Name: _____ Class: _____ Date: _____

Regents Writing

Writing to Inform

Directions: Read the text and study the graphics, then write a response based on the situation described below.

Your Task: Using relevant information from ***both*** documents, write a presentation for your Earth science class in which you explain wind-chill and discuss ways to **minimize its dangerous effects.**

Guidelines:
Be sure to

- Tell your audience what they need to know about wind-chill
- Discuss ways to minimize the dangerous effects of wind-chill
- Use specific, accurate, and relevant information from the text ***and*** the graphic to support your discussion
- Use a tone and level of language appropriate for a presentation to an Earth science class
- Organize your ideas in a logical and coherent manner
- Indicate any words taken directly from the text by using quotation marks or referring to the author
- Follow the conventions of standard written English

Text

Besides the actual outside temperature, there are many other factors that make someone feel "cold." Arguably, the most popular guideline is wind chill. In November 2001, the National Weather Service (NWS) changed the wind chill temperature index, and the latest formula is used extensively throughout Canada and the United States. The old index calculated wind speed in terms of how quickly water freezes at 33 feet above ground (the typical height of an anemometer, an instrument that measures wind speed), while the newer replacement index is based on readings at a height of five feet above ground—the average "face level."

A scientific definition to that elusive characteristic of the weather known as "cold" was first put forth by Antarctic explorer Paul A. Siple and his colleague Charles F. Passel in 1939. Some of the tests used water-filled plastic cylinders to measure the speed at which water freezes at different air temperatures and wind speeds. Siple coined the term "wind chill" to describe their concept of the relative cooling power (or heat removal) of the human body with various combinations of wind speed and low temperatures.

The widely accepted wind chill formula is designed to provide a consistent measure to ensure public safety. There are a number of definitions for the wind chill factor, but simply put, it combines air temperature and wind speed to come up with a reading of what it really feels like outside. The stronger the wind during a given temperature reading, the lower the wind chill factor. Wind moving past exposed skin during cold weather increases the body's heat loss. If the temperature is low, and the wind is strong, the body often cannot keep up with heat loss, and the skin temperature decreases. Wind chill pertains to all warm-blooded animals—including pets, wildlife, livestock, and of course, people.

Outdoor enthusiasts who create their own wind or increase the existing wind—by skiing, snowmobiling, or running for example—can increase the apparent wind chill. Air movement evaporates moisture from the exposed skin, decreasing the temperature. In the summer this feels great—a reason fans are so popular—because it has a cooling effect on an overheated person. However, this same experience can have serious consequences during cold weather in situations where it's good to retain as much heat as possible. Any part of the body touching a cold surface also takes away body heat (known as conduction), as does breathing cold air. Other elements of the weather such as wind speed, relative humidity, and sunshine also influence comfort. The health and metabolism[1] of a person—along with the type of clothing worn—will also affect how cold a person feels. Becoming extraordinarily cold can have adverse effects; two of which are outlined below.

Frostbite is tissue damage caused by exposure to intense cold, and usually occurs when wind chill temperatures fall below 25 degrees F. The early stages of frostbite are a burning or stinging sensation in the affected parts. The skin will be bright pink at first as ice crystals begin to form under the surface. Numbness sets in as the skin turns to pale white, with a hint of gray or yellow spotting. When actual frostbite occurs, parts of the body begin to freeze. It usually starts with the extremities—spreading to the cheeks, and on to the hands and feet. Medical attention is essential! Until help arrives, or the victim can be taken to the nearest treatment center, keep affected body parts as warm as possible. Fingers are usually frostbit first, and they can be slipped under the arm pits, inside the upper thighs, or in the mouth for warmth. You can also make body temperature rise by

[1] metabolism — all the physical and chemical processes involved in the maintenance of life

flexing the affected hand or foot. Without assistance—and sometimes even with it—possible consequences of frostbite are gangrene, severe infection, and in extremely bad instances, amputation.

