The WeatherCycler

Name _____

Study Activity I WEATHER MAPS

Introduction
Weather maps are keys to understanding the weather. They tell about the atmospheric systems, called Highs and Lows, that control weather. *The WeatherCycler* shows how weather maps can be read.

Learning Objectives
As a result of this learning activity, you will be able to:
1. Read a weather map and explain it to others.
2. Use a weather map to describe the weather at different places.

Directions
Refer to *The WeatherCycler* to select the responses at the right which correctly complete the statements in this Study Activity. Circle your responses.

Section A

Carefully look at the face of *The WeatherCycler* with the slide pushed all the way in. What you see in the large chart window is a map view of a weather "Low". You can find explanations of common weather map symbols to the lower left of the chart face.

1. The "L" marks the middle of a Low. It is called a Low because its center is where the air pressure is lowest. Lows are large storm systems that stretch over hundreds of miles or more. It is raining or snowing in the Low wherever the map _____ shaded.

   1. is
      is not

2. Weather stations are shown on the map as small circles with attached lines suggesting musical notes, or arrows. Look at the station on the map pointed to by "A". It looks like this: 
   The wind direction there is given by the arrow shaft. The wind is from the southeast. Since winds are named by the direction from which the wind is blowing, this station has a _____ wind.

   2. southeast
      northwest

3. Look at all the wind directions displayed at stations surrounding the map "L". The general pattern of wind directions in the Low shows winds blow _____ around the center of lowest pressure.

   3. clockwise 
      counterclockwise 

4. Cloud cover is reported by the way the station circles are filled in. Stations in the shaded areas on the map have reported amounts of cloud cover described as _____.

   4. no clouds
      completely overcast

5. Fronts extend outward from the center of the Low. The blue line with attached "spikes" represents a _____ front.

   5. warm
      cold

6. *The WeatherCycler* shows that rain or snow usually occurs in a relatively broad band ahead of the (a) _____ front and in a narrow band along the (b) _____ front.

   6a. warm
   cold
   b. warm
   cold

Section B

Pull *The WeatherCycler* slide out until the "H" is in the center of the "Surface Weather Map" window. This view represents a major weather system called a "High'.

1. The nearly circular black lines surrounding the "H" connect places that have the same air pressure. They show how air pressure changes in a High with the highest pressure in the center. These lines are called _____.

1. isotherms
   isobars

2. Wind directions are generally _____ around the center of the High marked by the "H".

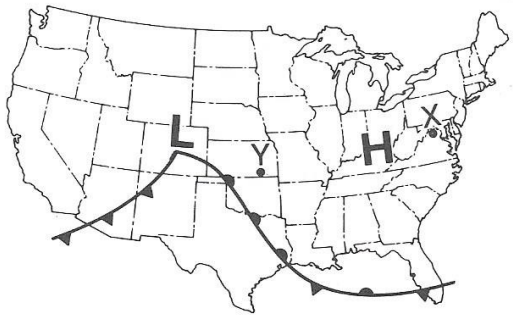
2. clockwise ↻
   counterclockwise ↺

3. Skies are generally _____ in a High.

3. clear or
   partly cloudy
   overcast

Section C

Use *The WeatherCycler* and the weather map at the right to answer the following:



1. Weather at Location X: The weather at X is controlled by a (a) _____. The wind at X is probably from the (b) _____ and the sky is clear or partly cloudy.

1a. High
    Low
 b. southwest
    northwest

2. Weather at Location Y: The weather at Y is controlled by a Low. The wind is probably from the (a) _____, the sky is (b) _____, and rain or snow (c) _____ likely to be falling.

2a. southeast
    northwest
 b. clear
    overcast
 c. is
    is not

The WeatherCycler

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Study Activity II WEATHER IN HIGHS

Introduction
The "H's" or "Highs" of weather maps mark the centers of fair-weather systems. *The WeatherCycler* helps you understand what kind of weather you can expect in a High.

