

## CAUSES OF HEAT LOSS

### 1) RADIATION

Definition: The transfer of heat energy through space

Example. Hold your hand close (don't touch) to a lit light bulb and feel the heat

This is the leading cause of heat loss in almost any situation. Exposed skin is the most vulnerable. An unprotected head and neck may lose up to 50% of the body's total heat production at 40° F and up to 75% at 10° F. This originated the saying: "When your feet are cold, put on your hat."

### 2) CONDUCTION

Definition: The transfer of heat energy through direct contact

Example: Now touch the light bulb (not too long or you may get burned)

Usually small amounts of body heat are lost through conduction. Frequently heat is lost through the hands by contact with metal objects, rock, snow, ice, and liquids. This is one of the most common ways to obtain frostbite. Heat is also lost through your seat when sitting on cold objects or through your feet when standing. Conduction is increased by 240 times your body is wet. Super cooled liquids, such as gasoline, spilled on the skin in the winter can cause instant frostbite.

### 3) CONVECTION

Definition: The transfer of heat by the movement of gases

Example: The rising smoke in a chimney.

The body continuously warms a thin layer of air next to the skin to a temperature nearly equal to that of the skin. If this warm layer is retained close to the body by clothing, we remain warm. If this layer is drawn away by a brisk wind, we feel cold (wind chill factor), and the body tries harder to renew the warm layer. This wind chill factor increases enormously as the temperature falls and the wind increases. For example, at 0°, with air movement at just 5 mph, the equivalent temperature is -5°, but with a 20 mph wind, the temperature is close to -40° F. If the clothing is wet as well, the heat loss can be as much as 100 times as great as with dry clothing in calm air.

### 4) EVAPORATION

Definition: The change of a liquid to a gas. This requires energy (usually in the form of heat)

Example: You get cold if you go swimming on a hot windy day

The evaporation of sweat from the skin and the evaporation of water from lungs accounts for a large amount of body heat loss. There is little we can do to prevent this loss except reduce as much perspiration as possible by regulating clothing layers and wearing a face mask (this reduces evaporation through the lungs).

### 5) RESPIRATION

Definition: The inhalation and exhalation of air

Inhaling cool air and exhaling warm air accounts for a significant amount of heat loss. This increases rapidly during heavy exertion at low temperatures. We can help prevent or conserve this type of heat loss by wearing something over our face.