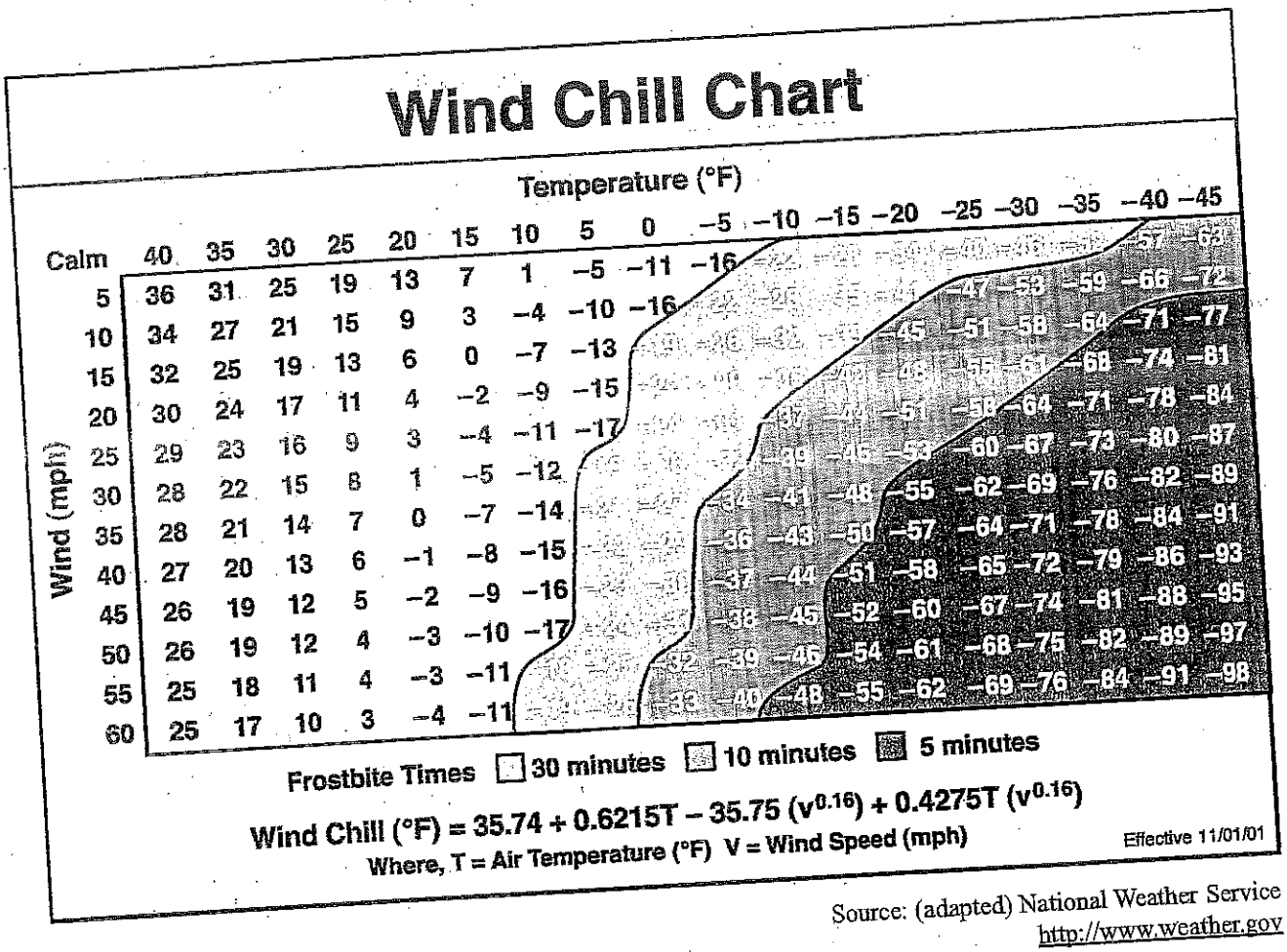
Another result of wind chill is hypothermia, the rapid cooling of the body's inner core to below its normal temperature of 98.6 degrees F. Some of the symptoms are violent shivering, slurred speech, exhaustion, drowsiness, disorientation, and impaired judgment. Hypothermia gradually overcomes a person who has been chilled by wet clothing, low temperatures, or brisk winds. The important thing to remember is, temperatures do not have to drop below freezing for this condition to set in. Smoking, drinking, or taking prescription drugs or illegal narcotics present added dangers in wind chill conditions. All of these dull your sensitivity to the circumstances, and have physical effects that will make you more susceptible to frostbite and hypothermia.

With winter always offering the possibilities of low temperatures, it's important to be aware of the wind chill factor, and what it can mean. Wind chill charts for regular reference are available wherever outdoor equipment is sold. When you venture out in winter, dress for both the weather and the wind. Wear loose-fitting, lightweight, warm clothing in several layers, which can be removed to prevent perspiration and subsequent chilling. Snug mittens are better protection than fingered gloves. If you take the proper precautions, when wind chill comes whipping at your nose you'll be ready!

— Tom and Joanne O'Toole
adapted from "Wind Chill Makes It Colder Than You Think"
New York State Conservationist, February 2004

GRAPHIC

Chart



Source: (adapted) National Weather Service
http://www.weather.gov

Table

How to Assess if Someone is Hypothermic

Stage	Core Body Temperature	Signs and Symptoms
Mild Hypothermia	99° – 97° F	Normal, shivering can begin.
	97° – 95° F	Cold sensation, goose bumps, unable to perform complex tasks with hands, shivering can be mild to severe, hands numb.
Moderate Hypothermia	95° – 93° F	Shivering, intense, muscle incoordination becomes apparent, movements slow and labored, stumbling pace, mild confusion, may appear alert. Use sobriety test, if unable to walk a 30-foot straight line, the person is hypothermic.
	93° – 90° F	Violent shivering persists, difficulty speaking, sluggish thinking, amnesia starts to appear, gross muscle movements sluggish, unable to use hands, stumbles frequently, difficulty speaking, signs of depression, withdrawn.
Severe Hypothermia	90° – 86° F	Shivering stops, exposed skin blue or puffy, muscle coordination very poor, inability to walk, confusion, incoherent/irrational behavior, but may be able to maintain posture and appearance of awareness.
	86° – 82° F	Muscle rigidity, semiconscious, stupor, loss of awareness of others, pulse and respiration rate decrease, possible heart fibrillation.[1]
	82° – 78° F	Unconscious, heartbeat and respiration erratic, pulse may not be felt.
	78° – 75° F	Pulmonary edema,[2] cardiac and respiratory failure, death. Death may occur before this temperature is reached.

[1]fibrillation — uncoordinated muscle twitching that replaces normal contraction of the heart muscle
[2]pulmonary edema — an abnormal buildup of fluid in the lungs causing difficulty breathing

Source: (adapted) Rick Curtis
"Outdoor Action Guide to Hypothermia and Cold Weather Injuries," www.princeton.edu,
August 28, 2007