ROYAL CANADIAN ARMY CADETS

GREEN STAR

INSTRUCTIONAL GUIDE

SECTION 1

EO M121.01 – SELECT PERSONAL EQUIPMENT

Total Time: 60 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

The group discussion was chosen for TP 1 as it allows the cadets to interact with their peers and share their knowledge, experiences, opinions and feelings on what needs to be considered when selecting clothing for an outdoor activity. Sharing in the group discussion encourages the cadets to examine their own thoughts and may prompt them to re-think their previously held ideas. Participating in a group discussion improves the cadets' listening skills and team development.

An interactive lecture was chosen for TPs 2 – 4 to introduce the cadets to the types of sleeping bags and additional items required for an outdoor activity.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadets shall be expected to select appropriate personal equipment for participation in a field training exercise (FTX). Cadets shall be able to identify the layering system, choose suitable clothing for the weather conditions, select sleeping equipment, and identify additional items that may be required for a FTX.

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IMPORTANCE

Understanding the basic requirements of personal equipment for a FTX will allow the cadets to be prepared for the weather conditions, to be comfortable in their environment, and to prepare themselves for participation in upcoming exercises.

Teaching point 1 **Explain considerations when selecting clothing for an outdoor activity.**

Time: 20 min Method: Interactive Lecture

LAYERING SYSTEM

The most effective way to maintain warmth and comfort in varying cold conditions is by using multiple clothing layers, rather than just one garment. Layers allow you to build a tiny microclimate that surrounds your body which can be adapted to moisture, wind, temperature and exertion levels.

Principles of Layering

Temperature control

- The temperature of air around the body will heat and cool according to the:
  - amount of activity being conducted,
  - ambient temperature,
  - weather changes and time of day (i.e., wind, rain, snow), and
  - altitude.
- The simplest way to control such temperature changes of the body is through effective layering.

Insulation

- Insulation slows the rate of heat transfer. The warmth of a garment may be considered as its ability to hold heat. The more heat it can hold over time, the more slowly it transfers heat away from the body, and the warmer the garment is.
- The ideal insulation would weigh next to nothing, be as thin as a tissue, and be compressible down to a tiny volume.

Materials

Synthetic Materials	
Polypropylene	• Man made fabric with many properties of wool • Relatively inexpensive • Same material as milk bottles • Base layer
Polyester	• High resilience and loft • Light weight • Clean, odourless and non-allergenic • Will not develop mildew

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Acrylic	• Not often used • Good insulating properties • Inexpensive • Wears well
Tyvek	• Not very durable • Doesn’t breath
Coolmax	• A patented polyester fabric • Great wicking properties • Base layer
Gore-tex	• Wind and water resistant • Limited breathability • Outer layer
Thermax	• Fine weave polyester • Dries quickly • Base layer

Natural Fabrics

Cotton	• Absorbs and holds moisture • Poor material for base layer • Can lead to hypothermia (cotton stores moisture, when cooled the body cools). • May be worn as an insulating layer a sweater
Wool	• Doesn’t absorb moisture • Retains insulation properties when wet • Best used as insulation
Silk	• Great insulating characteristics in very thin fabrics • Very comfortable next to skin • Somewhat fragile (must be laundered and dried carefully)

Types of Layers

Layering allows a person to micro adjust the immediate climate next to the body. This layering structure can be broken into three groups.

Base Layer. This layer actually touches the skin. During hiking, paddling or climbing, the body sweats to cool itself. As the base layer comes in direct contact with your skin, it must be a material that keeps the body warm even when wet. This layer should transport moisture away from the skin and disperse it to the air or outer layers where it can evaporate. This is known as wicking (i.e. wicking layer). The best base layer materials are synthetics, **polypropylene** and **polyester**. These materials are available in three different weights, all containing the same characteristics as listed below.

