Will humidity cause the hair to shorten, lengthen, or stay the same?	Sample answer: I think humidity causes the hair to lengthen.		
298	Why do people care about the humidity of the air?	Sample answer: Knowing the humidity lets people know whether it is going to be muggy or not.		
298	How can you tell whether the humidity is high or low?	Sample answer: Perspiration does not evaporate well when the humidity is high and your skin may feel clammy when you go outside. Things don't dry as well in high humidity conditions.		
298	Are weather sayings as accurate as weather forecasts. Defend your answer.	Sample answer: No, weather sayings are based on limited observations and may interpret observation incorrectly. Weather forecasts are based on scientific data and detailed analysis by professionals who understand weather and how it works.		

299	Is the air most likely to be above or below its dew point when dew forms?	*Below.		
299	What happens to relative humidity as the air temperature goes up?	*Relative humidity goes down.		
299	What happens to dew point as the temperature of the air goes up.	*The dew point stays the same.		
299	At what point would condensation most likely occur?	*24°C		
299	How would you read these numbers aloud?	*Forty-seven percent and thirty-two degrees Celsius.		
299	How might this affect athletes who train in areas that are usually very humid?	Sample answer: Their perspiration does not evaporate as it should, the body has to work harder to cool itself off and overheating can occur.		
299	Under what conditions might athletes want to be in a high-humidity environment for short periods?	Sample answer: If they are trying to increase their endurance, or if they are trying acclimate their body for an event in a high humidity location		
299	What percentage indicates that the air is saturated?	When the relative humidity is 100%.		
299	During what time of the day does dew often form on grass?	Sample answer: In the morning, because the morning temperature is more likely to reach dew point.		
299	Why does relative humidity change if no water is being added or removed from the air?	Because the temperature of the air changes, as the temperature of the air changes the amount of moisture the air can hold changes.		
299	At what temperature would condensation most likely occur?	At about 24° C.		
300	What will the relative humidity be in your classroom?	Answers will vary depending on conditions in the classroom. Students should have data that is similar to one another, which would allow similar calculations and results. Have students self-check their calculations and results.		
300	What affect do plants have on the humidity of an area?	Sample answer: Plants generally increase the humidity of an area.		
301	What do you think eventually happens to a Maritime tropic air mass that moves over cold dry land?	*The cold dry land causes water vapor Maritime tropic air mass to condense. It may fall as precipitation. The cold land will cause the Maritime tropic air mass to become somewhat cooler and drier.		
301	How do the seasons affect the formation of these air masses?	*Sample answer: During warmer seasons water will retain heat longer and the temperature of the atmosphere will be warmer. The tropic air masses will migrate north during the spring and summer and polar air masses will migrate south during the fall and winter.		

301	What characteristics will an air mass have if it lies over warm tropical water long enough?	Sample answer: It will become warm and moist.		
301	If an air mass lies over cold, dry land long enough?	Sample answer: It will become cold and dry.		
301	What kind of air mass is over your area right now?	Answers will vary depending on the location and time of year.		
301	Did it form there, or did it move in from elsewhere?	Answers will vary depending on the location and time of year.		
301	How would winds form between continental tropic and maritime polar air masses?	Sample answer: The cold dry air will flow toward the warm, moist air up causing winds. These winds will lift the warm moist air up into the cooler regions of the atmosphere causing thunderstorms and sever weather to occur.		
302	Which type of front is most likely to affect an area's weather for the longest period? Explain.	*Sample answer: A stationary front because it can stall over and area for days.		
302	In which general direction do the fronts appear to be moving? Explain.	*The general direction is from west to east because weather in North America is influenced by the prevailing westerlies.		
302	What happens when fronts collide?	Answers will vary depending on the kinds of fronts that collide. Students should understand that different results occur when different kinds of fonts meet. Note: If a warm and cold front meet, the cold air will move under the warm air and the warm air will rise; if a cold front is moving fast, it may overtake a warm front and meet and combine with the cold air ahead of the warm front. The warm air rises as these two cold fronts come together; if two fronts meet that have about the same conditions, a boundary may form where the two air masses meet. Cloudy weather with rain or snow develop along the boundary line. This creates a stationary front.		
302	What is a front?	*The boundary between two air masses with different conditions.		
302	Why do you think symbols are used to represent fronts on weather maps?	*Sample answer: Symbols save space on crowded weather maps. They are easy to spot and interpret.		
302	Which front most likely involves air masses that are only slightly different from on another? Explain your reasoning.	*A stationary front most likely involves air masses with only slight differences because neither air mass moves. The differences in temperature, moisture, and pressure are not large enough for one front to overtake the other.		
303	How are these two systems different?	*The both move in the opposite direction in the northern hemisphere than in the southern hemisphere.		

