ROYAL CANADIAN ARMY CADETS

GREEN STAR

INSTRUCTIONAL GUIDE

SECTION 12

EO C121.03 – SELECT COLD WEATHER CLOTHING

Total Time: 30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-701/PG-001, *Green Star Qualification Standard and Plan*, Chapter 4. Specific uses for said resources are identified throughout the instructional guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson to introduce the cadets to the selection of cold weather clothing.

INTRODUCTION

REVIEW

The pertinent review of EO M121.01 (Section 1) for this lesson will include:

QUESTIONS

Q1. What are the three layers that make up the layering system?

Q2. What is a good material to use for base layer clothing?

ANTICIPATED ANSWERS

A1. Base layer, insulating layer, outer layer.

A2. Polypropylene.

OBJECTIVES

By the end of this lesson, the cadet shall be expected to know how to select clothing for cold weather.

IMPORTANCE

Cadets need to know how to select the best types of clothing that will enable them to enjoy winter conditions and prevent cold weather injuries.

Teaching Point 1 **Explain the principles of clothing design.**

Time: 10 min Method: Interactive Lecture

PRINCIPLES OF CLOTHING DESIGN

The human body must always maintain a temperature of 37°C. Clothing acts as an insulator, preventing body heat from escaping to the outside air.

Cold weather clothing must provide insulation and, at the same time, ventilation to prevent overheating and allow sweat to evaporate. The two primary considerations when dressing for the cold are; insulation and layer method.

- **Insulation.** Insulation is provided by any material that restricts the transfer of heat. Dry air is both light and an excellent insulator. Materials that hold quantities of motionless, or dead air are the best insulators. These include natural materials such as wool and fur and synthetic materials such as the popular polar fleece.
- **Layer Method.** The principles of the layer method of insulating the body for a cold climate include:
    - The next to skin layer should be of a suitable material to wick perspiration away from the skin and allow it to evaporate.
    - Several layers of medium weight clothing will keep a person warmer than one heavy garment, even if it is as thick as the combined layers. Layers trap dead air, therefore resisting the passage of heat out of the body.
    - Inner garments should be more porous, therefore having more air pockets, while the outer layers are more wind and water resistant. The outer garments prevent the outside cold air from displacing your trapped, body-warmed, still air.
    - Layering allows you to adjust the amount of clothing being worn for a wide range of temperatures and activities by merely adding or removing a layer of clothing at a time. You have the ability to help control the balance of body heat.
    - The outer layer must allow moisture from perspiration to escape while retaining warmth. In a dry cold this material does not need to be water resistant but must be wind resistant.
    - When properly dressed you should feel cool, but not cold.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. What are two examples of insulating materials?

Q2. Which is warmer, several medium weight layers, or one thick layer of clothing?

Q3. Outer layers should be resistant to what?

ANTICIPATED ANSWERS

A1. Wool and fur.

A2. Several medium layers of clothing.

A3. Wind and water.

Teaching Point 2 **Explain the principles related to the choice of footwear.**

Time: 5 min Method: Interactive Lecture

PRINCIPLES VALUABLE IN CHOICE AND USE OF FOOTWEAR

Feet are vulnerable to the cold because they get wet easily, both externally and from perspiration.

The following principles are valuable when choosing and wearing footwear:

- **Ensure Footwear is Loose and in Layers.** The layers are made up by the boot and the different combinations of socks and insoles.
- **Avoid Restriction of Circulation.** Two or more pairs of socks worn too tightly or tying the boot too tightly can restrict the circulation of warm blood from the body core and allow for freezing of the feet.
- **Change Socks and Insoles as Often as Possible.** Since footwear often gets wetter than other types of equipment, select footwear designed to help decrease this (e.g. with a rubber lower and material upper). Dry socks should always be carried, and socks should be changed as soon as possible when they become wet. If wearing heavy footwear equipped with removable insoles, such as mukluks, both socks and insoles should be changed.
- **Dry Footwear When Wet.** Footwear should be dried thoroughly at the first opportunity available to you.
- **Ensure Footgear and Feet are Kept Clean.** Footgear should be kept clean of mud and dirt, and feet should be cleaned frequently. Feet should always be exercised and massaged when changing socks.
- **Ensure All Footwear Fits Properly to Avoid Chafing and Blisters.** Ski and snowshoe bindings must be adjusted carefully. Improperly adjusted bindings may chafe the feet or cause excess wear and tear to the boot.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. What are considered to be layers in footwear?

