Blizzards

A **blizzard** is a severe snow storm with strong winds and low temperatures. A storm is classified as a blizzard if the winds exceed 40 km/h, there is blowing snow that will reduce visibility to less than 400 m, and it lasts more than 4 hours.

Causes of Blizzards

Blizzards develop in much the same way as thunderstorms. However, cold temperatures bring snow rather than rain, and there is seldom any lightning.

Some of the worst blizzards in Canada develop when a warm air mass, filled with moisture from the Gulf of Mexico and the Atlantic Ocean, moves northward and meets a cold Arctic air mass under a strong jet stream. The resulting mid-latitude storm, rotating counterclockwise, may drop up to a meter of snow in 24 hours.

Dangers of Blizzards

Blizzards have devastating effects on transportation. They cause whiteout conditions on the highways, roads, and even on water, making driving dangerous and navigation along coastal waters impossible without radar. Blizzards can close airports when air travel becomes too dangerous. Public transportation usually grinds to a halt. Bridges become icy and extremely dangerous in the winds. Emergency road crews have difficulty clearing the snow because more blows into the areas just cleared. People get stranded when their vehicles get stuck in snowdrifts.

Blizzards can also cause avalanches in mountains. These snow slides occur when loose, new snow, piled on hard snow base, breaks loose and slides down the mountainside.

Another danger that may result from a blizzard is the loss of electricity. If power lines break or utility poles are blown over, electricity can be cut off for several days or even a few weeks. Since our society relies heavily on electricity, this can be a very serious problem.

Storm Precautions

Weather forecasters can typically give us plenty of warning of blizzards. When you hear that a blizzard is approaching, take the following precautions:

- If possible, stay off highways, especially in rural areas. Avoid bridges.
- If you are in a vehicle that gets stuck, stay with the vehicle, but don't keep the engine running. Carbon monoxide from the exhaust could kill you.
- Take blankets, extra warm clothing, food, candles, and matches routinely on winter car trips.
- At home, have enough supplies on hand to help you cope with an electrical failure that may last several days.

Extreme Heat and Cold

The healthy human body functions best with an internal temperature of $37°C$. Any extreme conditions that make it difficult to maintain its normal temperature are dangerous and may even cause death.

Heat Waves and the Humidex

A **heat wave** is a period of more than three days at or above $32°C$. During such conditions, the risk of heat related illness is dramatically higher.

Heat waves can feel hotter with high humidity. The **humidex scale** (shown below) measure how hot, humid weather feels to humans. This scale combines the temperature and relative humidity.

°C	Relative Humidity (in percent)																		
	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10
49																			50
48																			49
47																		50	47
46																		49	46
45																	50	47	45
44																	49	46	43
43																49	47	45	42
42															50	48	46	43	41
41															48	46	44	42	40
40														49	47	45	43	41	39
39													49	47	45	43	41	39	37
38												49	47	45	43	42	40	38	36
37											49	47	45	44	42	40	38	37	35
36									50	49	47	45	44	42	40	39	37	35	34
35								50	48	47	45	43	42	40	39	37	36	34	33
34							49	48	46	45	43	42	40	39	37	36	34	33	31
33					50	48	47	46	44	43	41	40	39	37	36	34	33	32	30
32			50	49	48	46	45	44	42	41	40	38	37	36	34	33	32	30	29
31	50	49	48	47	45	44	43	42	40	39	38	37	35	34	33	32	30	29	28
30	48	47	46	44	43	42	41	40	39	37	36	35	34	33	31	30	29	28	27
29	46	45	43	42	41	40	39	38	37	36	35	33	32	31	30	29	28	27	26
28	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25
27	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25		
26	39	38	37	36	35	34	33	33	32	31	30	29	28	27	26	25			
25	37	36	35	34	33	33	32	31	30	29	28	27	26	26	25				
24	35	34	33	33	32	31	30	29	28	28	27	26	25						
23	33	32	31	31	30	29	28	28	27	26	25								
22	31	30	30	29	28	27	27	26	25	25									
21	29	29	28	27	26	26	25												

From the humidex scale, you can see that if the air temperature is $30°C$ and the relative humidity is 65%, then the humidex reading is $40°C$. People start to feel uncomfortable at a humidex rating of $30°C$, and at $40°C$ almost everybody feels uncomfortable.