303	How do conditions differ in high-pressure systems and low-pressure systems?	*High-pressure systems tend to bring fair weather. Low-pressure systems tend to bring rainy or even stormy weather.		
303	What makes air rotate in a pressure system?	*The Coriolis effect.		
303	What type of pressure is over your school?	Answers will vary depending on location. Sample answer: We have a high pressure giving clear skies and sunny weather.		
303	How would you know whether it was changing?	Sample answer: If a wind started blowing, or if clouds began moving, or if the temperature suddenly dropped.		
303	What factors do you think affect the speed at which these systems move?	Sample answer: The speed of the wind associated with the air pressure. The bigger the pressure difference between air pressures, the faster air will move from high pressure to low pressure.		
303	How do you think the speed at which pressure systems move can affect the weather?	Sample answer: The greater the difference between air pressures the faster the weather can change.		
303	Under what conditions would you expect a low-pressure storm to spin clockwise in the northern hemisphere?	Sample answer: Occasionally, during major winter storms, the jet stream can bend south so much that it causes winds to blow from east to west. This could cause low pressure system to spin in a clockwise direction. This might also happen if a high pressure system moving at high speeds collided quickly with a low-pressure storm that was near the edge of the low-pressure cell. Note: References that describe how this might happen, or even if it does are difficult to find.		
304	What can you infer from the movement of air masses?	*Students should have learned that air masses can be used to determine what the weather might be by doing where the air masses come from, and the moisture and that air masses move from high pressure to low pressure.		
304	What determines how much rain falls during a thunderstorm?	*Rain amounts are determined by the amount of water vapor in the air, how quickly the air is lifted, and how fast the front moves.		
304	What is hail?	*Hail is small droplets of water that are caught in the updraft of a thunderstorm. The droplets eventually freeze as they are lifted higher in the sky. Once they become too heavy to remain in the clouds, they fall as hail.		
304	What classifies a thunderstorm as severe?	*When it brings hail that is 2.5 cm or greater, wind gusting in excess of 92.5 kph, or a tornado.		

304	Why doesn't hail fall with all thunderstorms?	Sample answer: The updraft of the thunderstorm is not great enough to lift the raindrops high enough to freeze and form hail.		
304	What other dangers might develop because of sever thunderstorms?	Sample answer: Dangerous lightning, power outages, strong winds, tornados, and torrential rains.		
305	How are a thunderstorm and tornado alike?	*Both are severe storms that can have strong winds.		
305	How are they different?	*Thunderstorms form from tall cumulonimbus clouds that contain thunder and lightning. Tornadoes are powerful, rotating columns of air that touch the ground. They form from swirling winds in a thunderstorm.		
305	What kinds of severe weather events are most common in the spring?	*Sample answer. Thunderstorms, tornadoes, flash floods.		
305	What kinds of severe weather events are most common in late summer and early fall?	*Sample answer: Hurricanes.		
305	What kinds of severe weather events are most common in winter?	*Sample answer: Blizzards		
305	Which time of year would you expect to have the most thunderstorms? Why?	Sample answer: In spring and summer. Because their air near the Earth's surface is warm and the upper air is still cold causing a greater uplift of warm moist air.		
305	What saved so many people that day?	Sample answer: Advanced tornado warning systems. Note: While this is a great question, it is difficult to find a specific answer, it can be assumed that advance warnings helped people to take cover in time, but this is true of many examples of severe weather events.		
305	Since tornadoes are so dangerous, how do we study them?	Sample answer: Barometers, weather satellites, doppler radar and other specially designed instruments.		
305	What kinds of instruments are used to measure conditions within the tornado itself?	Sample answer: Barometers, doppler radar, and other instruments. Note: "Turtles" (developed by Tim Samaras) are small devices filled with instruments that measure humidity, pressure, temperature and wind speed/direction. Storm chasers place these devices in the path of an approaching tornado. When the tornado passes these devices are lifted into the tornado and begin to send data to scientists who are able to watch real-time conditions that improve prediction and warnings.	https://sciencing.com/levels-tornadoes-4910.html	
306	How does a hurricane appear on a weather map.	*A hurricane is a low-pressure storm so quite often there is a letter "L" in the center of a large circle.		

306	After the water from a surge recedes, what sorts of damage must people deal with?	*Sample answer: Depending on where the people live, they may have mud and sand to remove, trees and shrubs to remove, roads to repair or homes to repair or replace.		
306	What will happen to a hurricane that moves over land?	Sample answer: It will weaken.		
306	How might the size of the hurricane and the direction in which it moves change as it moves over land?	Sample answer: The hurricane will get smaller and quite likely change direction.		
306	How have hurricane emergency responses changed over time?	*Have students share their research with each other and compare their findings. Hopefully they conclude that people are more informed about severe weather because of updated equipment and information.		
306	How might a such a wave affect agricultural land?	Sample answer: It can wash away crops, destroy livestock, wash away soil, deposit mud and sand, the salt water can alter the soil and destroy its fertility.		
306	What do you think would happen as the storm surge reaches an estuary?	Sample answer: It would move up the estuary and flood the surrounding homes, damage boats and piers, and bring in debris and it would carry the salt water much further up the estuary which could negatively affect the ecology of the ecosystem.		
306	What other hazards are associated with these storms?	Sample answer: Blizzards can cause power outages, traffic accidents, interruption in transportation services, interfere with emergency services, it can cause frost-bite, hypothermia, and possible death to people caught in the blizzard unprepared.		
306	How are jet streams related to the development of a blizzard?	Sample answer: During winter, the jet stream can dip south brining cold, frigid air in contact with warmer, semitropical air mass, causing strong winds and heavy snow fall.		
307	How does wind speed affect storm surge?	*Higher wind (speed) pushed more water on land.		
307	What happens?	Sample answer: The water is pushed higher up on the land and the sugar cubes begin to turn blue if the water hits them.		
307	What do you observe?	Sample answer: The water is pushed higher up onto the land.		
307	How does this simulate a storm surge?	Sample answer: The blowing air from the air dryer models the strong winds of the hurricane, the hair dryer wind blowing the water onto the "land" models how the hurricane storm surge pushes up on the land near to the hurricane.		

307	What materials would help simulate the effects of the storm surge more accurately?	Sample answer: Put sand on top of the "land" near the shoreline, make small structures out of wood that could be damaged and/or moved by the surge, etc. Note: Encourage students to build a larger model and use these materials to make it more realistic and do the investigation again.		
	* Means the answer is found in the TE.			