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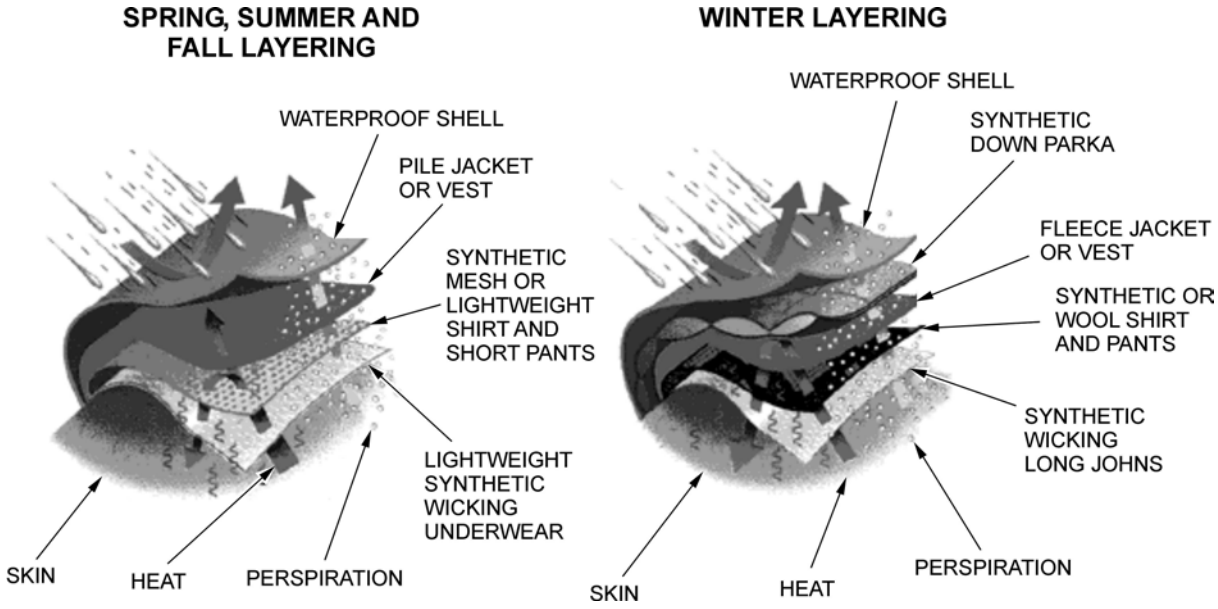
- Types
  - Light weight – suits high aerobic activity where sweat distribution is greatest.
  - Medium weight – provides moisture control and insulation for stop-and-go activities.
  - Heavy weight – best in cold conditions, or when relatively inactive.
- Characteristics
  - Light and strong
  - Absorbs very little water
  - Quick to dry



Remember water (sweat) is a good heat conductor. Damp clothes draw heat from the body, even in conditions above freezing. This rapid heat loss can cause a dangerous drop in the body's temperature.

Insulating layer. This is the mid-layer that provides insulation and continues the transportation of moisture from the inner layer. To slow heat loss, this layer must be capable of retaining the warmth generated by the body. This is accomplished by the structure of the fibres creating small air spaces that trap molecules of warm air. Additional features, such as pit zippers and full-length front zippers, allow venting. As with the inner layer, this layer should be snug but not constricting.

Outer Layer. The wind breaking and / or waterproof shell is the outer layer that protects a person from the elements and should allow air to circulate and excess moisture to escape. For dry conditions, a breathable (uncoated) wind shell or a smooth-surfaced soft shell may be all that is needed. If expected conditions are more severe, a waterproof (coated) rain jacket maybe more effective. A shell made of a breathable and waterproof fabric protects from wind and rain, and allows water vapour to escape.



Hiking and Backpacking, A Complete Guide, by Karen Berger, 1995

Figure 1 Layering

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DRESSING THE BODY

There are many ways to dress for most activities. Being warm and dry allows you to concentrate on, and enjoy, the activities being conducted. Insulating thickness is a determined variable based on the activities being conducted and then adjusted to fit the particular circumstance. Employing the layering method is the best way of controlling body temperature.



Remember:

- It is much easier to stay warm than to try to warm up after getting cold.
- It takes much more insulation to stay warm when sitting still than when moving.
- Heat is lost faster to a cold solid object through conduction than to cold air through convection.

A choice must be made as to what clothing will best suit the environmental conditions for a particular body part. There are many parts to consider and many types of clothing to take into account. The following is a list of clothing items for the various parts of the body:

Head and face

- Toque / cap
- Balaclava
- Tilley cap
- Parka hood
- Face mask
- Scarves

Trunk

- Undershirt
- Shirt
- Sweater
- Vest
- Jacket
- Parka

Neck

- Turtleneck
- Neck Gaiter
- Scarves
- High Collar
- Parka Hood

Legs

- Pants
- Insulted pants
- Windbreaker

Hands

- Gloves
- Mittens

ACTIVITY

Time: 15 min

OBJECTIVE

The objective of this activity is for the cadets to gain an understanding of the garments required for a day hike or FTX, taking into consideration the weather conditions expected.

RESOURCES

- Scenarios: Cold weather, wet weather, and hot weather.
- Flip chart paper, and
- Markers

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ACTIVITY LAYOUT

Arrange the room for cadets to work in small groups.