The humidex scale is not precise, but it is a useful guide to help people decide what to wear, how much outdoor activity to participate in, etc.

Heat Alerts

A heat wave becomes more dangerous the longer it lasts. Here are some of the dangers and how to cope with them.

- Dehydration: drink plenty of water (not pop!).
- Heat cramps (especially in the legs): these result from reduced salts in your body as you sweat. Stop exercising, drink lots of water, and eat some salty food.
- Fainting: happens when blood pressure drops. Stop exercising, drink lots of water.
- Heat exhaustion: caused by extreme loss of water and salts. The body temperature rises to about $39°C$. Drink lots of water, stop exercising.
- Heatstroke: results when the body's ability to regulate its own temperature fails. The body temperature rises to $41°C$ or more. Confusion, unconsciousness, and even death can follow. Seek immediate medical care.

Extreme Cold and Wind Chill

When wind blows against a person, it removes body heat and the body cools down more quickly. When brisk winds accompany cold temperatures, this increased cooling can be dangerous.

To take the cooling effect of wind into account, meteorologists calculate the rate of heat loss and report it as the **wind chill factor**.

COOLING POWER OF WIND EXPRESSED AS "EQUIVALENT CHILL TEMPERATURE"																					
WIND SPEED		TEMPERATURE (DEGREES C)																			
CALM	CALM	4	2	-1	-4	-7	-9	-12	-15	-18	-21	-23	-26	-29	-32	-34	-37	-40	-43	-46	-48	-51
KNOTS	*KPH*	EQUIVALENT CHILL TEMPERATURE																			
4	8	2	-1	-4	-7	-9	-12	-15	-18	-21	-23	-26	-29	-32	-34	-37	-40	-43	-46	-48	-54	-57
9	16	-1	-7	-9	-12	-15	-18	-23	-26	-29	-32	-37	-40	-43	-46	-51	-54	-57	-59	-62	-68	-71
13	24	-4	-9	-12	-18	-21	-23	-29	-32	-34	-40	-43	-46	-51	-54	-57	-62	-65	-68	-73	-76	-79
17	32	-7	-12	-15	-18	-23	-26	-32	-34	-37	-43	-46	-51	-54	-59	-62	-65	-71	-73	-79	-82	-84
22	40	-9	-12	-18	-21	-26	-29	-34	-37	-43	-46	-51	-54	-59	-62	-68	-71	-76	-79	-84	-87	-93
26	48	-12	-15	-18	-23	-29	-32	-34	-40	-46	-48	-54	-57	-62	-65	-71	-73	-79	-82	-87	-90	-96
30	56	-12	-15	-21	-23	-29	-34	-37	-40	-46	-51	-54	-59	-62	-68	-73	-76	-82	-84	-90	-93	-98
35	64	-12	-18	-21	-26	-29	-34	-37	-43	-48	-51	-57	-59	-65	-71	-73	-79	-82	-87	-90	-96	-101
(Higher winds have little additional effects)		LITTLE DANGER					INCREASING DANGER (Flesh may freeze within 1 minute)						GREAT DANGER (Flesh may freeze within 30 seconds)								
		DANGER OF FREEZING EXPOSED FLESH FOR PROPERLY CLOTHED PERSONS																			

Figure 15-1. Windchill table.

From this table, you can see that a temperature of $-21°C$ with a wind speed of 32 km/h feels like about $-43°C$. At this value, exposed human skin freezes.

The wind chill equivalent temperature indicates what the temperature would feel like with the wind. These values were developed in the 1940s, and are not necessarily accurate, but they are a good guide when deciding what to wear on a winter day.

Cold Alerts

Two major problems are caused by exposure to extreme cold: frostbite and hypothermia.

- Frostbite: skin damage caused by freezing. The ears, nose, hands, and feet are the first to freeze. Sever frostbite causes pain and sensitivity to cold that lasts for years. Extreme frostbite may require amputation.

- Hypothermia: happens when the core body temperature falls to $35°C$ or lower. The person becomes disoriented and may become unconscious and die. The very young and the elderly are most susceptible to hypothermia. Proper protective clothing and staying dry and out of the cold are the best defenses against the effects of extreme cold.