Globe Weather Chart

High Clouds

Cirrostratus

These clouds are a thin, almost transparent, whitish layer made up of ice crystals. They may totally or partly cover the sky and can create a halo appearance around the sun.

Cirrus

These clouds look like white delicate feathers. They are generally white wispy forms. They contain ice crystals.

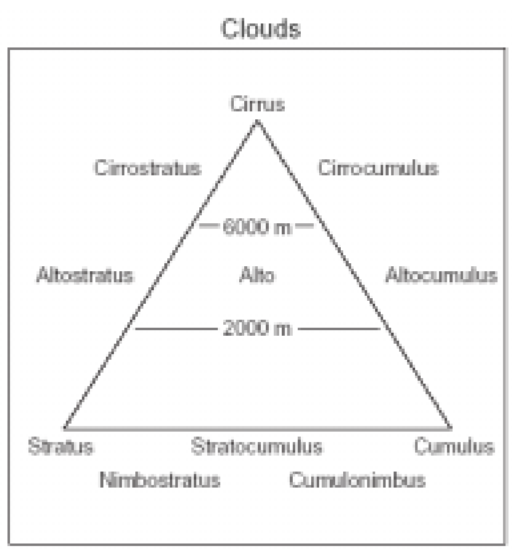
Cirrocumulus

These clouds are thin white layers with a texture giving them the look of patches of cotton or ripples without shadows. They contain primarily ice crystals and perhaps some very cold water droplets.

Middle Clouds

Altostratus

These clouds form a bluish or grayish veil that totally or partially covers the sky. The light of the sun can be seen through them but there is no halo effect.



Altocumulus

These clouds look like waves of the sea with white and gray colouring and shadows. They contain mostly water droplets and perhaps some ice crystals.

Contrails

Short-lived Contrail

Note the short line of cloud above the lightpole. The airplane is barely visible in this photo but is at the front of the contrail

Persistent Contrails

These are very distinct contrails, and show a range from persistent non-spreading on the right to persistent spreading on the left. The most likely explanation for this photo is that all three airplanes followed about the same path, but that the winds high in the atmosphere are blowing from right to left, moving the older contrails to the left. The spreading of the left-most contrail indicates there is a fair amount of water vapor in the upper atmosphere.

Persistent, Spreading Contrails

This photo shows persistent, spreading contrails in an area of high air traffic. As above, it is likely that the planes are mostly following a similar path, but the contrails are being spread out by the wind. Note that all the contrails in this photo appear as wide or wider than those above, indicating that the presence of abundant water vapor in the atmosphere is allowing the contrails to spread. Also note the cloud near the middle of the photo, which looks like a regular cirrus cloud, but whose position makes it likely that this cloud actually originated from a contrail.

Contrail Cover Classification

None	There are no contrails visible.
0-10 %	Contrails are present but cover less than one-tenth (or 10%) of the sky.
10-25 %	Contrails cover between one-tenth (10%) and one-fourth (25%) of the sky
25-50%	Contrails cover between one-fourth (25%) and one-half (50%) of the sky
> 50%	Contrails cover more than one-half (50%) of the sky.
Obscured	Contrails cannot be observed because more than one-fourth (25%) of the sky cannot be seen clearly.

Low Clouds

Stratus

These clouds are gray and lie very close to the surface of the Earth. They usually look like a sheet layer but sometimes are found in patches. They rarely produce precipitation.

Stratocumulus

These clouds are a gray or whitish colour. The bases of these clouds tend to be more round than flat. They can be formed from old stratus clouds or from cumulus clouds that are spreading out. Their tops also tend to be mostly flat.

Cumulus

These clouds have a flat base and a dense, mound shaped top that resembles a large cauliflower. Where the sun hits these clouds they are a brilliant white. The base tends to be a darker gray. They generally do not produce precipitation.