Learning Objectives
As a result of this learning activity, you will be able to:
1. Describe the kinds of weather that are likely to be found in a High.
2. Predict the weather changes that can happen as a High passes through your area.

Directions
Refer to *The WeatherCycler* to select the responses at the right which correctly complete the statements in this Study Activity.
Circle your responses.

Section A

Turn to your *WeatherCycler* and pull the slide out until the "H" is centered in the "Surface Weather Map" window. Answer the following:

1. The wind blows _____ around the high-pressure center marked with an "H".
   1. clockwise ↻
      counterclockwise ↺

2. According to the map, skies in a High tend to be _____ with the weather generally fair.
   2. clear
      cloudy

Section B

With the "H" in the middle of the map window, imagine yourself being on the map at Point B. Now pull the slide out slowly to imitate the typical motion of Highs towards the east. Look at map data and the windows below the map to see how your weather changes at Point B.

1. Which sequence at the right better describes the shift in wind direction as the High's center passes by to the north of your Point B location?
   1. north, east, southeast
      south, west, north

2. According to the window showing air-pressure changes at Point B, which choice at the right describes how the pressure changes as the High passes by?
   2. rising and then falling
      falling and then rising

3. The same chart window shows gradual _____ at Point B when the air pressure is falling.
   3. cooling
      warming

Section C

Adjust the slide so the "H" is again in the middle of the map window. Now pull the slide out slowly. Imagine yourself on the map at Point A while the High moves towards the east.

1. Which sequence at the right better describes the shift in wind direction as the High's center passes by to the south of your Point A location?

   1. northwest, west, south
      south, east, northwest

2. According to the window showing air-pressure changes, which choice at the right describes how the pressure would change at Point A as the High passes by?

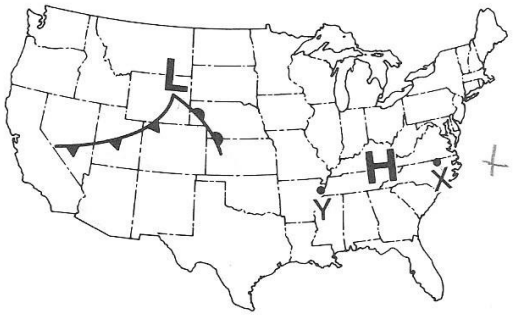
   2. rising and then falling
      falling and then rising

3. The same chart window shows gradual _____ at Point A when the air pressure is falling.

   3. warming
      cooling

Section D

The High shown on the map at the right is dominating the weather at X and Y. Use *The WeatherCycler* and the map to answer the following:



1. Weather at X: The wind is probably from the (a)_____, the sky is (b)_____, and the temperatures are relatively cool.

   1a. north
   south
   b. clear
   cloudy

2. Weather at Y: The wind is probably from the (a)_____, the sky is (b)_____, and temperatures are relatively warm.

   2a. north
   south
   b. cloudy
   mostly clear

3. The center of the High is predicted to be to the east of X tomorrow. Tomorrow, X should be (a)_____than today with winds from the (b)_____. The weather at X tomorrow should be similar to the weather at Y (c)_____.

   3a. warmer
   cooler
   b. north
   south
   3c. today
   tomorrow

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Study Activity III WEATHER FRONTS

Introduction
Neighboring Highs with different temperatures are separated by boundaries called fronts. Fronts sweeping through your area can bring dramatic weather changes. *The WeatherCycler* describes the kinds of weather cold and warm fronts can deliver.

Learning Objectives
As a result of this learning activity, you will be able to:
1. Explain what cold and warm fronts are and how the weather changes across them.
2. Describe the sequence of weather events that can occur as cold and warm fronts pass your location.

Directions
Refer to *The WeatherCycler* to select the responses at the right which correctly complete the statements in this Study Activity. Circle your responses.