The following instructions are suggested:

- Split the cadets into groups of four to six cadets.
- Provide a form of recording material (flip chart and markers)
- Give each group one of the following topics 1) Cold Weather Wear, 2) Wet Weather Wear, 3) Warm Weather Wear.
- Provide the cadets with the details of an upcoming unit exercise.
- Have cadets produce a list of required clothing to suit the environmental condition they were assigned.

ACTIVITY INSTRUCTIONS

- Divide the cadets into at least three groups.
- Provide each group with a different scenario. If there are more than three groups, two groups or more may work on a similar scenario.
- Have the cadets develop a list of clothing articles that will be required for the presented scenario.
- Have the cadets present their list to the rest of the class.
- Allow cadets from other groups to discuss the lists that were developed.

SAFETY

Nil.

CONFIRMATION OF TEACHING POINT 1

QUESTION:

Q1. What layers make up the layering system?

Q2. What is the best base layer material?

Q3. Give an example of a natural fibre.

ANTICIPATED ANSWERS:

A1. Base layer, insulating layer, outer layer.

A2. Polypropylene.

A3. Silk, wool, cotton.

Teaching point 2 **Discuss the considerations for selecting a sleeping bag for an outdoor activity.**

Time: 10 min Method: Interactive Lecture

INSULATING MATERIAL

Sleeping bag insulation is divided into two categories, natural and synthetic.

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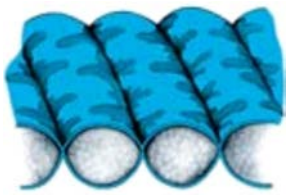
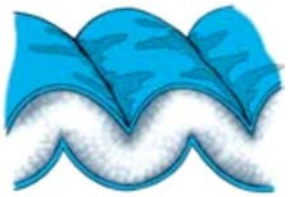
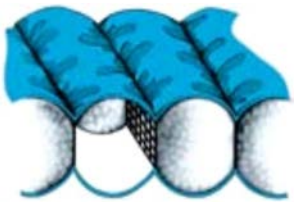
Natural insulation is usually waterfowl down – the short feathers closest to a duck's, or goose's, body that insulate the animal when in cold water. There is a variance in quality of down and the methods used to secure it in place inside the bag's inner and outer shell. Down sleeping bags are measured according to their fill-power (FP) cubic inches per ounce of down. A good quality down-blend is around 550 FP. Look for a bag with good quality down with the insulation held in place by "baffles" – dividers sewn between the two shells that keep the down in place. Down is the warmest and lightest insulation that can be found in a sleeping bag; however, it loses almost all of its heat retaining ability when it gets wet and it is very difficult to dry in the field.

Synthetic insulation is comprised of plastic threads that are either continuous long filaments or short staples (pieces about five centimetres long) and may be hollow. Short staples may be a mixture of thin and thick pieces. Thinner, lighter threads fill voids and trap warm air effectively while providing loft and durability.

Some bags offer more insulation on the top than on the bottom. Avoid bags where the insulation is secured by sewing the two shells together creating seams where there is no insulation. Most synthetic insulation retains its insulative value when wet. Some synthetics are very light and warm – they make a better all-round choice than down for a general purpose sleeping bag. In sleeping bags, cost often is a good indicator of the quality of the bag.

SLEEPING BAG CONSTRUCTION

Methods

 *www.mec.ca/main/content*	 *www.mec.ca/main/content*	 *www.mec.ca/main/content*	 *www.mec.ca/main/content*
Sewn-through is used in lightweight or warm-weather synthetic or down bags, but can have cold spots at quilt lines.	**Offset Quilt** is used for synthetic bags only. It has no cold spots at quilt lines and is less expensive than shingled construction.	**Shingles** are used for synthetic bags only. It is the most warmth-to-weight efficient construction, but is more expensive than offset quilt.	**Baffles** are used in down bags only. They feature mesh partitions at quilt lines to prevent cold spots and keep down from migrating through the bag. Expensive, but very warm.

Sleeping bag parts

Outer shell – constructed from a lightweight fabric, often nylon or polyester. It should be of sufficient weight and quality to protect the insulation layer.

Inner shell – constructed from a lightweight fabric. Look for an inner shell that does not retain moisture. Many inexpensive bags use cotton / flannel inner shells, which are comfortable, but not ideal for a hiking or expedition bag, as cotton takes too long to dry.

Hood – a part of the main bag that can be pulled around your head in cold weather. This keeps your head warm without a build up of moisture from your breath in the bag.