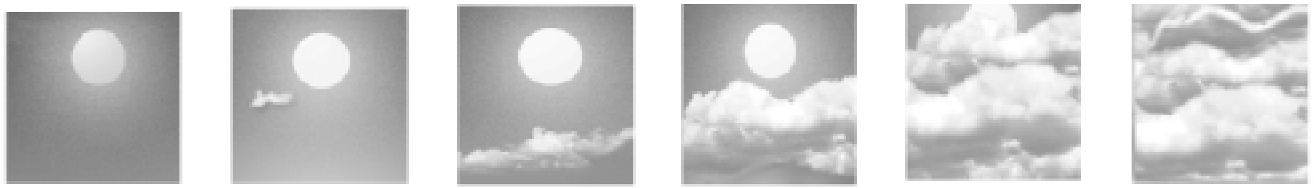
Nimbostratus

This is a very dark and gray-coloured cloud layer that blots out the light of the sun. It is massive and has a continuous fall of precipita-tion.

Cumulonimbus

These are large, heavy, and dense clouds. They have a generally flat, dark surface with very tall and large tops like the shape of a massive mountain or anvil. These clouds are often associated with lightning, thunder and sometimes hail. They may also produce tornados.

Cloud Cover



No Clouds	Clear	Isolated	Scattered	Broken	Overcast
0%-No Clouds	<10% Clouds	10-25% Clouds	25-50% Clouds	50-90% Clouds	>90% Clouds

Obscured: Clouds cannot be observed because more than one-fourth (25%) of the sky cannot be seen clearly. If the sky is Obscured, record what is blocking your view of the sky. Report as many of the following as you observe.

[] Fog []Smoke []Haze []Volcanic Ash []Dust []Sand []Spray []Heavy Rain []Heavy Snow []Blowing Snow

Setting up your weather station and defining your site

Be sure that the weather station is installed correctly so that the measurements you take are accurate and comparable against readings from around the world. You need to calibrate your equipment periodically. You then need to tell the GLOBE database where you weather station is located and describe the surroundings.

The GLOBE web site refers to the weather station as the 'Atmosphere Study Site'. You can complete a Site Definition Sheet then enter data onto the website at www. globe.gov Give your Atmospheric Study Site a name you will remember. You will need measurements for latitude, longitude and elevation at the site for the Instrument Shelter from the GPS. Remember to take 5 readings over 5 minutes and then average them. Notice any obstacles or buildings in the area. Make notes on the type of the ground cover.

The Instrument Shelter is where the thermometers are placed so that they are protected from direct sunlight, vibration and other external factors that could influence the readings. The Instrument Shelter must be properly assembled and positioned before any readings are taken.

- It should be painted white to reflect the sun light.
- The ideal position for the shelter is out in the open on a flat, natural surface. Avoid areas on steep slopes, in sheltered hollows or near buildings or concrete surfaces, as these become hotter than their surroundings. Notice the ground cover too.
- Ideally the shelter should be four times as far from an object as the object is high, so if a wall is 3 m high, the shelter should be 12 m away.
- The door should face North.
- The instruments in the shelter should be 1.5 m off the ground.

Clouds and Contrails

Pupils observe the clouds and contrails to determine the amount of sky covered and the types of clouds and contrails using this chart. Record the cloud and contrail data on the data sheet.

Precipitation: rain and snow fall

Pupils measure rainfall collected in a rain gauge and empty it after each measurement. They may also record the pH of the rainfall. Pupils may also measure snow depth and the amount of water contained in the snow. The standard rain gauge consists of an inner measuring tube, a funnel and an outer overflow tube. The inner tube is marked in mm and stands inside the overflow tube. The gauge should be placed in an open area away from overhanging trees but not in a place where strong winds could blow the rain across the top of the tube. It should be on a post at least 50 cm off the ground (it could be on the post with the Instrument Shelter).

Temperature

Pupils record maximum, minimum and current temperature regularly. Pupils can use a "U-tube" maximum/minimum thermometer with a magnet for resetting the indicators. Alternatively you could use a digital thermometer which reads and displays temperature in 0.1°C increments. Both thermometers should be kept inside the screen along with the calibration thermometer. Pupils will need to take three readings each day - minimum, maximum and current temperature. Record the temperatures as near as possible to solar noon each day. You will need a calibration thermometer for calibrating other thermometers at regular intervals. This calibration thermometer is a single tube, liquid filled that records temperatures as low as -20°C. The thermometers should be calibrated every three months. Thermometers are kept in the Instrument Shelter. Temperature is measured in °C.