Section A

Pull out the *WeatherCycler* slide so that Point B is aimed at a place on the map's (blue) cold front about ⅛ inch to the right of the station reporting a 25-knot wind from the northwest.

1. The front is a boundary between warm and cold air. It is called a cold front because it is moving and cold air is replacing warm air at the Earth's surface. The cold front is moving in the direction the blue "spikes" are pointing. The windows below Point B show that the cold air is _____ the front.

   1. ahead of
      behind

2. Chart windows below Point B show weather along the cold front is _____.

   2. fair
      stormy

3. Winds ahead of the cold front are from the south-southwest to southwest while winds behind the front are from the _____.

   3. southeast
      northwest

Section B

Adjust *The WeatherCycler* slide until Point B is aimed at the first station to the east (right) of the cold front. Now pull the slide out slowly to put the cold front into motion towards the east. Imagine that you remain at Point B while the front passes by.

1. As the cold front approaches you at Point B, the sky _____.

   1. clears
      becomes more cloudy

2. At the time the front passes Point B, the wind shifts direction until it is coming from the (a) _____ and the temperature begins to (b) _____.

   2a. northwest
       northeast
   b. rise
      fall

3. After the cold front passes, the sky (a)_____ and the temperatures are relatively (b)_____.

3a. remains cloudy
clears
b. cold
warm

Section C

Move *The WeatherCycler* slide until Point B is aimed at the (red) warm front. It should be pointing at a place on the front about ¼ inch to the right of the nearest station west of the front.

1. This boundary is called a warm front because warm air is replacing cold air at the Earth's surface. The warm front is moving in the direction the red semi-circles are pointing. The windows below Point B show that the warm air is_____the front.

1. ahead of
behind

2. The windows below Point B show that stormy weather is found _____the warm front.

2. ahead of
behind

3. Winds ahead of the map warm front are from the southeast while winds behind the front are from the _____.

3. northeast
southwest

Section D

Push the slide completely into *The WeatherCycler*. Now pull the slide out slowly to put the warm front into motion towards the east. Imagine that you remain at Point B while the front moves.

1. As the warm front approaches you at Point B, the _____.

1. sky clears
cloudiness increases

2. As the warm front passes, your temperature at Point B (a)_____ and the rain or snow (b)_____.

2a. rises
falls
b. starts
stops

3. After the warm front passes, the temperature is relatively_____ and the weather fair.

3. warm
cold

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Study Activity IV WEATHER IN LOWS

Introduction
Lows are the large storm systems that affect our weather. They form between Highs. Traveling Lows deliver a mixture of weather to places in their paths.

Learning Objectives
As a result of this learning activity, you will be able to:
1. Describe Lows and the mixture of weather they contain.
2. Describe the sequence of weather as a Low passes by.

Directions
Refer to *The WeatherCycler* to select the responses at the right which correctly complete the statements in this Study Activity. Circle your responses.

Section A

Push *The WeatherCycler* slide all the way in. The "L" on the map marks the center of a Low. Answer the following:

1. The wind blows _____ around the center marked by an "L".
   1. clockwise ↻ counterclockwise ↺
2. Rain or snow is falling in a broad band ahead of the _____ front and in a narrow band along the other front.
   2. cold warm
3. The warmest temperatures in the Low are located generally to the _____ of the storm system's center.
   3. south north

Section B

With *The WeatherCycler* slide pushed all the way in, imagine yourself being on the map at Point A. Now pull the slide out slowly to imitate the usual motion of Lows towards the east. Look at map data and the windows above the map to see how your weather changes while you remain at Point A. Answer the following:

1. The center of the Low will pass by the (a) _____ of you while you experience (b) _____ period(s) of rain or snow.
   1a. north south
   b. one two
2. _____ fronts will cross your location at Point A as the Low passes by.
   2. No Two

Section C

With *The WeatherCycler* slide pushed all the way in, imagine yourself being on the map at Point B. Now pull the slide out slowly to imitate the motion of Lows towards the east. Look at map data and the windows below the map to see how your weather changes while you remain at Point B. Answer the following:

1. The center of the Low will pass by to the (a)_____ of you while you experience (b)_____ period(s) of precipitation.

1a. north
south
b. one
two

2. Your weather at Point B will first feel the effects of a (a)_____ front. When it passes, the wind will shift until it is coming from the (b)_____.