Q2. How often should you change socks?

Q3. What happens when two pairs of socks are worn too tightly?

ANTICIPATED ANSWERS

A1. Boots, socks and insoles.

A2. As often as possible, and as soon as they become wet.

A3. They can restrict circulation and cause feet to freeze.

Teaching Point 3 **Explain the principles for keeping warm in the cold.**

Time: 5 min Method: Interactive Lecture

PRINCIPLES FOR KEEPING WARM IN THE COLD

Principles for keeping warm in the cold can be remembered using the acronym COLD:

C – Clean Clothing. Important for both sanitation and comfort. Dirt and grease will fill air pockets in clothes and allow the heat to escape your body more easily, leaving you feeling cold sooner.

O – Overheating must be avoided. Overheating causes perspiration, which causes clothing to become damp. Dampness fills the air pockets in the clothing with heat-conducting moisture, permitting the body heat to escape. Overheating can be prevented by ventilation or removing layers.

L – Loose and in **Layers.** Clothes and footwear that are too tight restrict the blood circulation, increasing the danger of frostbite. Clothes should not be too loose either, as this allows trapped air to move, causing heat loss. Layering allows you to take clothing off before you overheat and add clothing as you cool.

D – Keep clothes **Dry.** Moisture will soak into your clothes from both inside and outside. Frost or snow that collects on your clothes will melt, making your clothes wet.

To stay warm, remember the catch word "**COLD**".

CONFIRMATION OF TEACHING POINT 3

QUESTIONS

Q1. What does the acronym COLD stand for?

Q2. Why should your clothes be clean?

Q3. Why should clothes be in layers?

ANTICIPATED ANSWERS

A1. Clean clothes, avoid overheating, loose layers, and dry clothes.

A2. Clothes should be clean so dirt and grease do not fill the air pockets, allowing air to flow around the body.

A3. When clothes are worn in layers, they can be added and removed depending on how warm you are.

Teaching Point 4 **Discuss maintaining body heat.**

Time: 5 min Method: Interactive Lecture

MAINTAINING BODY TEMPERATURE

As said previously in this lesson, the body has to maintain a certain body temperature. The body does this in two ways: heat gain and heat loss.

Heat Gain. The body increases heat production in two ways:

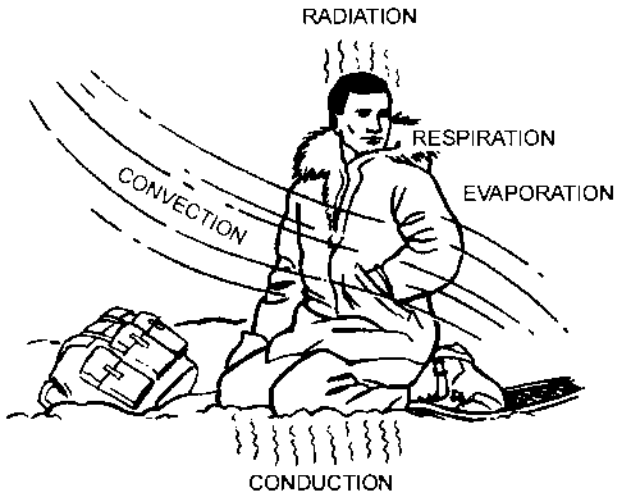
- **Muscular.** Heat is generated within the body by muscles performing physical work. When cool, the body will resort to shivering, which consists of uncontrolled, irregular, and uncoordinated contractions of voluntary muscles. Unlike animals, humans do not have any special features of the body that allow them to gain heat in cold weather. We do have brains though, and through physical activity, special clothing, shelter and an ability to build a fire, people can help maintain normal body temperature in a cold weather climate.
- **Metabolic.** Heat production to tissues may be increased by metabolic chemical reactions taking place, mostly in the liver, but is not significant enough to warm the entire body. The human body is like a car, and food is your fuel. Some foods are better for you than others. Carbohydrates give great boosts of energy to do more physical activity. It is important to eat three meals a day and snacks in between meals

as well as when you feel hungry. Eating nutritious food and lots of water, allows the body to work to its maximum potential.