Liner – a thin bag you place inside your main bag to help keep the main bag clean and to offer a little more insulation.

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Over bag – a durable bag placed over your main bag to protect the outer shell, and to offer more insulation. Over bags made from waterproof and waterproof-breathable material can be used as mini-shelters. There are several good designs of these “bivi-bags” that have screened openings to protect your face from bugs and to allow some ventilation in warm weather.

TYPES OF SLEEPING BAGS

The choice of a sleeping bag has a lot in common with the personal choice of outdoor clothing. It must be the right size (length and width), have the appropriate amount of insulation for the coldest expected temperature, be made of a material that breathes and doesn’t retain moisture, and have a good quality fastener (zipper).

When choosing a sleeping bag, check the bag size by getting in and moving around. There should be some space for a liner and extra clothes in cold weather. Ensure to have enough room to move arms around, the ability to zip up from the inside, and enough room around the feet so that they can rest in a comfortable position. Bags come in three basic styles, each one offering its own advantages.

Mummy Bag. Acquired its name by the occupant resembling an ancient Egyptian mummy when in it! The bag tapers from the opening following the contours of the body closely. There is very little extra air space once in the bag. The zipper may only reach halfway down the side of the bag and is protected by an insulated flap (called a “draft tube”). The opening of the bag will have an insulated hood with a draw cord to pull the hood snug around the face to keep warm air in. Mummy bags are designed to save weight and maximize heat retention, are best suited for extreme cold, and will come with two separate bags, an inner and outer, which are used together. The mummy bag is certainly the warmest of the bag styles.



www.mec.ca

Figure 2 Mummy Bag

Barrel Bag. This is a compromise between the efficiency of the mummy design and the economy of the rectangular bags. The shape tapers from the opening towards the foot, but is still considerably roomier than a mummy. Quite often there will be a hood with a draw cord, or at least an extension of one side of the opening that offers some head insulation. Depending on the insulation, this design is a good choice for spring, summer and fall camping.



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Figure 3 Barrel Bag

Rectangular Bag – the most common economical bag. The zipper often opens fully to create a double sized blanket. This style is roomy and can be useful for warm weather camping or indoor accommodation. The disadvantages as a bag for hiking or expeditions are numerous. The extra air space around the torso, legs and feet means that it takes more heat energy to heat up and keep the space warm. The extra material means the bag is bigger and heavier. There is no protection for the head in cold weather. The liner materials used tend to retain moisture and odours.

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Figure 4 Rectangular Bag

Military Bag. Based on the 1951 pattern, this sleeping bag consists of five main parts:

1. **The cover** of the sleeping bag is made of a moisture proof nylon. The cover's main purpose is to keep the bag clean and protect it from moisture.
2. **The outer bag** is down filled with a composition of 40% down and 60% feathers.
3. **The inner bag** is made in the same way as the outer. The inner bag is secured to the outer bag and liner using a series of ties.
4. **The liner** is flannelette and attaches to the inner bag.
5. **The Hood** (not shown) is pulled over the head and secured by straps pulled underneath the armpits.



Figure 5 The Outer Bag



Figure 6 The Inner Bag



Figure 7 The Liner

CONFIRMATION OF TEACHING POINT 2

QUESTIONS:

Q1. What are the two types of insulation used in sleeping bags?

Q2. If you were planning to go on an over night winter FTX and the projected weather was expected to be extremely cold, what would be the best style of sleeping bag to take for the cold temperatures?

Q3. With the approach of the new cadet year you expect to do a fair amount of sleeping in the field. You decide to look for a naturally insulated sleeping bag to purchase. What fill power would you look for in a naturally insulated sleeping bag?

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ANTICIPATED ANSWERS:

A1. Natural and synthetic.

A2. Mummy style.

A3. 550 FP.

Teaching point 3 **Describe sleeping pads.**

Time: 10 min Method: Interactive Lecture

SLEEPING PADS

A sleeping pad is the foundation of a sleeping system. The pad cushions against the hard ground, and keeps a warm thermal barrier between the ground and the sleeping bag. Choose a pad that is appropriate for the activity being participated in and the weather expected. The colder the ground temperature, the more insulation needed. Pads come in several lengths and designs.

Closed cell foam pad – the foam is lightweight and doesn't absorb water. Foam pads come in a variety of individual thicknesses, depending on desired amount of insulation and comfort. Most foam pads are low priced and durable.