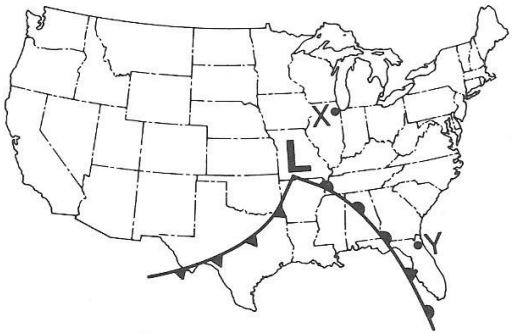
2a. warm
cold
b. southwest
northwest

3. When the second front arrives at Point B, your temperatures will begin to (a)_____. At the same time, the wind will shift until it is coming from the (b)_____.

3a. rise
fall
b. southeast
northwest

Section D

Use *The WeatherCycler* to interpret the map at the right.



1. Weather at Location X: It is relatively cold and the wind is from the _____.

1. northwest
northeast

2. Weather at Location Y: The wind is probably from the _____ and the sky is overcast.

2. southeast
northwest

3. Since Lows usually move toward the east, Location _____ is the place likely to have greater changes in weather during the next day or so.

3. X
Y

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Study Activity V FORECASTING WEATHER

Introduction
While modern weather forecasting is complicated, you can often make weather forecasts yourself. It is possible because the weather now to the west of you is likely to be your weather in the future.

Learning Objectives
As a result of this learning activity, you will be able to make and check weather forecasts for the next half day or so.

Directions
Refer to *The WeatherCycler* to select the responses at the right which correctly complete the statements in this Study Activity. Circle your responses.

Section A

The WeatherCycler can give you forecasts. To get the forecast, move the slide until Point A or Point B is aimed at the map station that best fits the current weather. Then flip *The WeatherCycler* to the back side to read the forecast.

1. Push the slide all the way in. Assume that Point B is aimed at the map station that best describes current weather. Flip to the back side to read the forecast in the lower window. According to the forecast, it _____ rain or snow in the next few hours.

1. will
   will not

Section B

You can make forecasts because Highs and Lows usually move from west to east. To make a forecast, assume that the weather currently at the next station to the west of your map position will travel and arrive at your location a half-day from now.

1. Push the slide all the way into *The WeatherCycler*. Place yourself at the station aimed at by Point B. Forecast the weather for that station by pulling the slide slowly until the next station arrives at Point B.
   In the next half-day, skies should (a)_____ and precipitation will probably (b)_____.

1a. clear
    become cloudy
 b. stop
    begin

2. Pull *The WeatherCycler* slide out until the station due north of the map "H" is at Point A.
   Your 12-hour forecast for the station at Point A: Temperatures will slowly (a)_____, skies will be (b)_____, and winds will gradually shift until coming from the (c)_____.

2a. rise
    fall
 b. mostly clear
    overcast
 c. south
    north

3. Adjust *The WeatherCycler* slide until Point B is aimed at the station most nearly due south of the map "L".
Your 12-hour forecast: Temperatures (a)_____, showers, and winds shifting to the (b)_____.

3a. rising
falling
b. southeast
northwest

Section C

You can quickly check the forecasts you make by comparing them with the forecasts appearing in the windows on the back side of *The WeatherCycler*.

1. Look at the front side of *The WeatherCycler* and move the slide until Point B is aimed at the station due south of the map "H". What is your 12-hour forecast for this location?
Forecast: The weather will be (a)_____with winds gradually shifting until they are coming from the (b)_____.