Barometric Pressure

Measure air pressure using an Aneroid Barometer and Altimeter. For schools at elevation 500 m or less use an aneroid barometer. For schools at a higher elevation an altimeter that also provides barometric pressure readings is recommended. The barometer/altimeter can be mounted on a classroom wall, since the air pressure is the same inside and outside the building. The instruments should be calibrated every six months.

Relative Humidity

Measure relative humidity using either a digital hygrometer or a sling psychrometer.

The Digital Hygrometer must not be exposed to condensation, if yours is - then record a reading of 100% and comment that 'condensation occurred'. It is therefore best not to leave the hygrometer in the instrument shelter overnight. The ideal situation is to place the hygrometer in the instrument shelter 30 minutes before local solar noon. For calibration instructions check the individual certificate, it may need to be sent to the manufacturer to be calibrated.

A Sling Psychrometer consists of two thermometers which can be whirled by hand. One thermometer is dry and the other is kept wet by a small,wet cotton sock that fits on the end of the thermometer. Check that there are no breaks in the columns of fluid in each thermometer. If there are gaps, give it a vertical shake to bring the liquid together. Calibrate each thermometer every three months. Record the wet and dry temperatures. Calculate the difference between the two temperatures. Using the chart, find the dry bulb temperature along the left side of the chart and the temperature difference across the top. The intersection of the two readings give the relative humidity.

Relative Humidity (°C) Chart

	Difference between Wet and Dry Bulb temperature (°C)																	
DryBulb Temp\	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
-10	67	35																
-9	69	39	9															
-8	71	43	15															
-7	73	48	20															
-6	74	49	25															
-5	76	52	29	7														
-4	77	55	33	12														
-3	78	57	37	17														
-2	79	60	40	22														
-1	81	62	43	26	8													
0	81	64	46	29	13													
1	83	66	49	33	17													
2	84	66	52	37	22	7												
3	84	70	55	40	26	12												
4	85	71	57	43	29	16												
5	86	72	56	45	33	20	7											
6	86	73	60	48	35	24	11											
7	87	74	62	50	38	25	15											
8	87	75	63	51	40	29	19	8										
9	88	76	64	53	42	32	22	12										
10	88	77	66	55	44	34	24	15	6									
11	89	78	67	56	46	36	27	18	9									
12	89	78	68	58	48	39	29	21	12									
13	89	79	69	59	50	41	32	23	15	7								
14	90	79	70	60	51	42	34	26	18	10								
15	90	80	71	61	53	44	36	27	20	13	6							
16	90	81	71	63	54	46	38	30	23	15	8							
17	90	81	72	64	55	47	40	32	25	18	11							
18	91	82	73	65	57	49	41	34	27	20	14	7						
19	91	82	74	65	58	50	43	36	29	22	16	10						
20	91	83	74	66	59	51	44	37	31	24	18	12	6					
21	91	83	75	67	60	53	46	39	32	26	20	14	9					
22	92	83	76	68	61	54	47	40	34	28	22	17	11	6				
23	92	84	76	69	62	55	48	42	36	30	24	19	13	8				
24	92	84	77	69	62	56	49	43	37	31	26	20	15	10	5			
25	92	84	77	70	63	57	50	44	39	33	28	22	17	12	8			
26	92	85	78	71	64	58	51	45	40	34	29	24	19	14	10	5		
27	92	85	78	71	65	58	52	47	41	36	31	26	21	16	12	7		
28	93	85	78	72	65	59	53	48	42	37	32	27	22	18	13	9	5	
29	93	86	79	72	66	60	54	49	43	38	33	28	24	19	15	11	7	
30	93	86	79	73	67	61	55	50	44	39	35	30	25	21	17	13	9	5

Wind

Measure wind velocity and wind direction using a vane type wind gauge that is placed in an unobstructed location. Wind direction should be given as a compass bearing from true north. Wind velocity should be given in km/hr.

Data loggers

Using an automated data logger you can collect weather data many times a day, download the temperatures to your computer and then email the data table to GLOBE. This means you are monitoring the weather more closely by collecting data more frequently over regular intervals. There are many on the market and if the installation instructions are followed carefully they collect very accurate weather data. Weather information from the data logger can usually be displayed in real time via a computer so everyone can see it.