Heat Loss. The body naturally cools itself down by sweating. Approximately 90 to 95 percent of heat is expelled through the skin, and the remainder is expelled through the lungs during respiration.

Body heat is lost from the skin in four ways (see Figure 1):

- **Convection.** Occurs when air, or water that has a temperature below that of the body, comes into contact with the skin and subsequently moves away. While in contact with the body, the air is warmed. Cool air that replaces it must also be warmed. The heat that warms the air is lost whenever the air moves away. The greater the difference in temperature between the body surface and the speed with which the air is moving, the greater the heat loss.
- **Conduction.** Is the transfer of heat energy away from the body by substances with which it is in direct contact. Air conducts heat poorly and still air, which does not cause convective heat loss, is an excellent insulator.
- **Evaporation.** With heavy sweating, also comes insensible sweating. Insensible sweating can happen in cold weather as well as warm weather. Cold air is dry and has to be moistened by the body to avoid injuring the lungs.
- **Radiation.** Largest source of heat loss, it consists of the direct emission or absorption of heat energy. The human body continuously radiates heat to nearby solid objects that have a cooler temperature. In a cold environment, nearby solid objects are colder and radiant heat loss is greater.



http://brooksidepress.org/Products/Operationalmedicine/DATA/operationalmed/Manuals/cold/TC213Chapter6HygieneandFirstAid.htm

Figure 1 Mechanisms of Heat Loss From the Body

CONFIRMATION OF TEACHING POINT 4

QUESTIONS

Q1. What are the two ways the body maintains normal temperature?

Q2. What is an involuntary movement the body does to gain heat when it is losing it?

Q3. What are the four ways in which the body loses heat from the skin?

ANTICIPATED ANSWERS

A1. Heat loss and heat gain.

A2. The body involuntarily shivers.

A3. The body loses heat through convection, conduction, evaporation, and radiation.

END OF LESSON CONFIRMATION

QUESTIONS

Q1. Which is warmer, several medium weight layers or one thick layer of clothing?

Q2. How often should you change your socks?

Q3. What does the acronym COLD stand for?

ANTICIPATED ANSWERS

A1. Several medium layers of clothing.

A2. As often as possible, and as soon and they become wet.

A3. Clean Clothes, avoid Overheating, Loose Layers, and Dry clothes.

CONCLUSION

HOMEWORK/READING/PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

You can enjoy winter activities and training if you know how to select the proper clothing and take care of yourself by being prepared for the elements.

INSTRUCTOR NOTES/REMARKS

This period may be conducted as a stand alone lesson or as pre-training to EO C121.05 (Participate in Cold Weather Training).

This lesson is best delivered under the supervision of a cold weather instructor.

REFERENCES

A2-009 A-CR-CCP-107/PT 002 DCdts. (1978). *Royal Canadian Army Cadets Course Training Plan Corps Training Program Winter Adventure Training Manual.* Ottawa, ON: National Defence.

C2-031 (ISBN 0-89886-024-5) Wilkerson, J., Bangs, C., and Hayward, J. (1986). *Hypothermia, Frostbite and Other Cold Injuries. Prevention, Recognition and Prehospital Treatment.* Seattle WA: The Mountaineers.

C2-037 Brookside Press. (2005). *Hygiene in the Field.* Retrieved 25 May 2006, from http://brooksidepress.org/Products/Operationalmedicine/DATA/operationalmed/Manuals/cold/TC213Chapter6HygieneandFirstAid.htm.