1a. stormy
fair
b. southwest
southeast

2. Keep the slide in the same exact position and flip to the back side of *The WeatherCycler.* The Point B forecast window indicates the weather will be fair with winds shifting until coming from the _____.
(Check this answer with the forecast you just made in (1) above.)

2. southwest
southeast

Section D

Forecasts you receive by television and radio include portions covering the next half day or so. They can be interpreted with *The WeatherCycler.* Do this by adjusting the slide until Point A or B is aimed at the station on the map most likely to have the given forecast.

1. Forecast: Increasing cloudiness and turning colder with the chance of thunderstorms. South winds shifting to northwest.
This forecast applies to the station (a)_____of the map "L". A (b)_____front is expected to pass through the area during the forecast period.

1a. north
south
b. warm
cold

2. Forecast: Continued fair, partly cloudy, and gradual warming. Light east winds shifting gradually to southeast.
This forecast best fits a station to the (a)_____of a passing (b)_____.

2a. south
north
b. High
Low

The WeatherCycler

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Study Activity VI INTERPRETING WEATHER ON YOUR OWN

Introduction
You can often tell a great deal about the weather on your own. *The WeatherCycler* is especially useful in helping to understand the weather you directly observe.

Learning Objectives
As a result of this learning activity, you will be able to use direct observations of the sky to detect the High or Low that is controlling your weather and to make general forecasts.

Directions
Refer to *The WeatherCycler* to select the responses at the right which correctly complete the statements in this Study Activity. Circle your responses.

Section A

Turn to your *WeatherCycler* map to find where you would have to be in a High or Low to have the weather described in the following sets of observations.

1. Winds from the northeast, cloudy, steady rain, and low pressure could be observed when you are located to the (a)_____ of the center of a (b)_____.

   1a. north south
   b. High Low

2. Fair weather, cool, and light winds from the north mean you are probably to the_____ of the center of a High.

   2. east west

3. Clear skies and calm conditions would place you in the center of a _____.

   3. High Low

Section B

A series of observations made over several hours at the same place can tell you even more about the prevailing High or Low. Use your *WeatherCycler* to interpret the following:

1. Air pressure is rising while the wind direction is gradually shifting from north to northwest. It is fair and cool.
   These data best fit weather at a place to the northeast of the center of a _____.

   1. Low High

2. Rain has stopped, winds have shifted from southeast to southwest, skies have cleared, and temperatures have risen.
   These data best fit a station south or southeast of the center of a (a)_____. They indicate a (b)_____ front recently passed the station.

   2a. High Low
   b. cold warm

Section C

General relationships among kinds of weather, air pressure, and wind direction are useful in interpreting your local weather.

1. *The WeatherCycler* shows that _____ air pressure and fair weather usually go together.

1. low
   high

2. According to *The WeatherCycler*, if you stand with your back to the wind (imagine yourself at one of the stations on the map), lower air pressure will be in the general direction to your _____ and slightly forward.

2. left
   right

3. If the wind is from the south and your back is to the wind, low pressure will be to your (a) _____. This tells you that low pressure is probably to the (b) _____ of your location.

3a. left
    right
b. east
   west

Section D

Make forecasts based on the following sets of observations. Assume that it takes about 12 hours for the weather to move east from one weather station to the next on *The WeatherCycler* map.

1. The weather has been fair, warm, and humid with southwest winds following an extended period of rain. This places you to the south or southeast of the center of a (a) _____. In the next half day or so, you can expect a (b) _____ front.

1a. High
    Low
b. warm
   cold

2. Skies have been clear, air pressure has been gradually rising, and the wind has shifted from north to northeast. You can expect that the weather will (a) _____. Your weather is being controlled by a (b) _____.

2a. continue to be fair
    become stormy
b. High
   Low