Figure 8 Closed Cell Foam Pad

Air mattress– rubber, vinyl or a combination of materials in a variety of thicknesses. Usually they are heavier than a foam pad, but offer good insulation when fully inflated. Disadvantages include being easily damaged and taking a long time to inflate for use and deflate to pack. In cold weather, if the air mattress is inflated by mouth, ice crystals will form inside from the moisture in your breath and will provide less insulation from the ground than dry air (later, in the warmth, the moisture will cause your mattress to rot).



Figure 9 Air Mattress

Self-inflating foam-air combination pads– these pads use foam as well as an adjustable valve to create a quick-to-inflate pad that offers better thermal insulation, is much more comfortable and warm and that it is light-weight like a foam pad.

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Figure 10 Self-Inflating Air Combo Pad

CONFIRMATION OF TEACHING POINT 3

QUESTIONS:

Q1. What type of sleeping pad does not require inflation?

Q2. Name a disadvantage of the air mattress.

Q3. Name an advantage of the self-inflating pad.

ANTICIPATED ANSWERS:

A1. The closed cell foam pad does not require inflation.

A2. Punctures easily, considerable time to inflate / deflate, ice crystals may form inside the mattress.

A3. Very comfortable, warmer, lightweight and better thermal insulation.

Teaching point 4 **Select additional personal equipment.**

Time: 10 min Method: Interactive Lecture

ACCESSORIES

During any hike or weekend exercise there is always a need to carry additional items that may not be necessarily required for the exercise itself. Some small pieces you should always carry in your pack when preparing for a hike are:

- **Bug repellent.** The active ingredient in bug repellent is DEET. Many brands are available; however, the greater the concentration the more effective it is.



***Caution*:** DEET in high concentrations may cause health problems. Health Canada has banned any products with DEET concentrations over 30%.

As stated from the Public Health Agency of Canada:

- Children from birth to 2 years are not to use insect repellents containing DEET.
- Children between 2-12 years are to apply no more than three time a day, using the lowest concentration of DEET (10% or less).
- Individuals 12 years or older are to apply insect repellents containing no more than 30% DEET.

- **Flashlight.** To provide light in the dark, a flashlight should always be carried, the smaller the better for weight reasons (be sure to have a spare set of batteries and bulb before each trip).
- **Lip Balm.** Lips burn easily at any elevation and in cold the dry winds can make lips crack and bleed.

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- **Map and compass.** Any time when going into the field a map and compass should be taken. Becoming turned around and lost could happen to anyone.
- **Matches.** At least 20, the kind that will strike anywhere and are waterproof. Store matches in a separate container inside your kit with a striker (35 mm film cases would suffice).
- **Notepad and pencil.** Allows for note taking and / or leaving a message.
- **Pocketknife or multi-tool.** Useful tool for many applications in the field. Hunting type knives with long fixed blades are not appropriate for most cadet activities.
- **Sunscreen.** A Sun Protection Factor (SPF) of 15 means that a person can remain in the sun without burning their exposed skin for 15 times longer with the protection than they could without it. Most sunburns can be prevented with a SPF of 15, however a SPF of 29 or higher is recommended.
- **Survival kit.** Reflects the needs of the user. Fill with items that you can use and that reflect the environment you will be travelling in.
- **Whistle.** Signalling device.



Testimonials detailing how lack of preparation led to discomfort in the outdoors will serve to reinforce the teaching points.

CONFIRMATION OF TEACHING POINT 4

QUESTIONS:

Q1. What are five accessories that should be brought on a hike or FTX?

Q2. What is the minimum number of matches that should be taken on an overnight exercise?

Q3. What is the active ingredient in bug spray?

ANTICIPATED ANSWERS:

A1. Answers may vary. Answers not listed above may be valid.

A2. The minimum number of matches that should be taken on an overnight exercise is 20.

A3. DEET is the active ingredient in bug spray.

END OF LESSON CONFIRMATION

Cadets will be expected to select their own equipment when packing for a FTX. The instructor will assess this selection informally when the cadet arrives for the FTX.

CONCLUSION

HOMEWORK/READING/PRACTICE

Cadets will be expected to select their own equipment and pack it for all FTXs.

METHOD OF EVALUATION

Nil.

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CLOSING STATEMENT

Understanding what personal equipment is required for an outdoor activity allows to be prepared for conditions and to be comfortable in the environment. This is particularly important as outdoor activities represent a big part of the Army Cadet Program.

INSTRUCTOR NOTES/REMARKS

This lesson should be delivered prior to the bivouac FTX.

Cadets' backpacks should be verified for proper equipment prior to the FTX.

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